

Using Digital Images in Teaching and Learning

Perspectives from Liberal Arts Institutions

by David Green

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Thanks go to the 404 faculty members who completed the online survey and to the more than 300 faculty and staff who participated in individual and group interviews; without them this study would not exist. The institutional contacts at each of the 33 participating institutions (listed in Appendix One) worked tirelessly to elicit support from their faculty and to ensure that survey participation and the interview schedule proceeded without a hitch. Thanks to them all for their dedication and perspicacity.

Finally, this report would not have achieved its final seamlessness were it not for the flair and persistence of its editor, Jennifer Curran, managing editor of Academic Commons.

“[Using digital images] has revolutionized every aspect of my teaching.”

David Domozych, Professor of Biology, Skidmore College

1. Introduction

Digital images have become a major element in the rapidly-evolving educational digital landscape. How is the use of these new digital formats contributing to changing practices in teaching and learning in higher education? This is one of many questions explored by Academic Commons, an online space created in 2005 to examine the relationships between new technologies and liberal education.¹

Interested in using Academic Commons to build both a knowledge base of such practices and an active online community of faculty using digital images, Wesleyan University’s Michael Roy, Director of Academic Computing Services (and one of the co-founders of Academic Commons) approached the National Institute for Technology and Liberal Education (NITLE) in the summer of 2005 with the outline of a project to do both.

NITLE’s Center for Educational Technology (CET), based at Middlebury College and serving liberal arts colleges in the northeast and mid-Atlantic states, invited its member institutions to join the project and to help faculty share their experiences in using digital images. Thirty-one colleges agreed to participate and were joined by Yale and Harvard Universities.

The two principal investigative instruments were an online survey and a set of follow-up face-to-face interviews. The project sought both to build a knowledge base on the key issues, opportunities and challenges for faculty as they began to use digital images; and to create an active online forum for participants to further share their practices, recommendations and needs.

¹ <http://www.academiccommons.org>

2. Method

There are four components to the project:

1. Literature review
2. Online survey of faculty
3. On-site face-to-face interviews with faculty and staff
4. Report with discussion areas published on Academic Commons

2.1 Literature Review

First, we reviewed other relevant studies of faculty use of digital images. Three in particular stood out:

- Pennsylvania State University's "Visual Image User Study" (VIUS) examined the needs of digital image users across its campuses in order to design an effective image delivery system.
- The University of California at Berkeley's "Digital Resource Study" focused on how to produce better and more well-used digital resources.
- RLG's smaller study, "Out of the Database, Into the Classroom," reported on its efforts at improving the usability of its own Cultural Materials image database.²

Each of these studies was focused on increasing and/or improving the use of existing digital resources and planning for improved use of resources in the future. The Penn State study was instigated in response to a lower-than-expected use of available digital image banks on campus. Similarly, the University of California study attempted to understand use and users of digital resources in the humanities and social sciences in order to improve strategic planning in this area for future investment, to improve the return on previous investment and to improve the use and especially the integration of digital resources into the everyday curriculum. RLG aimed simply to understand user behavior in order to improve its own product.

Some key findings in these studies, borne out by our own work, include:

² The VIUS report was published September 2003 at <http://www.libraries.psu.edu/vius/>; the Berkeley study published its First Year Report in October 2004 and the full report, "Use and Users of Digital Resources: A Focus on Undergraduate Education in the Humanities and Social Sciences" in April 2006, at <http://cshe.berkeley.edu/research/digitalresourcestudy/report/> and the RLG study was published February 2005 at http://www.rlg.org/en/page.php?Page_ID=406.

1. **Personal Collections and their management:** many of the report writers were surprised by the extent and size of individual digital image collections and noted aggregate images from multiple sources—something that many systems prevent. Most faculty in these studies saved images on their computers, by file or in PowerPoint, and had no time (nor patience, nor expertise) for image organization. Almost all had no metadata for retrieval. And for many it was becoming a daunting problem. The U.C. Berkeley study noted the need for an effective tool that could create and manage personal digital libraries, aggregating and integrating heterogeneous resources for re-use. The authors were “struck by the fact that most faculty may be adrift until these technical promises can be fulfilled.”³
2. **Sources:** Google Images was a very popular tool for finding images. Its ease of use and ability to produce made up for the very variable, often poor, image quality and the paucity of metadata attending the images that were found. Meanwhile, most licensed resources went underused and largely unknown by faculty.
3. **Software:** PowerPoint was the fairly universal choice as a presentation tool, but most disliked it (it cannot zoom or easily project dual screens and was cited as preventing lively in-class interchange of views). In one study, only a few said they used Blackboard or WebCT, and most found them difficult to use.
4. **Comfort with technology:** There was a clear connection between inadequate technical support and underuse of digital resources by faculty and staff. Those with high technology comfort levels used more digital images more often.
5. **Copyright:** Copyright issues were problematic—for around half the faculty and a third of students in one study. Most wanted a system that could assure them of the copyright status of works and how they could re-use them.

A review of these studies was published on Academic Commons, July 19, 2005.⁴

³ http://cshe.berkeley.edu/research/digitalresourcestudy/report/digitalresourcestudy_final_report_text.pdf, page 8-3. See also Christine Borgman’s work on this phenomenon, for example, in her paper, “Personal Digital Libraries: Creating Individual Spaces For Innovation,” delivered as part of the NSF Post-Digital Libraries Futures Workshop, June 15-17, 2003, http://www.sis.pitt.edu/~dlwksshop/paper_borgman.html.

⁴ The review is currently available at http://wiki.academiccommons.org/wiki/Image_Project

2.2 Online Survey of Faculty

The project's executive staff assembled a team of primary contacts at each participating institution. Half the institutional contacts were instructional technologists (ten directors of instructional technology and six IT specialists or consultants). Others included six visual resource curators/librarians, six librarians, one archivist, one dean, one professor and two art center directors.⁵ The responsibilities of the institutional contacts included publicizing the project to faculty on campus, recruiting faculty to take the survey and to be available for an interview, and scheduling the site visit and faculty interviews.

The executive committee for the project worked with the consultant to create a seven-part online survey that considered both quantitative and qualitative responses to aspects of teaching with digital images. The survey took into consideration the surveys designed by cognate projects. The survey went through seven drafts, was edited and co-fashioned by institutional contacts using an Academic Commons discussion board, and underwent testing by willing volunteers. A live copy, available for use, was posted September 22, 2005. An archived copy of the survey is available at:

<http://www.academiccommons.org/group/image-project/survey-instrument>.

Privacy

Each participant was given three options with regard to the confidentiality of their responses:

1. Responses could be identified by name and shared with other project participants.
2. Responses could be identified by name, but shared only with the project's executive committee.
3. Responses could be completely anonymous.

Participants were informed that all responses might be quoted anonymously in subsequent reporting on the project, but that no personal or institutional names would be used without a respondent's express approval. About 40% elected for identification (158); 16% wanted only project staff to identify name with responses; and 44% (178) opted for anonymity.

⁵ See Appendix One, Executive Committee and Institutional Contacts.

Results from the survey were collected onto an Oracle database at Wesleyan University and then exported and collated on an Excel spreadsheet. After eliminating false, duplicate and incomplete results, we obtained 404 valid and complete responses from faculty at 33 schools. The number of responses from schools varied from 1 to 47 (with an average of 12).

2.3 On-site Interviews with Faculty and Staff

Campus contacts worked with the consultant to schedule a site visit to each campus for interviewing faculty. The interviews were mostly open-ended, one-on-one, and lasted 15 to 30 minutes. The interviews were designed to draw more detailed stories and examples from faculty about the experience of the transition to teaching with digital images. To help give institutional and technical context, interviews and group meetings were also held with campus staff, primarily from instructional technology, visual resources, libraries, museums, and/or information technology.

Of the 326 interviews, all but 39 were digitally recorded. There were 296 individuals interviewed (258 faculty, 13 instructional technologists, 12 visual resource curators, 9 librarians, 4 museum staff and 2 administrators).⁶ Thirty of the interviews were group meetings, where participants were not always individually identified. Half of these meetings had some mix of attendance by instructional technologists, faculty, librarians and administrative staff. Instructional technologists attended 17 of the 30 group meetings.

⁶ Two of the 258 faculty were also administrators, two were also librarians.

3. Survey Results

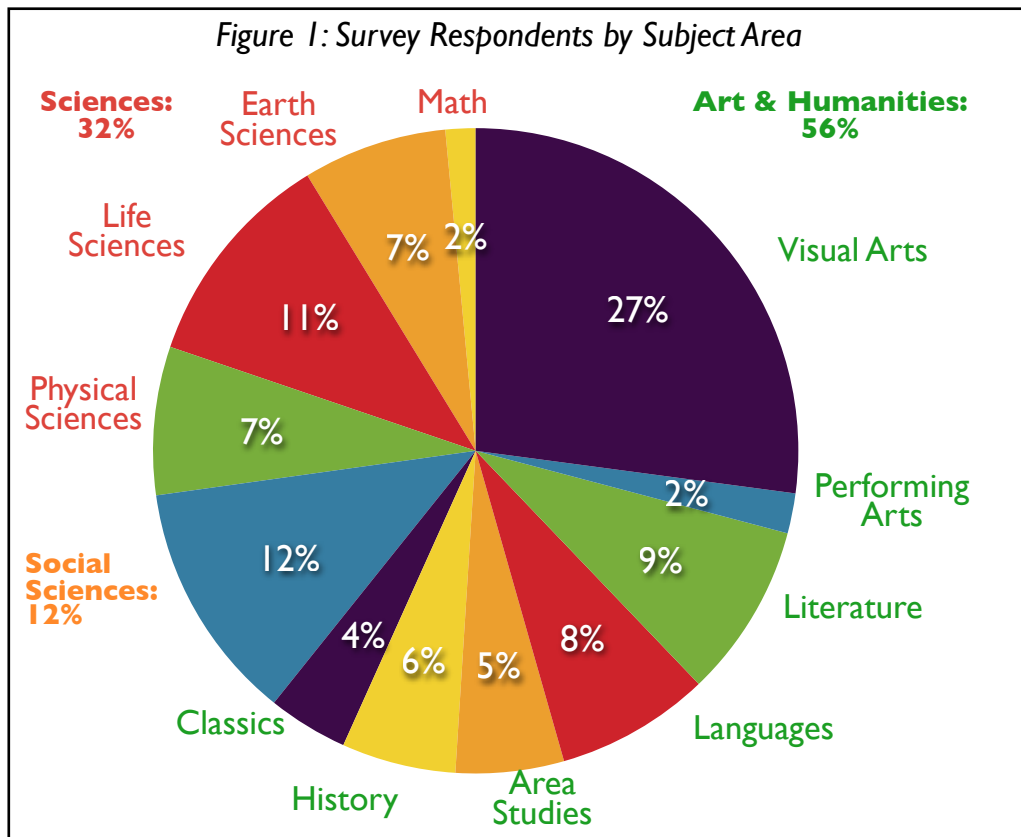
The survey asked participants questions in seven areas:

1. The digital elements of the courses they taught
2. Characteristics of the sources for the digital images they used
3. Details of how they used digital images—including comparisons to analog images and the perceived advantages of using each, both for faculty and students
4. The technology and tools faculty used and what other tools they needed
5. The technical support they received
6. The chief obstacles to their effective use of digital images
7. Any other comments they had about their use of images

3.1 Teaching Information

3.1.1 Subject Areas

Participation was encouraged from all disciplines: faculty were asked to select from twelve subject areas with an additional write-in area. Staff subsequently added two



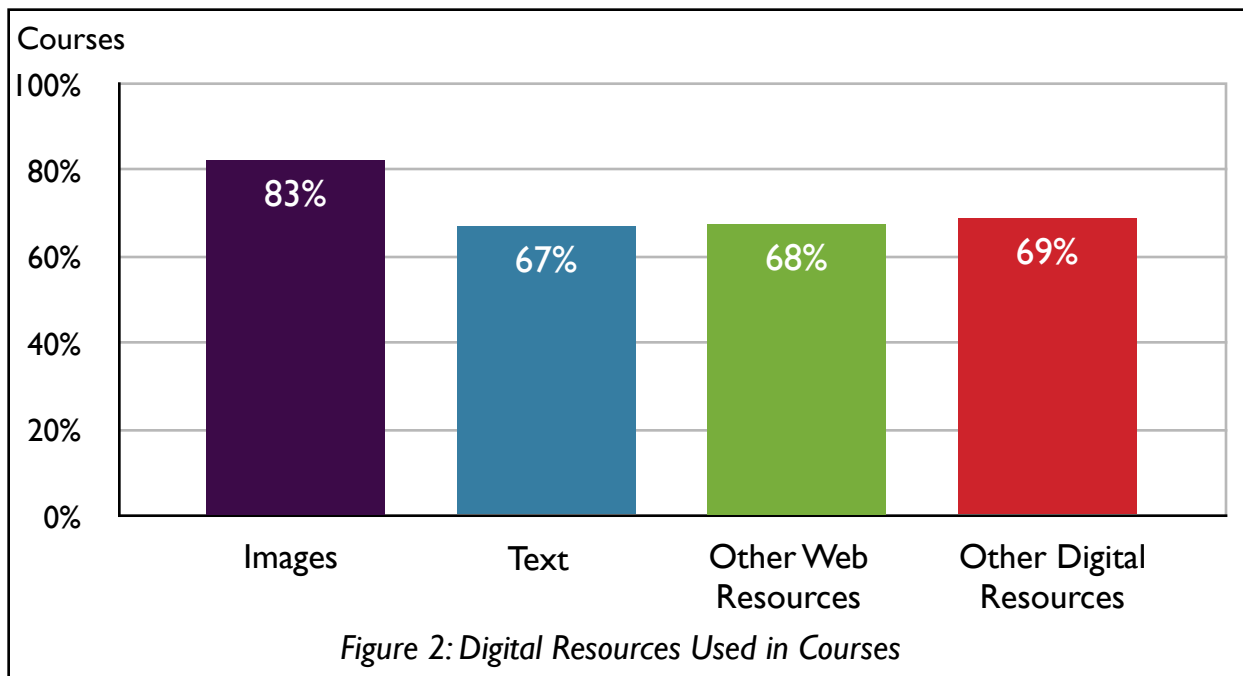
more subject areas, giving fourteen: Anthropology, Archaeology, Area Studies, Art/Art Practice/Art History/Architecture, Classics, Environmental/Earth Sciences/GIS, History, Languages, Life Sciences, Literature, Mathematics, Performing Arts, Physical Sciences, and Psychology/Sociology/Social Sciences. Anthropology and Archaeology were subsequently incorporated into the Social Sciences. Respondents working in the arts and humanities represented 61% of the entire sample; 27% represented the sciences and 12% the social sciences. See Figure 1 for details.

3.1.2 Years Teaching

Faculty had been teaching at their current institution for an average of 13 years: half for 10 years or fewer, a third for 5 years or fewer (121), and just 33 people for 1 year or less. Only 24 had been teaching at their institution for over 30 years.

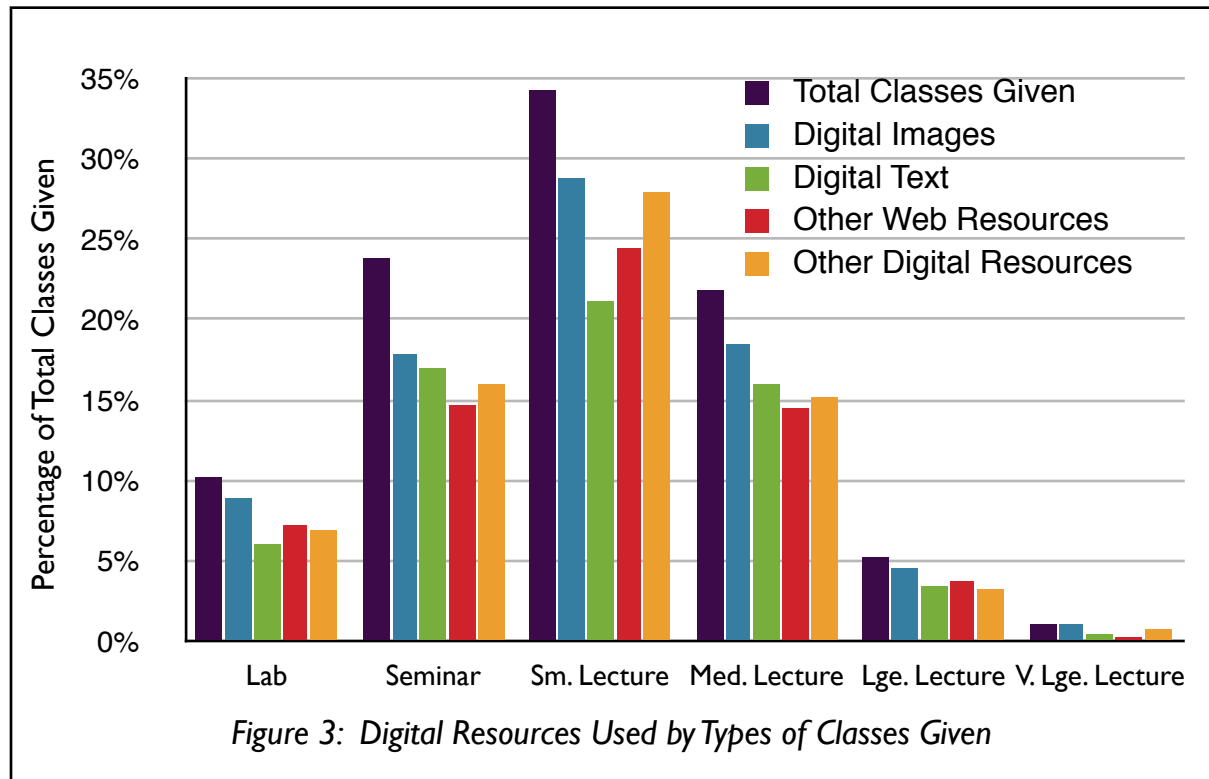
3.1.3 Courses Taught and Digital Materials Used

Faculty were then asked for the titles of classes they typically taught and the digital elements they most often used. Every one of the 404 respondents taught at least one course, 368 taught two, 308 taught three and 212 taught four courses. Digital image use was very high, with faculty overall using digital images in 83% of the courses they taught. These faculty used digital texts in 67% of courses, other Web resources in 68% and other digital resources in 69% of their courses (Figure 2). Interestingly, use of digital material fell for after-class online discussions (19%) and for assignments to be completed online (17%).



Class Types

Most teaching took place in small lectures (fewer than 25 students); fairly consistently, one-third of available classes were taught in this way across all courses, followed by seminars and medium lectures (25-50 students). Figure 3 shows the share of the total classes given by each class type, and within that the percentage of each class type in which digital resources are used. Within each class type the percentage in which digital images are used was between 84 and 87%, except for seminars, where the figure sank to 75%.



3.2 Image Sources and Searching

The second group of questions concerned the sources of the digital images used by faculty and the relative importance of certain aspects of images when searching for them.

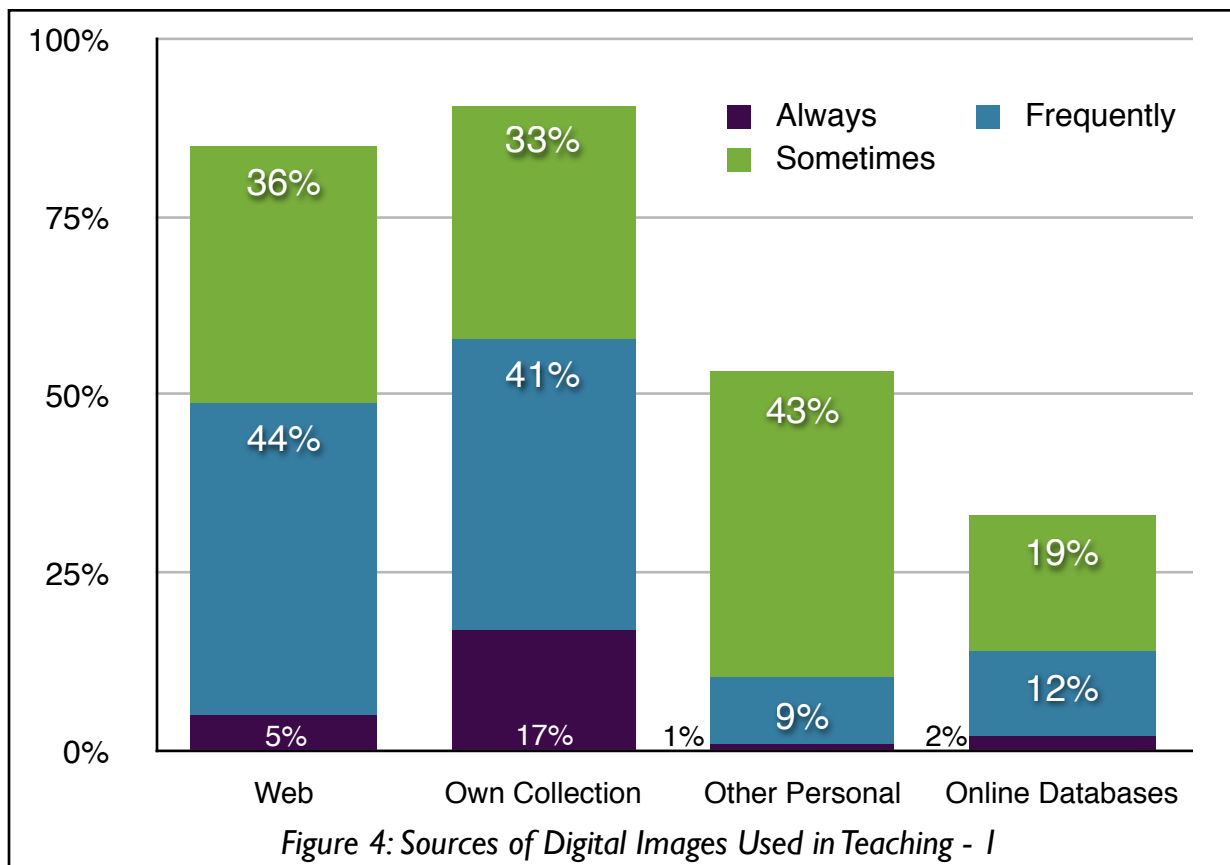
3.2.1 Sources of Digital Images Used

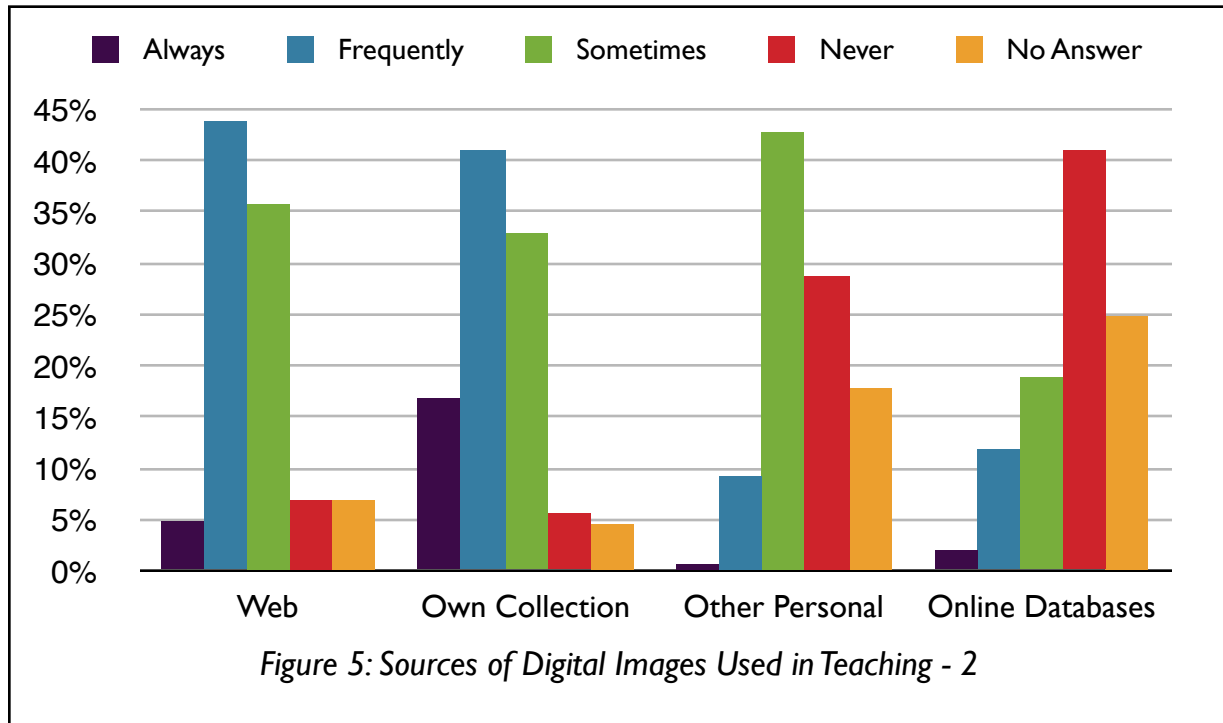
In results consistent with other research, faculty elected almost universally to use digital images from their own or others' personal collections or discovered on the Web, using Google Images or some similar search tool. Existing free databases of images

(something that faculty persistently called for in the interviews) were often not known about and were not well used. But these were still used more frequently than licensed resources or any departmental, library or other institutional resources the college might have invested in. This bears out the need for studies (like the VIUS and University of California studies mentioned earlier) with goals of improving the usability and increasing the use of organized digital resources provided at great cost but generally under-used.

Personal Collections and Web Search Engines

Personal collections (built, we have learned, from many sources, including the Web) were the most often cited as “always” used (17% said they always used their own personal collections, while 5% said they always used a Web search engine). Fifty-eight percent “always” or “frequently” used their own personal collections, while 49% “always” or “frequently” used the Web; and 91% always, frequently or sometimes used their own personal collections against 85% for the Web. Use of other personal collections was more muted: less than 1% “always” used a colleague’s collection, only 9% used them frequently, but 43% used them “sometimes” (Figures 4 and 5).



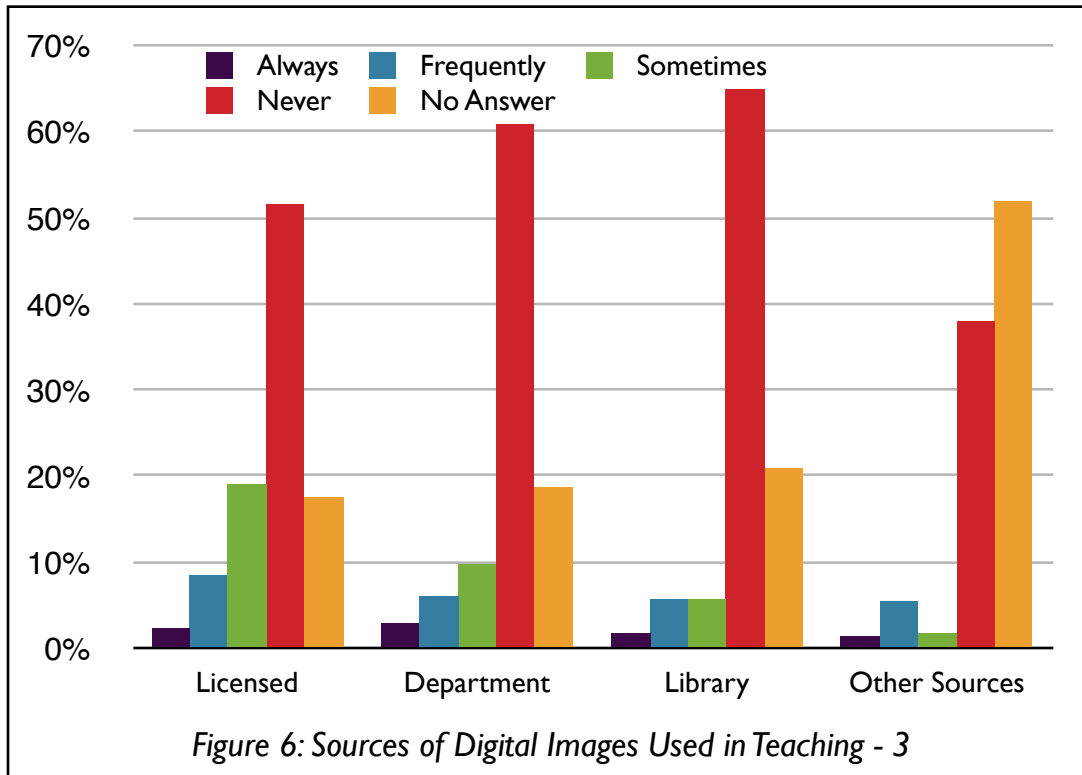


Online Databases

Meanwhile, most faculty (41%) “never” used online databases (25% did not reply to this question and only 33% used them at all). Only 8 faculty (2%) said they “always” used online databases of digital images. About a quarter of respondents did cite specific online sources. Those that stand out include various NASA sites (9), the Library of Congress (7), Perseus (6) and Maecenas (3) (for classicists), and 2 each for the Artchive, Artcyclopedia and the Society of Architectural Historians. Museums were mentioned generically 3 times and specific museums included the Smithsonian (2), the Getty Museum, the Kyoto and Nara National Museums in Japan, San Francisco Art Museum, the Victoria & Albert Museum and the Worcester Art Museum. Other specific archives cited included the Huntington Library, the Los Angeles Public Library Regional History Archive, the Beazley Archive, the University of Texas map collection, and the University of Pennsylvania South Asia archive. This list was amplified during the interviews (see separate Resources listing in Appendix Two).

Licensed resources

As already mentioned, the situation regarding the sources of digital images used by faculty worsens for image custodians (Figure 6). Licensed resources were never used by 52% of faculty (18% did not reply). Although 76 (19%) were aware of ARTstor, only 6% used it “always” or “frequently.” Other resources mentioned included AMICO (5),



Saskia (2) and there were single mentions of Associated Press Multimedia Archive, Birds of North America Online, Grove Dictionary of Art, History of Costume slide set, JSTOR, Science Direct and Prometheus.

Departmental Digital Image Collections

As for departmental digital image collections, 61% report never using them (while 19% did not reply) and only 3% (all from Art History) “always” use them. Twenty-five faculty members (6%) “frequently” use departmental collections at 14 colleges; 16 of these 25 were from Art departments; others were in Classics, Earth Sciences, Languages, Literature and the Performing Arts. Another 10% “sometimes” used departmental collections (17 of these 41 were art faculty, and the remaining 24 came from ten other departments).

Those who commented indicated that several collections were beginning in rudimentary ways, but were still in their early days. A faculty member from a language department noted, “We have a small collection of digital photos that were taken by a student traveling abroad. These are meant to enhance language learning at the intermediate level.” An Art department member reported, “the collection is in process; it is being built by individuals over the last six years.” In another Art department, one faculty

member still “scans from the department’s slide collection or from books. I wouldn’t call these digital images a ‘library.’” And another reports a department with an “incipient collection but [it is] extremely complicated to work with staff, and unreliable...”

Others are more upbeat and are working on a project-basis. For example, the Williams College Art department, which already has its own art history digital library online, is also building a costumes collection, “mostly from a database we created this summer of existing costume stock from the Theater department (the Costume Archives)—a CONTENTdm project,” and, in the performing arts, Vassar is building a collection of “digital photos of garments from our own historical collection.” One Classics professor is pleased to report an “on-line searchable departmental digital library with 2,500 scanned slides”; an environmental studies instructor says the department has “a small and growing image library that illustrates the sustainability projects on which we work. I use these in my classes”; and a Skidmore biologist is sharing his own collection: “[it] has evolved to be used by others in the department.” However, many are just beginning. One Art department isn’t sure where to start; a faculty member says: “we lack the support for the necessary staff to create and look after such a collection. Our slide curator can work only 10 hours per week—too little to even begin the work.”

College Libraries

Fully 65% of faculty never use their college library’s digital image collection, while 25% did not reply to the question. However, quite a few faculty were not sure whether such a thing existed: “I don’t have any information about a college-wide collection”; “I’m sorry—I don’t know what they have”; “Does one exist?” “Do we have one?”

A few were beginning to be aware of the efforts of special collections: at Wesleyan, a historian enjoyed the “digitized maps from Olin Library’s Special Collections.” And a few were also aware of the structural (and infrastructural) problems of building one. Here is an art historian speaking: “We are desperately in need of some college-wide design that will manage, store and search images of high quality for our daily classroom use. High costs in time and labor even for scanning have made image production very slow. Without an overarching storage/management/search system, we are advancing in a piecemeal and uneven fashion. Some hardware solutions (fine quality digital projectors) are appearing, but we are very far from having a dependable, understandable method of accessing digital images for daily teaching.”

Other Sources

For other sources, 90% either gave no response or did not use them. Only 6% reported frequently using other sources (either using the images on CDs supplied by textbook publishers or otherwise scanning from books).

3.2.2 Ability to Combine Images

To the question, all-important for the curators of digital image databases, as to whether faculty can successfully combine and interoperate their images, a perhaps remarkable figure of 64% reported that they could do so (26% were unable and 10% did not reply). This was surely a reflection on how few are using sophisticated systems and licensed resources—as a frequent complaint in interviews was how difficult it was to move images into and out of ARTstor or Luna Insight.

3.2.3 Comparative Value of Features

When asked about the comparative importance of certain aspects of images when searching for them, faculty responded unanimously that all named qualities were of nearly equal importance: resolution (401); ease of finding (401); metadata (399); and the ability to indicate scale (397).

3.3 Use

3.3.1 How Long Teaching with Images?

Faculty had been teaching with analog images for, on average, 17 years (and as long as 42 years). The largest number had taught for 15 years (31). Of those who were teaching with digital images, they had been doing so for up to 25 years, but the average was 6.4 years and the largest number of them (77) had been teaching with digital images for 5 years.

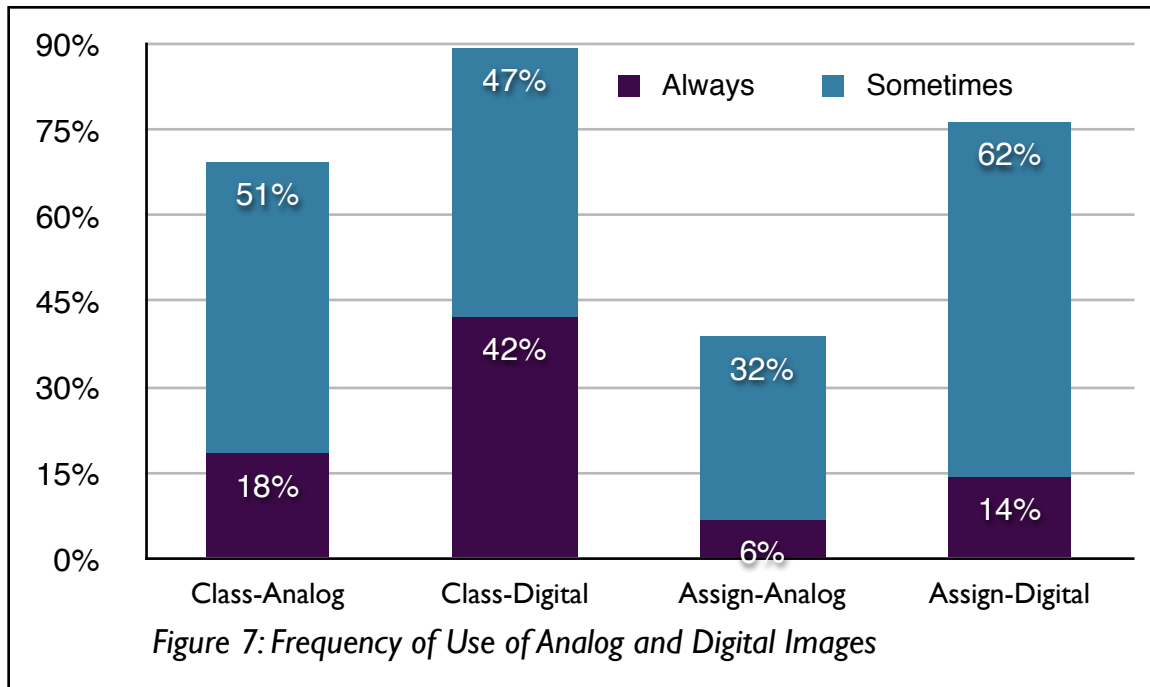
3.3.1a How Long Preparing Images for Teaching?

How long did faculty estimate it took them each week to prepare digital images for teaching? This ranged from less than 1 hour to 25 hours a week; however, most (85) spent 2 hours (followed closely by 83 who spent 1 hour). Of the 24 who had been teaching for over 30 years, 7 had been teaching 10 or more years with digital images, and they averaged 3 hours of prep a week (although a chemist teaching for 35 years, and using digital images for 25 years, still works 5 hours a week preparing his digital

images for teaching). Given the chorus of complaint about how long initial set-up takes, we can assume that this is the time taken *after* the initial set-up of lectures.

3.3.2 Frequency of Use of Analog and Digital Images

We asked how often faculty used analog and/or digital images (“always,” “sometimes” or “never”) in interactions with students, in class presentations, on course websites, for student assignments, for student review or study, for texts and quizzes, for online discussions or for any other purpose.



Those using digital images did so more often than those using analog: more images were in play. While roughly half were still “sometimes” showing analog and digital images in the classroom, over twice as many “always” chose digital over analog (Figure 7).

Posting digital images on course websites, either directly or via course management systems, is fairly popular (despite the complaints heard in the field against Blackboard and WebCT); two-thirds reported posting digital images on them “always” (38%) or “sometimes” (29%).

The difference in analog versus digital image use was greatest in student assignments. For example, 35% do not use analog images for assignments, 26% did not answer the

question, 32% use them sometimes and only 6% always use them. Conversely, 14% always use digital images in assignments, 62% sometimes do, 18% never do, and 6% didn't answer.

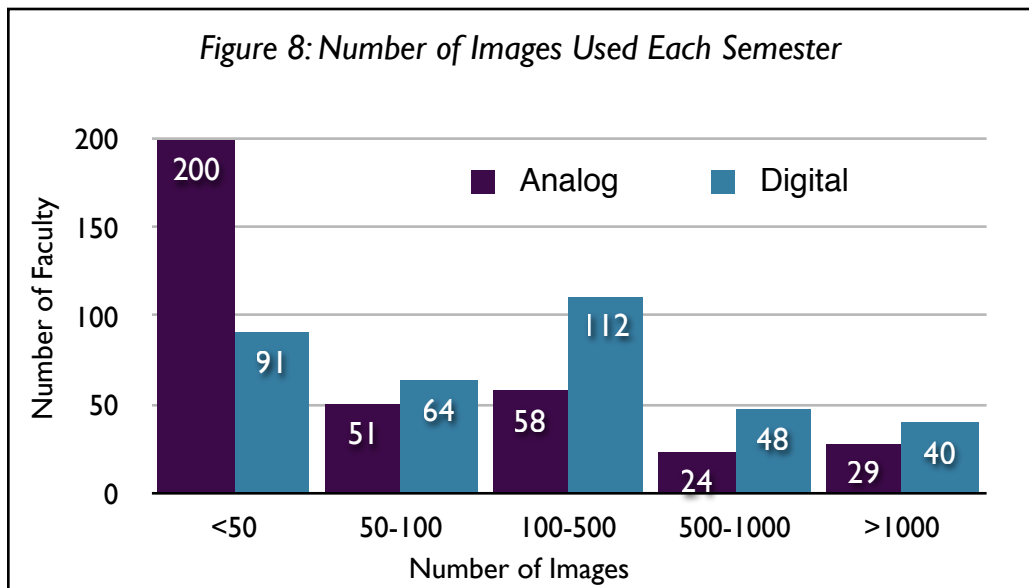
Compare this to the answers to the earlier question on whether faculty use digital material in "assignments that can be completed online" (Section 3.1.3). There, between 13% and 20% replied that they did assign digital material. It could be that they see a difference between giving any kind of assignment to be completed online and simply using digital images in assignments in general (perhaps the image is available on a course website) that need not be completed online.

The differences between analog and digital use were less pronounced in tests and exams, although faculty were also using more digital images (47% "always" and "sometimes") than analog (39%).

3.3.3 Number of Analog and Digital Images Used Each Semester

How many images are being used in the courses taught by our respondents? Broadly speaking, about twice as many digital as analog.

While 200 faculty used fewer than 50 analog images in all their courses (compared to 91 using fewer than 50 digital images a semester), faculty who do use more than 50 images a semester use roughly twice as many digital as analog images. In other words, more of these faculty are using fewer analog images and more are using more digital (Figure 8).



3.3.4 Advantages of Using Digital Images in Teaching

What are the perceived advantages of teaching with digital images? We asked this open-ended question in three parts: advantages for students, for faculty's own teaching style and any other perceived advantages.

For Students

Images More Accessible

For students, improved access to images was perhaps most frequently cited. Of the 355 responses to the question, 118 mentioned access ("ease of access," "24/7 access," "instant access," "access from multiple locations," "easy access and cannot be lost," and so on). As one chemistry professor at Allegheny College described it, "The images can be posted on my website after class for students to review...Just as they can always go back to the text in studying, they can now go back to the image to help clarify concepts and to synthesize information."

Knowledge More Accessible

Many felt that digital images help make many subject areas or bodies of knowledge more accessible for students. For example, in biology, "Good images can vastly improve the accessibility of most biological concepts." And again, "Many of the lectures that I present concern complicated biological processes or methods. Well-crafted illustrations allow the students to more easily understand the concepts."

Images also "increase accessibility to and familiarity with distant regions of the world and foreign cultures," "reinforce aural concepts in music courses," "make 'real' aspects of the course that we cannot otherwise see or experience" and "[make] the classes more interesting—even upper level math courses are enriched by use of digital images." Finally, as one literature professor put it: "My courses emphasize the confluence of visual and literary culture in a variety of media. Digital images allow students to see examples of nineteenth-century spectacles, optical toys, photography and graphic art. Digital images are more accessible to students than slides."

Convenience

Apart from ease of access, the digital format makes other functions more convenient for students. Digital images provide "ease of use in assignments and quick availability after trips or labs" and "ease of reference for papers or exam study." They offer "ease of collection and use," "ease of [making] multiple copies, with data attached," "ease of

manipulation,” “ease of research beyond published images” and they “make it easier to review notes and study.”

Advantages for Teaching Style

As far as the advantages of digital images for their own teaching style, many faculty gave similar answers (access, ease of use, etc.) but there was more emphasis on the variety and volume of available images and the ability to quickly find, show, “annotate and animate” images, making faculty feel lighter on their feet.

More Images

First, teachers are using more images: “It takes much less time to prepare an image for a classroom presentation and it is much easier to find appropriate images, so I use more images and update them more frequently” (Biology); using digital images “allows me to focus on and require works outside the textbook” (Art History); “I can use a vast variety of images from a variety of sources” (Art History); and “I can include text, endless reproductions and can convey ‘plenitude’” (Art History).

Nimbleness

A new nimbleness that comes with having more and different kinds of images involves “having a more interactive classroom” (Physics); being able “to involve students’ first-hand observations; to be ad hoc in classroom; and to identify and use new images immediately” (Architecture); being able to take advantage of the “greater flexibility to respond to student comments and questions” (Classics); and “To call up an image on the spur of the moment when the conversation suggests it would be helpful” (Art History).

Such nimbleness encourages new approaches to teaching: “Not limited to text, I can take a picture into a language course and build a lesson around it” (Language & Linguistics); “[I can discover] new pedagogical techniques to encourage intellectual risk-taking and appeal to different learning styles” (History); and “I can enjoy the excitement, ability to teach about all topics, not just those easily drawn on the blackboard” (Physics).

Control over Images

Part of this nimbleness involves having more control over images: “[Having] high resolution zooms of an image and [being able to] expand/reduce the size of an image in relation to class discussion is of vital importance” (Art History); “I can easily retrieve the same musical examples year after year, and make small modifications as desired”

(Music); and “[There’s a] constantly changing set of images available [from] new research results in astronomy—important for keeping things up to date” (Astronomy).

Closer to the Thing Itself

Being more easily able to show images of the real thing, whether primary document or object, has enabled many to ease off lecturing and encourage the experience of a document, an object, or a place and the discussion that follows: “I allow the students to examine and analyze a space, costume, text, image of a performance, etc., rather than lecturing about those in the abstract” (Theater); “digital images allow me to emphasize and awaken students to the uniqueness and marvel of other parts of the world and foreign cultures” (History); and “you can talk all day about pahoehoe lave but one image is better”⁷ (Oceanography).

“Having high resolution zooms of an image and being able to expand/reduce the size of an image in relation to class discussion is of vital importance.”

Word and Image

For many, the bringing together of text and image is an important new thing—not only in terms of text serving image (as with captions and annotations) but in creating new relationships: “I can combine text and pictures, so that primary texts can be brought close to objects” (Art History); “Digital allows me to connect ideas to images as part of a through-line or thematics of a particular lecture. Comparisons and details are much easier to create” (History).

Just Grabbing the Jump Drive

It also of course makes teaching physically lighter: “I can save lectures for future use, it all fits in my laptop: no carousels, no heavy slide cabinets, and the information on the image (title, author, etc.) can be projected along with the image”; “I don’t have to drive to the slide library, which is in a different part of campus than where my office is or my classes take place”; “I can have all of my images on my iPod with me whenever I go to class and I can use as I see fit without planning ahead”; and “I love not having to use slide carousels. Just grabbing my jump drive for class is great.”

⁷ See, for example, http://volcanoes.usgs.gov/Products/Pglossary/pahoehoe_toe.html.

Greater Creativity

Perhaps all this is best encapsulated by this one art historian:

I have much greater flexibility which leads to greater creativity—I can come up with new images or uses for images just minutes before class. I've used everything from current political cartoons to images of Barbie dolls to make my point, something I would never waste a slide on. I can rearrange my lectures instantaneously, or, while presenting the material, I can hop into my other stored images during a lecture to make an unexpected point. I no longer waste time pulling slides, reshuffling them after lectures, and then waiting for them to be filed. I no longer fear the absence of slides on exam days (I own my images). I feel comfortable knowing that the images my students are studying are the same that I am testing them on (not slightly different versions in the book). I can email pictures to my students for clarification or post them on Blackboard. Make-up quizzes and exams are a breeze because I own the images. I no longer have to put up with dirty or older slides.

Other Advantages

For most humanists, the most important fact about digital images is that “they are images, not that they are digital” (French). Some scientists regard them quite differently, pointing out that digital images are essentially data and that they can be mined and manipulated. They are the stuff of modern research: “Digital images are data, and can be exploited for a wealth of quantitative information”; “a great deal of real data in astronomy is available in digital form, so students can deal with the same stuff astronomers use”; and “all new images in our field are digital, so this is where things are going” (all Astronomy).

3.3.4a Advantages of Analog

Moving to the advantages of traditional analog 35mm slide images, almost a quarter of faculty did not reply to the question, implying perhaps that they could not see any. Of the 316 that did respond, 10% said that they saw no advantages. As one put it, “More and more, I see fewer and fewer.”

Better Image

However, around 50 (including 33 of the 111 visual arts respondents) were convinced that their slides gave a better, more accurate and satisfying image than digital images could: “A well-maintained slide still preserves and conveys more information than most digital images”; “slides are much higher in the relationship between resolution and projecting quality—digital images can’t compete in this arena. In addition, a digital image is ‘flat,’ in that it exists on one plane in the form of pixels. A slide is three-dimensional (film emulsion, crystals, etc.), and light passes through it providing a more vibrant and textured image” (both Art History).

But quality was no longer always the supreme issue: “High resolution, but rarely use them today” (History); “quality, probably, but it’s too awkward to make it worthwhile to me” (Literature); “they generally have better quality, but I never use them because the prep time is too cumbersome, compared to digital” (Earth Science).

Others find that digital quality is improving or can improve with better projectors:

“There used to be issues of spatial and color resolution and of color fidelity with digital images. For the material that I need to illustrate, however, these are no longer issues” (Biology); “It used to be the case that the projection resolution was not great, so slides were much better in quality. I believe many supporters of slides still complain about the quality of digital projection and I think it does not help that projectors are costly and not easily replaceable” (Art History); and “Quality and resolution are much more beautiful with slides, though this doesn’t have to be true if good projectors are purchased—but projectors are very expensive and most institutions don’t invest in good ones” (Languages).

“Unless the slide is taken directly from the original work of art with good color balance, the present slide collections are 3rd or 4th generation reproductions at best. I see no advantage to analog slides once the digital system and technology is a bit better.”

And a few undermined the notion of the perfect slide: “Unless the slide is taken directly from the original work of art with good color balance, the present slide collections are 3rd or 4th generation reproductions at best. I see no advantage to analog slides once the digital system and technology is a bit better” (Art History).

Tradition

Why mess with a good thing? Art historians, especially, have “a great familiarity with the available images in our collection and a familiar delivery system that can be counted on to work the way you expect it to.” The great advantage of analog is, as expressed in this example, “the availability of a collection of over 400,000 slides often tailor-made to my ideas and style of teaching.” As one succinctly put it, “I have them!” And many echoed the sentiment: “I have thousands of slides accumulated over 25 years of taking pictures”; and “I know the collection intimately. I have little problem collecting and using the slides and I know how to present them to the greatest effect for all my courses.”

One response perhaps summed up all of this the best: “The collection is maintained by a professional in the Art department. The collection is stored in the building where we teach. The images are searchable through rational organization in storage and through a computer database. The technology to project images is extremely reliable and does not crash, does not take immense time to set up connections, warm up projectors, trouble shoot laptops, connections, dead remotes, loss of net connection.”

This comment underscores one of the biggest problems (especially to art historians) in that in the transition to digital, many of the services provided faculty in the past have not (yet) been extended into the digital arena. Some early adopters of digital images feel out on a limb compared with how things used to be with analog slides, where “staff fully prepares images for use and fully catalogs and files images.”

Digital Resources Not In Place

For many, the great “advantage” of analog images is that they are still the only game in town. The new technologies, the digital libraries and the requisite infrastructure are not yet in place: “Availability of specific resources not yet possible to access in digital format” (Dance); “The original may only be available in analog form” (Math); “In my field, there’s a vastly wider range of images available. Most of what I might want to show the students is not available readily in digital form” (African History).

Digital Technology Unreliable

Analog is reliable, digital definitely not. For many, “the infrastructure for projecting slides is still more robust and reliable” and there are “fewer chances of technology failure or the distraction of getting your laptop to speak to the digital projector.” “Ana-

log images don't 'crash' right when you need them"; and overall, "there is less technological anxiety about slide projectors."

Books and Prints

A few spoke up for other analog images, for books and prints. They appreciated the "physicality" of a print: something you can pass around and annotate. "Allowing students to hold an image, to see it up close, to look for texture, wear and tear, variations in shading, etc." is still an important value for some. It is especially the case "when dealing with medieval manuscripts, [when] it is good to have a book in your hands (a facsimile edition, for instance). Materials and scale can thus be appreciated." And, finally, as one person put it: "Taking students to a museum or library collection is best!"

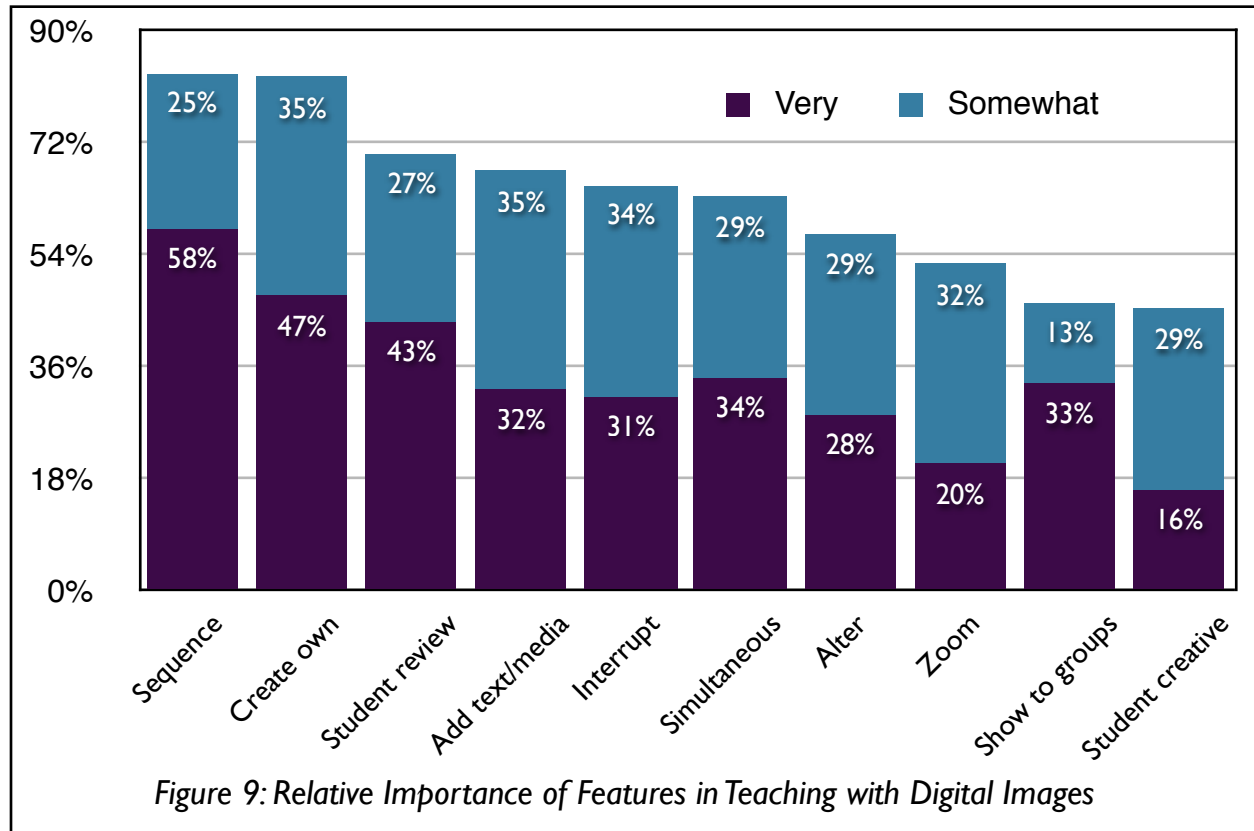
"There is less technological anxiety about slide projectors."

3.3.5 Relative Importance of Features

Faculty were asked to evaluate the relative importance of ten aspects or features of teaching with digital images, by marking them "very" important, "somewhat," "not very" or "not at all" important (Figure 9).

Most important for 83% of faculty is the ability to "create image sequences for presentation" (not surprisingly as this is what most faculty do). Interestingly, it was very important for half of the faculty to be able to "create my own digital images by camera or scanning." Being able to post images for student review, generally the most widespread activity and often the first adopted by those teachers going digital, was third in this ranking: important for 70% of respondents.

Presenting several images simultaneously, presenting images to groups, adding text or other media to accompany an image, and being able to interrupt or change sequences in the middle of a presentation were each "very" important for about one-third of the faculty (and "somewhat" important to another third). Less important was the ability to alter images or to zoom in to reveal progressive detail. And least was "tasking students to find or create digital images for their own creative work."



Other Uses of Digital Images

Sixty faculty answered the request for other features of digital images they appreciated. Most cited ways of using images to gather information and to “read” the results (either in the cultural or physical world). One sociologist had his students use the “photo-elicitation method to conduct interviews”; a French teacher was more easily able to have his students “analyze image as a culture-bearing text”; and a historian was “using images as primary sources like textual sources that students would have to analyze.”

Scientists were more directly interpreting the data: a biologist “[used] software to make quantitative claims about digital images,” while astronomers “extract quantitative information from images and perform mathematical operations on them.”

Digital images can easily and flexibly report on fieldwork: “After having a lab in the field, I create a PowerPoint document with images of the students doing the work. They can download it and keep/share it” (Earth Science); “I post digital images (photos we’ve taken in the field, scans of maps, etc.) on Blackboard for students to use in their

own reports so that they do not have to spend time dealing with image scanning or processing and can spend more time on their writing” (Geology).

3.3.6 Has Teaching Changed Because of Digital Images?

When asked whether their teaching had changed because of using digital images, overall, three-quarters thought it had: 29% “very much” and 47% “somewhat.” The strongest response was in the sciences, with 40% in the physical sciences and 39% in life sciences registering that their teaching had changed “very much” (Figure 10).

Asked to explain how it had changed, 302 of the 404 in our sample responded. Several of the same answers for the preceding questions were given: they are using substantially more images, and using them more flexibly, especially on-the-fly in the classroom

Subject Area	#	Very Much	Somewhat	Not Much	Not At All	No Answer
Area Studies	23	30%	52%	9%	4%	4%
Art History	111	31%	42%	18%	5%	4%
Classics	16	25%	50%	25%	0%	0%
History	22	32%	36%	27%	5%	0%
Languages	35	20%	57%	11%	6%	6%
Literature	31	13%	45%	26%	10%	6%
Performing Arts	8	13%	63%	13%	13%	0%
Arts/Humanities	246	26%	46%	18%	6%	4%
Earth Sciences	29	34%	55%	7%	3%	0%
Life Sciences	44	39%	50%	7%	2%	2%
Mathematics	6	33%	33%	33%	0%	0%
Phys. Sciences	30	40%	37%	17%	0%	6%
Sciences	109	38%	47%	11%	2%	3%
Social Sciences	49	22%	51%	14%	4%	8%

Figure 10: Has Teaching Changed with Using Digital Images?

when needed. In addition, they feel that their use of digital images is engaging students more with the content of the class. With digital images, students look at images more keenly, focusing new attention on the skills needed to read and interpret images. Students can work with images more directly, encouraging interactivity, giving them more freedom to be creative with their classes and improving their overall effectiveness.

Efficiency

Several teachers thought using digital images made them more efficient. They were able to process and relate more material, more efficiently for class:

- “It’s cleaner, faster, more organized and a more accurate depiction of the topic” (Biology);
- “I can now revise the selection of images that I use immediately before a class, making it much easier to improve my teaching” (Biology);
- “I have the ability to do much more work with culture. For instance, students got my lesson faster with images of Confederate textbooks and sheet music” (American Studies);
- “It’s easier to bundle images for a lecture: to cut and paste one set of images used in one lecture for my European history course and then to copy them for a British history lecture. The time using a carousel would be so tedious” (History);
- “I can cover more material, in greater detail, since I can (a) use more examples, particularly photographs, and (b) go through them more rapidly than I would if I were constructing chalk drawings on the board. I can only do this speedup, however, because I also make everything available to students, so they can go back over materials at their leisure whenever anything is too fast for them to catch” (Earth Science).

Variety

Many were delighted to be able to show a much greater range of material:

- “I am able to incorporate a wider variety of images (interpretive and historic maps, popular images, etc.) that aren’t represented in our analog collection” (Environmental Science);
- “Now I am not limited to slide collections, I can find all sorts of images online (or scan them at a moment’s notice) and, by mixing photographs, maps, and texts, can convey more information than before in a way that is also much clearer for students” (Art History);
- “Drawing on a wide range of images for my lecture, I feel a lot freer and more creative with them” (Art History);

- “I enlist my own digital images from Russia in order to connect my history there with the subject and involve students” (Russian);
- “I can go out, take pictures of scenes I want to show, and bring them to class the next day. This keeps the material as current as it can possibly be” (Sociology);
- “I can present material that was otherwise either unavailable or too onerous to make available” (Classics);
- “I can lecture on and project images of contemporary or vernacular landscapes that are not included in our slide collection” (Landscape Studies);
- “I can do a much better job of varying the way I present material in class” (Languages);
- “I can provide a richer contextual background before getting into close reading/analysis of texts, to extend my subject into other areas of the humanities” (Spanish);
- “I use more of them and in a greater variety of orientations and situations” (Biology).

New Kinds of Courses

- “I actually have offered courses that would be difficult to imagine (Visually Displaying Data, for example) without the use of visual images” (Math);
- “I designed a new course, based on the availability of digital art and scientific imagery” (African Studies).

New Emphases Within Courses

- “Lectures are more visual-based now” (Earth Science);
- “I have put much more emphasis on material culture, on the circumstances of book production as it is now easy to show students what the first edition of Shakespeare’s Sonnets looked like, or how the Canterbury Tales were bound in different orders in different early manuscripts” (Medieval Studies);
- “Access to a vast variety of images from many different sources allows me to expand the range of art objects that I discuss in class. It also allows me to introduce images of the cultural and natural context in which the art was created and viewed. It has begun to affect the content of my teaching” (Art History);
- “I used to deal only with ancient texts: the images expand that window on the ancient world for me and for my students” (Classics).

Students More Attentive to Images

Some faculty have been able to shift the focus of the course because students are looking at images better:

- “Student recall of images has greatly improved. The difference is dramatic” (Art History);

- “I do notice that it is much easier to hold students accountable for visual material, since the digital format allows them ready access, and it means that they do spend more time looking at course images. I can expect a day-to-day level of visual preparation that is much higher than in previous years” (Art History);
- “Digital images are critical to my work in the classroom. I don’t lecture directly but constantly refer to the image on the screen. The image is central to the discussion; it is not merely illustrative” (Latin American Studies);
- “I ask students to incorporate images into their assignments and their research” (Physics);
- “In my next myth class (spring 2006) [I’ll] move from images as illustration to images as part of a genuinely inter-disciplinary myth class in which students will be expected to study myth in art as well as myth in literature” (Classics).

New Skills Needed for Teaching with Images

However, faculty discover that they must often teach students how to look at and read images:

- “Ease of access to images has led me to use them much more than before 1996, and to emphasize skills of image reading as a criterion of success in my courses” (Earth Science);
- “Visual images are different kinds of texts. This requires a different method of analysis” (History).

Some teachers, however, admit that they also need help with what is a new task for many of them:

- “I am learning how to read digital images and how to use them as ‘texts’” (Religion);
- “My students have not responded as much to the images as I thought they would: I use the images to try to give them a more concrete sense of history and literary interconnections, but they haven’t picked up on this. I need to find better ways of putting this across” (Literature).

Higher Expectations of Students

It also has led teachers to expect more from their students:

- “I have higher expectations of my students to find and use digital images” (Landscape Studies);
- “I think students have to be more responsible for their involvement in a course when images are online” (Art History);
- “I use more images and I hold students responsible for knowing images in a way I never did before” (French).

Students' Own Images

Increasingly, students are making images themselves, or are working more closely with them:

- “I now teach students how to make and publish digital images. Discussion of issues surrounding such tasks and their meanings are completely new since digital imaging has become available” (Art History);
- “I now have a major assignment in my course, Social Influence, where students create two magazine advertisements. They learn how to use PhotoShop...come up with their ideas (using social psychology theories, etc.) and literally make the ads—find images, write copy, arrange it artistically, etc.” (Sociology);
- “Digital technology also gives students more freedom to work with images as part of assignments” (Literature);
- “It makes it far more interactive, and allows a more sustained use of visual images as data” (Sociology);
- “Student participation through reports with images is now much easier than it used to be in seminars” (Art History).

“I now teach students how to make and publish digital images. Discussion of issues surrounding such tasks and their meanings are completely new since digital imaging has become available.”

Greater Freedom

The plenitude and variety of images available to teachers give many of them a new sense of freedom from the text and from the script, and permission to be more creative in class:

- “I feel much more liberated from the text of the lecture. I feel more conversational and dynamic, rather than lecturing” (History);
- “Previously, with analog images, my discussion was limited to the slides already in hand. Now, with particular images more easily found, I now concentrate on the historical story I want to tell and assume I can find the images I’ll need to illustrate the points” (Art History);
- “By providing images to students online, I can choose images to fit my course, rather than structuring the course to fit images used in textbooks” (Asian Studies);
- “I feel the range of what I can teach has expanded and there is more flexibility in the course plan” (Art History).

Greater Interactivity/Discussion

Greater variety of material and creativity in the classroom often leads to a more interactive classroom, where images often stimulate discussion:

- “It does change the dynamic of the class...when I use images in the classroom, it is livelier, there is more participation and more exchange between students” (Literature);
- “Digital images allow students to express their curiosity more openly—ask questions, seek explanations. It breaks up class time and lecturing” (Archaeology);
- “Because students can see images in advance and/or outside of class, I use less class-time to introduce them to images or review them, giving more time to debate, discussion of readings and issues” (Art History);
- “Analog is too limiting—with no accompanying text, no image size adjustment, and no manipulation of multiple images. My students now participate in illustrated discussions that just weren’t possible 10 years ago” (Classics);
- “I tell students not to copy what I say in lecture, but to discuss and think and look. The dynamics have changed and the students think rather than transcribe. [As] the facts are on the presentation, they can participate more in discussions without feeling that they have to write every word that is said” (Art History);
- “I don’t lecture nearly as much as I used to. I will show an image, or several images and then the class will discuss them” (Theater);
- “If I give students access to the images, they can concentrate more in class on what we are discussing...I can also have students work in groups to interpret what they see” (Genetics);
- “The ease of bringing relevant images into the classroom has made it more possible to work in an interdisciplinary way, to ask more questions of students, to broaden discussions, and to vary presentation of materials, etc.” (Literature).

“My students now participate in illustrated discussions that just weren’t possible 10 years ago.”

Better Experience For Students

This interactivity and engagement gives students what faculty feel is a richer experience:

- “The ease and flexibility are great and they add a certain depth and experiential immediacy to supplement the other forms of pedagogy such as lecture, discussion and note-taking” (Sociology);
- “Images create more of a sense of immediate experience, current knowledge and state of culture. I do a lot on the commodification of experience and there are a lot of websites out there catering to that” (Anthropology);

- “It has become more engaging to the students, has brought them closer to the actual experience of doing science, has made it possible to incorporate a wide variety of audio-visual modes seamlessly into my classes” (Astronomy);
- “My classes are more engaging and I can illustrate things much better. A good image will be remembered” (Biology).

Explain Concepts Better

A few faculty felt they could explain concepts better with digital images:

- “An array of visual images provides a structure for explaining concepts during lecture and these are especially helpful if students can refer back to the same images while they study” (Neuroscience);
- “Images have allowed for better connections to the applications of the theory. Also, digital graphs allow for varying parameters showing the role and importance of each” (Physics);
- “I tend to be a very visual learner. So my understanding of many chemical principles comes from my model or ‘picture’ of the microscopic world. Being able to relay that to students easily helps me explain concepts most easily” (Chemistry);
- “It is easier to incorporate images into my presentation of material and so I do it more often. I think this has led to an enhancement of my exposition of many chemical concepts and a deepening of student understanding” (Chemistry).

“An array of visual images provides a structure for explaining concepts during lecture and these are especially helpful if students can refer back to the same images while they study.”

More Effective as a Teacher

Overall, many felt that using digital images helped make them more effective teachers, able to reach more students:

- “I can reach students whose learning style in chemistry is more visual than mathematical” (Chemistry);
- “In teaching to ‘multiple intelligences,’ the visual component is essential” (Math);
- “My course evaluations were all ‘outstanding’ because of the superiority of digital images; their use truly enhanced my teaching” (Art History);
- “Presentations are clearer and more focused thanks to the ability to show ex-

“My course evaluations were all ‘outstanding’ because of the superiority of digital images; their use truly enhanced my teaching.”

- actly what I like, and to prepare it more quickly and easily” (Biology);
- “I can integrate images more effectively with both my presentation and into discussion” (Area Studies);
- “The freedom to vary the image in relation to class discussion has made those discussions more meaningful for all” (Art History);
- “In my teaching, texts are central, but digital images allow me to discuss the visuality of literature more adeptly than before. Whether explaining Browning’s fascination with Renaissance Masters or the importance of binocularity in the nineteenth century, I have found that digital images help students understand what and how the Victorians saw” (Literature).

Pedagogy

Some have used the transition to digital images to think about their pedagogy:

- “Changing presentation media has made me more aware of my methodology, I’ve spent a lot of time re-working classes to be digital” (Art History);
- “Complete revamping of process and course material” (Art History);
- “I use more images and less text in lecture notes—I use the images as the basis for lecture material or discussion material” (Psychology);
- “The temptation to use too many (too easy)—I am trying to think more about the pedagogical goals rather than just using lots of images” (Earth Sciences).

Up-To-Date

Some feel digital images effectively assist them in being as up-to-date as they can in their field:

- “It’s much easier to have the latest scientific results” (Physics);
- “I can more easily keep my lectures current and incorporate a wider variety of images more easily” (Biology);
- “I am constantly challenged by the need to keep up with new developments in both technology and in the field, and now these are easier to communicate in the classroom” (Communications);
- “I use images much more now than 5 years ago—classes based on contemporary France are much more up-to-date” (French).

The Book

Some are giving up (or re-writing) the textbook: “I no longer use a textbook. That has important consequences” (French); “They have allowed me to write my own online text, which wasn’t possible before” (Astronomy). But others miss the book: “I accept as a reality that students want/need to consult images digitally. I actually regret that they do not study from good reproductions in books, as these are generally even better than

any slides or digital projections. Plus, they sometimes used to read the books as well” (Art History).

Transition

Finally, several faculty are still caught in transition:

- “Not yet! I anticipate big changes in the future” (Archaeology);
- “It COULD change if I were to have the capability of using digital images in studio courses” (Studio Art);
- “For over 30 years I have gone weekly to the slide library of the Metropolitan Museum of Art which has a collection of around 750,000 images to get material for my classes, as I live in NYC and commute to Bard. Now the slide library has closed, and I am about to change to digital. I will probably give my first lecture using entirely digital material in two weeks, so this survey catches me very much in the process of changing the way I teach and present images” (Art History).

3.4 Technology & Tools

In the section on Technology and Tools, faculty were asked about the technology they used to present images and any tools they needed to be able to teach more effectively.

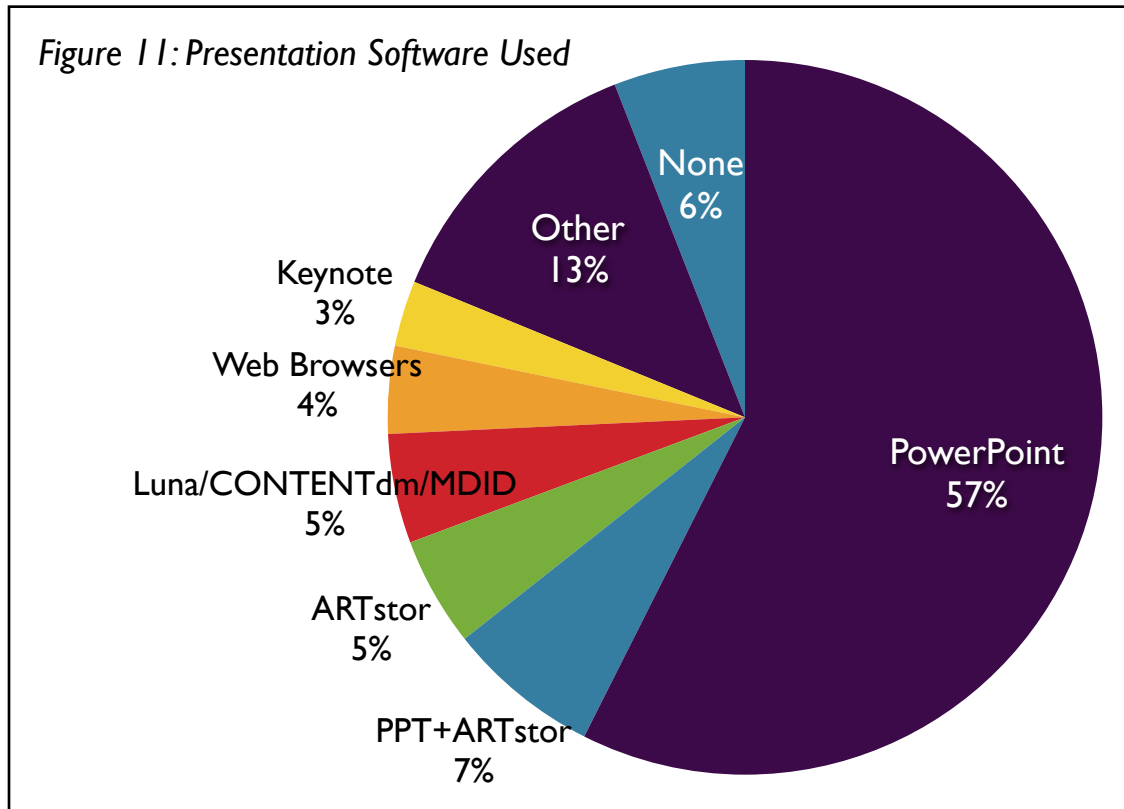
3.4.1 Adequate Hardware

Perhaps surprisingly (given the criticism of the quality of digital projectors on many campuses), 60% replied they were happy with the hardware used to present digital images in the classroom. Eighty replied with suggestions of how things could be changed. These were mostly for more, more reliable and higher-resolution projectors. A projector in every classroom was the dream of quite a few.

3.4.2 Presentation Software Used

In terms of presentation software used, the survey asked whether faculty used any of five specific kinds (ARTstor, CONTENTdm, Luna Insight, MDID and PowerPoint), to specify what else they used and what were their likes and dislikes (Figure 11).

PowerPoint, not surprisingly, appeared to be the default system. It was used by 266 respondents (64%). ARTstor followed with 49 users (12%), but 39 of them also used PowerPoint. Luna Insight (9 users), MDID (7) and CONTENTdm (6) combined made up only 5% of users. Other popular choices were desktops/webpages/Web browsers (22); Keynote (13); iPhoto (9); iView (4) and Adobe Acrobat (3).



3.4.3 & 4 Likes and Dislikes about Presentation Software

PowerPoint Likes

PowerPoint, loaded and available on most computers, appeared to have an advantage. Most seemed to find that it did its job and that it was relatively easy to use. 70 cited its ease of use; 30 liked the ease of bringing word and image together.

Its universality and basic interoperability are appealing: “The program is easy to use, and it is widely used. When I need to take my presentations to meetings, etc., PowerPoint is always available”; “all students have access to it so they can view the files on their own if they wish”; and “it allows me to adjust pictures, to organize them sequentially for presentation and to easily move them between my computer files, my classrooms, and my course Blackboard sites.” Overall, “it is reliable, flexible, and allows me to design my own visual presentations. It is very easy to use and provides me with much, but not all, of the functionality I require.”

PowerPoint Dislikes

On the downside, many found it unappealing and inflexible for what they wanted. Some found it would not run video or sound files reliably and it was difficult to size

images correctly. Some found the pre-set and automated features annoying (“I hate the auto formatting of text”) and the templates “very dull and unimaginative.” Further, it “lacks sufficient formatting capability—too clunky” and “preset formatting is horrible, so every presentation is made from scratch or based on another self-designed layout.”

It was clear to several users that PowerPoint was designed for business use, not for those whose world is defined by images and image manipulation:

- “It is not designed for my field, but for business; it can't handle high resolution images; it can't project two images simultaneously and move independently between them, etc.” (Art History);
- “It's clunky and it's hard to get rid of Microsoft's idea of what a [multimedia] presentation should look like” (Area Studies);
- “There are too many steps to combine templates, images, text and objects into a series of slides, then save, close, open ftp software and upload” (Classics);
- “It has infantilizing features and graphics; its poor compression algorithm necessitates that I leave files uncompressed, and thus enormous, in order to re-work them for subsequent presentations” (Art History);
- “I wish there were a way to select a whole directory of images and create a presentation in one command, rather than laboriously dragging each image to a new slide” (Languages);
- “The process of creating even a simple slideshow can be annoying in PowerPoint. I would like to be able simply to name a folder full of images, and then have PowerPoint automatically import those images into a slideshow, in order, black background, stretched to fit the screen. At the moment, I know of no way to automate that process” (Literature).⁸

There were those who wanted PowerPoint to be more like ARTstor, a media database; others, though, just wanted it to be a streamlined image presentation system: “Too much stuff; I just want to show the image and have it fill the screen”; and “it has too many silly choices that take away from the main usefulness of delivering an image quickly.” Finally, as one “meat-and-potatoes” PowerPoint user put it: “It has more functions than I care to think about but I need to field all those functions to make it do the simple things I want it to do.”

⁸ In one interview it was noted that CONTENTdm has a plug-in that will allow such automated loading from a CONTENTdm database of images.

ARTstor

Of the 49 ARTstor users, 32 also used PowerPoint; 3 had CONTENTdm, 2 had Luna and 1 had MDID. (Of the 49 users, 31 were in the Visual Arts at 18 colleges, 3 in Area Studies, 2 Classics, 1 History, 7 Languages, 1 Life Sciences, 2 Literature, 1 Performing Arts, and 1 Social Science).⁹ Nine liked ARTstor's zoom feature, one mentioned good image quality, and its ability to show dual images was appreciated. The dislikes, though, were fairly strongly expressed. Users found that there were too few images and too many poor-quality images; it was difficult to annotate or to improve the images, or to combine them with images from other sources; and the system was inflexible, cumbersome and did not provide the capacity to store lectures offline.

It should be pointed out that ARTstor was working on solutions to several reported difficulties and had already addressed many by the conclusion of the interviews. Many appreciated the latest Offline Image Viewer (OIV 2.5) that enables and eases the downloading of images and annotations from ARTstor to a personal computer and the addition of images from other sources that can then be presented together.

CONTENTdm

All 6 CONTENTdm users (at 3 colleges) also had ARTstor and 4 used PowerPoint. Comments were that it was "very flexible" and was used "by so many other liberal arts colleges that I wished more university art galleries and museums would use it."

Luna Insight

Of the reported 9 Luna users (at Smith and Trinity), only 2 had ARTstor and 4 used PowerPoint. Several liked its "flexibility; its ability to show multiple images on screen and the ability to prepare a canned presentation if necessary"; others liked its: "good and quick word search; excellent image/zooming qualities"; and its ability to "make groups, zoom in, and make presentations easily." Disliked were a "cumbersome" presentation-building system: "A more Windows-like environment...would help, as well as not having the largest image be the first to present itself in presentation building mode."

⁹ The nineteen colleges in this survey whose faculty reported using ARTstor were as follows: Bard (2), Bates (5), Bennington (2), Bowdoin (2), Bryn Mawr (1), Colby (1), Hamilton (2), Holy Cross (3), Lafayette (3), Mount Holyoke (1), Skidmore (6), Smith (1), St. Lawrence (3), Trinity (2), Ursinus (1), Wellesley (4), Wesleyan (3), Wheaton (5), and Williams (2).

MDID

Of the 7 MDID users (at 5 colleges), all except the 2 at Swarthmore also used PowerPoint. Users reported that MDID was useful to archive image sets and provided fast access to images. One user liked the zooming and metadata of MDID, but preferred the ease of organization of iPhoto, and the “portability, universality, PC/windows access” of PowerPoint. Another commented that MDID was “fairly easy to learn” and “has the basic functions that I need.” On the downside: “MDID only allows for one image to be shown (conveniently) at one point in time, which is often insufficient. It does not allow for the integration of text. It is slow to download particularly on a Mac”; and “There are too many steps, too many custom-made shows. I’d like to be able to use just one for all the tasks I do.” Someone who only used MDID did not like the “awkwardness in the changing of images when showing two at a time, the time it takes to create a slideshow that includes over 100 images, and the too-close juxtaposition of side-by-side images.”

3.4.5 Tools Needed

To the question “What would you like to be able to do when teaching with images that you don’t have a tool for?,” 236 provided a response. While 70 indicated they didn’t know or didn’t understand the question, most of the 170 others wanted more trouble-free, simpler (“more widely accepted”) presentation software and ease of integration of several media.

Zooming and Light Table

The zooming capability offered in several of the specialized presentation programs was a popular feature that faculty wanted more widely available. Similarly, the light table function offered by ARTstor, MDID and Luna Insight was needed, in ever-more flexible iterations: “A good electronic light table that would make it easy to access, identify, and sort large numbers of images accurately and quickly. For example, display dozens of folios from an illuminated manuscript in folio sequence. Or the sculpture from a Gothic cathedral in some semblance of logical sequence”; “big picture light-table-like palette to move images around and play with sequencing.”

3-D

Eight wanted better 3-D capabilities, to “rotate” or “walk around” objects, even to “walk through” architecture and to “display stereo images to see 3-D landscapes.” While one thought this was still a “far-out” idea, a veteran biologist commented that “current software has sacrificed ease of use for increased capability. A product that functioned

wonderfully a decade ago for my purposes is now much more difficult to use, although definitely more capable” (Biology).

Annotation

Many also wanted to be able to easily annotate images, ideally writing over an image independently, so that you could also see the annotation without the image, or vice versa:

- “Telestrator-type¹⁰ functionality would be helpful—the ability to draw and write on top of images”;
- “To be able to write over the images on the fly...then turn off the image to reveal the sketch and vice versa”;
- “I’m looking into a Symposium¹¹ smart screen, but it’s kind of expensive”;
- “I don’t know how to modify [and annotate] an image [of the brain] as I show it”;
- “...with a tablet PC I would be able to draw graphs on my laptop and project them on the screen. In addition, I could save the image into a file and provide it to the class online as a study tool.”¹²

More On-The-Fly Capabilities

Several wanted a much less linear approach to showing images: more like the Web and less like PowerPoint:

- “Take a deck of images and open multiple single images at once, move them around during seminar discussion”;
- “Greater flexibility and faster access to an image during seminar”;
- “To move from my prepared lecture to alternative visual material—either from the Web, from my desktop, or from the database stored at the college. If I have anything to add to the database, I have to wait for it to go through the library administration so I can’t make any last minute additions”;
- “I’d like to have more options and greater flexibility to move through a slide show in different ways. PowerPoint is so linear that you have to move through a set show—it’s difficult to show slides that respond to the discussion of the classroom. It would be great if there were software that enabled the teacher to

¹⁰ Leonard Reiffel’s 1960s invention, taken up by sports television and weather reports

¹¹ A Smart Technologies product <http://www2.smarttech.com>.

¹² For a recent study on the use of tablet PCs in teaching, see Weitz, R. R., Wachsmuth, B. & Mirliss, D. (2006). “The Tablet PC For Faculty: A Pilot Project.” *Educational Technology & Society*, 9 (2), 68-83, http://www.ifets.info/journals/9_2/6.pdf. Among the authors’ conclusions is the indication that “those fields that require freestyle drawing of diagrams, pictures and charts, as well as fields requiring the use of mathematical symbols are good areas for the use of tablets.”

have two screens shown on desktop—one of the projected image on wall and the other a menu of different slide choices to project”;

- “Modify them as I lecture. Going from 2-D to 3-D would also be interesting and useful”;
- “More and easier random access to desired image at the moment needed”;
- “More flexibility in manipulating the comparison of images and/or adding images during a presentation without enormous discontinuity.”

“I’d like to have more options and greater flexibility to move through a slide show in different ways. PowerPoint is too linear.”

Copyright

Several wanted a capability that freed them from copyright worries:

- “High-quality images from books with painless copyright handling”;
- “To handle images without having to worry about copyright laws”;
- “An easy way to prevent the publication of images on my class webpages beyond the college or class...WebCT would let me do this but it’s such a kludge job of a program that I’d rather create my own class pages.”

Management

Several recognized that they needed help managing and organizing their growing image collections:

- “An easy way to manage the amount of images that I have. Most database programs are very cumbersome, which is why the online projects that I’ve seen are very attractive”;
- “I am having a problem managing my own growing digital materials. I wish [the college] had some basic storage/retrieval software at our disposal”;
- “Organize my images effectively so that I can easily find them when I need them”;
- “Organize them so that a “tool” can be created!”

Equipment

Several mentioned some equipment needs such as digital cameras for students; monitors, “so students can examine images together and discuss them”; and remote controls for projectors.

Other Tools

A couple of faculty wanted GIS capabilities (“to create image maps—animated and otherwise—to map filming locations and narrative progression in urban spaces”). Others wanted the ability to work on images: “I’d like to deconstruct images...show parts of the whole, etc.”; “to work with sections of images electronically. That is highlight and point to areas electronically while teaching.”

In Sum

Finally, here are two wish lists. The first is for a single master presentation tool: “a single tool to acquire (from the Web, from proprietary databases, etc.), manipulate (i.e., crop, color correct, write or draw upon while lecturing), catalog, and present images.” The second is for a variety of abilities to make the teacher even more efficient and nimble: “I’d like to be able to find images quickly with good metadata. I’d like to be able to rip short sequences out of films and put them together in a presentation. I’d like to be able to scan images from printed sources quickly and circulate them readily to students. I’d like to be able to spontaneously use images the way I can use text in discussions. I’d like to have a live Web connection at all times in the classroom without having to do any set-up at all.”

3.5 Support

In the section on technical support, we asked whether faculty received support and, if so, what was its source.

3.5.1 Do You Receive Any Kind of Technical Support?

Fully 85% received support, mostly from instructional technology staff, but all received help from multiple sources. Instructional technology assisted 292, or 72%; visual resources assisted 126; student assistants, 111; the library, 106; workshops, 87; and departmental or other college staff, 82. Of the 292 who got help from IT, 94 also got help from visual resources, 92 from the library, 89 from students, 80 from workshops and 65 from their department. Similarly, the 126 who got visual resources support also got it from IT (94), students (56) the library (44), workshops (34) and the department (29) and so on (Figure 12).

What were other sources of support? Only 35 responded. While several commented that support was “minimal,” or “inconsistent,” and others felt very much on their own (“I am relatively self-supporting”; “Really I have to do it on my own”), many applauded

	IT	Visual Resources	Student Assistants	Library	Workshops	Dept
IT	–	94	89	92	80	65
Visual Resources	94	–	56	44	34	29
Student Assistants	89	56	–	48	41	33
Library	92	44	48	–	41	37
Workshops	80	34	41	41	–	29
Dept	65	29	33	37	29	–

Figure 12: Multiple, Shared Sources of Technical Support

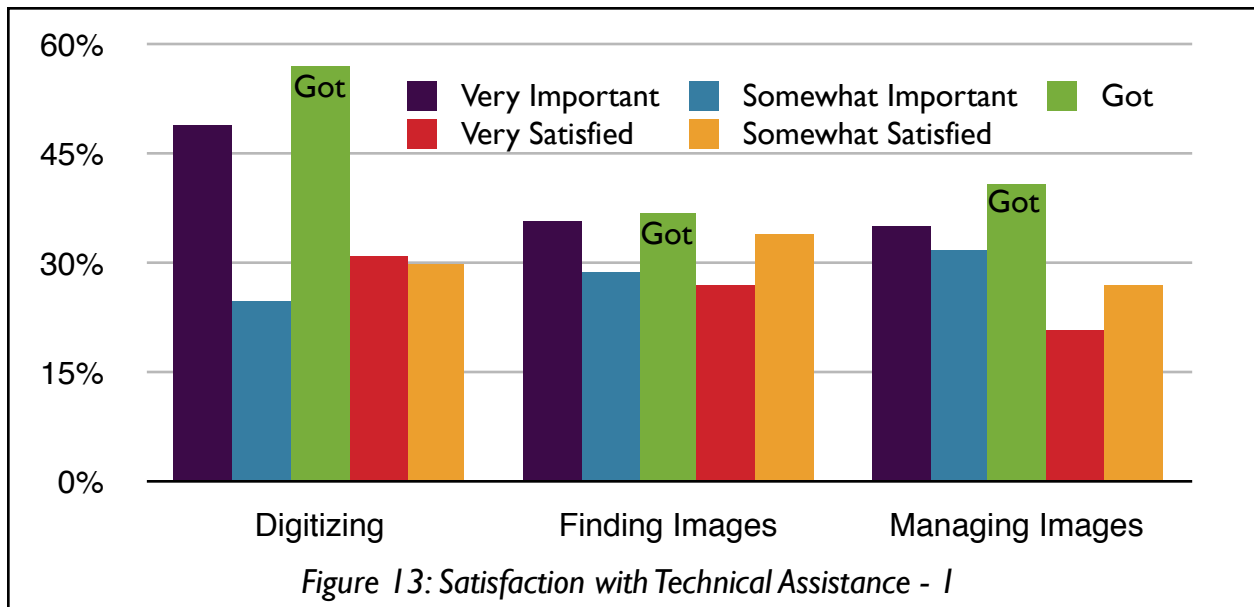
those that gave help (“Excellent support”; “IT has been fabulous”). New sources cited included “colleagues,” “faculty,” “friends,” “kids in class,” “language center staff,” “on-line help,” and “conferences.”

3.5.2 Comparative Importance of Certain Technical Assistance

What technical support did faculty most need, what did they get and were they satisfied with the support they received? We asked about the importance of six kinds of support: finding images; digitizing images; interpreting or applying copyright law; creating a website; importing images into a database or course management system; and organizing, cataloging and maintaining images in such a database or CMS.

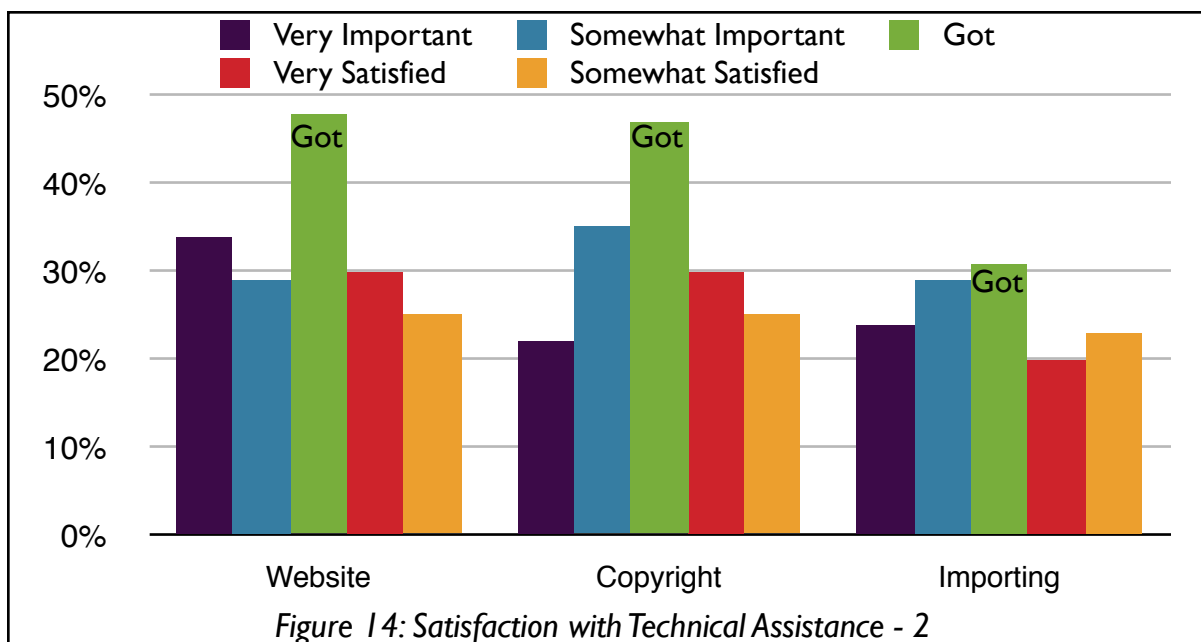
Consonant with other information on faculty’s attitude to acquiring digital images, this question showed that most faculty were not waiting for pre-packaged digital image-bases but were instead actively assembling their own collections. Most important for faculty was assistance in digitizing images. 74% said it was important (49% very; 25% fairly). More people got this kind of support than not (57% did, 27% did not) and more were satisfied than not (61% very or somewhat; 15% not) (Figure 13).

Next in importance was support in finding images: (36% very; 29% fairly). However, this was the area in which most people did not get the support they needed (48% did not get help, 37% did and 15% didn’t answer). Close to this in importance was support in



managing (organizing, cataloging and maintaining) images in a database or CMS. While 67% of respondents thought this very (35%) or fairly (32%) important, they were split over whether they got the help (41%) or not (38%) and half of those who got help were not satisfied with it.

Close behind image management in importance was support in creating websites: 63% saw this as important (34% very; 29% fairly); 48% got support and 55% were satisfied (30% very; 25% fairly) with the help they got. Least important was importing images



into a database or CMS (35% saw this as not important at all; 24% saying “very” and 29% “somewhat”).

Curiously, given the often heated expressions in the interviews, copyright assistance was not seen in the survey as critical (while 35% said it was somewhat important, only 22% said it was very important and 30% said it was not at all important). But still 47% felt they received copyright assistance, 30% were satisfied, and 25% somewhat satisfied (Figure 14).

3.6 Obstacles

The survey asked about the obstacles that prevented faculty from using digital images the way they wanted. The responses confirm the results from the question on technical support. Help in digitizing, finding and managing images was most important, but half or less received these kinds of support. As a result, there was much frustration, especially given the amount of time that was consumed in going digital.

Time

The chief obstacle for well over one-third (130) of the 330 respondents to this question was the amount of time demanded from faculty. This was itself the result of other obstacles, chiefly a combined lack of institutional support, adequate staffing, infrastructure and overall institutional planning and vision for digitization.

For some, it was the acceptable but still onerous amount of time to learn about digitization, technology and their pedagogical implications:

- “Time to learn the technology, to implement the knowledge and to design courses for ease and effective use” (Literature);
- “Finding time and garnering sufficient self-discipline to learn new software” (Literature);
- “Not enough time to develop the resource” (Earth Science);
- “Not enough time to explore options” (History);
- “To truly innovate would require more time than I have to give” (Engineering).

Some of the time required was the barely-acceptable and very burdensome time needed to digitize their own slide collections or to find new digital images:

- “I have done most of the work digitizing my slide collection for class presentations. It is in the beginning stages and hopefully I will have enough done by next fall so that I will give most all of my talks from digital images” (Art History);

- “Time is the chief obstacle. I have many of my own personal analog images and I simply don’t have time to digitize these” (Biology);
- “The primary obstacle is that I don’t have the time to spend searching for images, or to catalog them when I do find them. As a result, my use of digital images feels very random and chaotic” (Global Studies).

While some institutions do offer digitization services and support, often that service was so slow and tedious that faculty would opt to do it themselves: “The visual resources center will digitize existing slides for you if you know several months in advance what you will need, but it is often faster and more accurate to scan images from the original hard-copy as necessary; their collection of maps is particularly poor, and GIS-generated imagery is my solution” (Archeology).

But others prefer not to move until the land is secure: “We are terribly understaffed. I would have to do all the work myself and I have seen at a number of schools that faculty time disappears quickly into the shift in technology...I fully appreciate the potential advantages...but until I see a way to change over fully to a digital system, without spending the hours myself scanning thousands of slides, I will happily continue to work with slides” (Art History).

Lack of Knowledge

One obstacle is the lack of knowledge felt by many faculty about this entire enterprise. Many see the Promised Land but don’t know how to get there. They need time and personal assistance to help them help themselves:

- “Time to take the time to learn properly so that I don’t reinvent the wheel every time I need to use digital images” (Literature);
- “Lack of knowledge of tools and how to use them...for both classroom presentation and out-of-class viewing by students” (Classics);
- “My lack of ability to manipulate the database of images, make changes in sequences etc., to keep the site current year after year as the course evolves, because that makes me dependent on support that is hard to get because there are too few people available to help on an as-needed basis” (Art History).

Faculty also need help in understanding the effect that digital images might have on their pedagogy:

- “It’s very hard to know how to show images in a way that doesn’t interrupt discussion or lecture” (Area Studies);

- “I would like to learn how better to analyze images generally for use in a fruitful way in courses dealing with cultural content” (Literature);
- “Explanations of images in historical context would help students make better use of those images, I think” (Literature);
- “No way to assess impact upon students, who are drowning in images” (History).

Lack of Personal Support

Several suggested more personalized assistance, funds or release time to allow them to get the job done by other means:

- “It would help to have more technical staff available to be linked to a course or department” (Physics);
- “ITS are exceedingly generous with their time and responsive to my questions, but I would like there to be individuals whose job description was simply to assist faculty” (Art History);
- “There is not enough support given to professors for the research, cataloging, and liaison procedures... necessary to effectively go digital.

“IT has been terrific, but there are many tasks that take time away from actual preparation for teaching (as well as research) that really require funds for personal assistance.”

This is very ad hoc. In the past I have had to use my own research funds (and too much of my own time) for this. [IT] has been terrific, but there are many tasks that take time away from actual preparation for teaching (as well as research) that really require funds for personal assistance” (History);

- “Scanning images is exceedingly time-consuming. I would like release time to digitize all of my classes” (Literature);
- “Since I am not in a department whose primary engagement is with visual materials, it takes much more time than I have in a semester to learn new techniques. I would like time (release time) to become better acquainted with the various tools” (Gender Studies).

Lack of Adequate Support

Apart from the need for personalized, ideally one-on-one support, there is the problem of determining roles and responsibilities for delivering appropriate support:

- “The college’s ITS and ETS staff is woefully inadequate and not trained or motivated enough to provide professional support for pedagogy; I have been very disappointed with all of my dealings with them on classroom matters. Hardware

and software support seem OK, but classroom support needs a lot of help” (Art History);

- “There has to be some thought-out integrated faculty training, but not just in PowerPoint. IT people have to understand that what faculty do is teach; we don’t want to spend our lives tweaking and fussing with the hardware and we shouldn’t have to. It should—and could—be practically plug-and-play” (Art History);
- “Lack of adequate, user-centered tech support and a lack of a coherent framework for digital resources. No one, really, is minding the store on this one” (Art History);
- “Almost everything I do, I do myself—IT support for faculty has continued to decrease yearly. Yet the possibilities and complexity increase each year” (Russian);
- “There needs to be more institutional technical support for faculty to use electronic media in teaching to make it practical to have routine use of state-of-the-art or varied technologies” (Biology);
- “Outrageous lack of support from IT. Our visual resources slide library staff is wonderful, but the educational technology staff is surprisingly difficult to work with on this issue” (Art History);
- “My use of digital images is limited by the projection equipment available...and by the lack of support for finding, creating, storing, organizing, etc. digital images” (Art History).

“There’s a lack of adequate, user-centered tech support and a lack of a coherent framework for digital resources. No one, really, is minding the store on this one.”

More specifically, classrooms, hardware and software were all mentioned as obstacles.

Classrooms

- “Our classrooms are still awkward to use, especially for Web-based content. Our computer classroom in this building is particularly horrible for anything but a lecture class with problem sets” (Area Studies);
- “[We have] no computers, projectors or Web access in the studio arts building” (Studio Art);
- “Classrooms are sometimes unreliable, due to poorly maintained machines and unstable network” (Classics);
- “Not having enough classrooms set up to do it” (Sociology);
- “Different rooms have widely different equipment” (Classics).

Equipment

- “Simple working machinery. Using digital resources needs to be as simple as picking up chalk” (Astronomy);
- “The availability of LCD projectors in the classrooms is by far the biggest hurdle for me. The pain of finding and setting them up motivates me to rely primarily on overhead transparencies, unless I’m giving a special talk” (Earth Sciences);
- “College equipment is awkward, untrustworthy, and of mixed quality” (History);
- “There is no reliable set-up in a classroom to project from a disk, a laptop or a net connection” (Art History);
- “There are sites on campus where the technology for work with digital images in the classroom is excellent, and then sites where it is barely adequate. This makes teaching across campus, especially in interdisciplinary settings, more difficult than it should be” (Art History);
- “I’m disappointed that the quality of the image on the screen varies so vastly from the image loaded in and showing on my computer. The projectors are lousy. And I’m told that each projector is different!” (Performing Arts).

“Using digital resources needs to be as simple as picking up chalk.”

Software

- “Not having the right software on computers that are easily available to students to use the images in hands-on labs or homework exercises” (Astronomy);
- “I’d like to use the discussion boards and integrate images, but our version of Blackboard is appallingly bad, practically useless” (Art History);
- “WebCT is practically useless when it comes to posting images; it’s much too labor-intensive” (Art History);
- “No obstacles - but I do dislike Blackboard, which I find cumbersome and annoying to use, even though there is plenty of support for it here” (Music).

Access to Images: Collections

Finding images is a big problem for many. First, a departmental or college digital library is nonexistent, small or still being constructed:

- “I am in a very small department with no image library. So all the resources that an art library/slide library provide, from collection management on, is absent. It would be great to have that” (Art History);

- “No collection. We will slowly digitize but our visual resources person has to learn how this is done. In the meantime, ARTstor is wholly inadequate...Luna...might be better, and I’ve had to find everything online using Google—with VERY variable results—or on rare occasions I’ve found a nanosecond to scan things myself. This too is very tedious, and until our database parameters are set it doesn’t make sense to do it in any extensive way” (Art History);
- “I’m on my own to find or scan images. This might not be such a problem if the departmental digital collection were bigger, but it is still in its infancy and so far this collection has contributed less than 5% at most of the images I’ve used in my classes. So it would be great if Visual Resources had a bigger staff and infrastructure both to process requests very quickly and to scan the whole slide collection” (Art History).

Access to Images: Databases

Beyond local resources, many are desperately searching for reliable online databases:

- “Poor and/or inconsistent digitization of images relevant to the courses I teach, with poor and/or inconsistent metadata tags to allow them to be searched rapidly or easily” (Cultural Studies);
- “Access to more images, specifically current contemporary art practice” (Computer Science);
- “Access to the images. I do not know of any database of images” (Biology);
- “Finding images of theater sets and puppets and animations” (Theater);
- “It would be great if someone created a searchable index to URLs for images already existing on the Web” (Classics);
- “Having a central database with easily-identifiable images that can be used to create interesting lectures on a variety of issues ranging from popular culture and art to issues on race, gender, advertising, media events, etc.” (Communications);
- “Having a database on my area of research and teaching (Latin American History) that has a range of high-quality images...dating from the colonial period to the present would be nice” (History);
- “Some of the contemporary artwork that I want to utilize is difficult to find in digitized form. Also, it would help to have more digital images of the college museum’s exhibitions and collections” (Art History).

Copyright

Once faculty have found images, there is often confusion about how they can use them:

- “Clearing copyright for the use of contemporary images is the primary obstacle” (Performing Arts);
- “Draconian copyright laws can be an impediment to teaching...Educational institutions (including mine) tend to be pretty cowardly in their interpretation of copyright law. If I followed college guidelines, I’d have to curtail educational projects that I regard as highly useful” (Film);
- “Copyright concerns are significant. I feel as if the college wants us to use multimedia and wants to support us technically, but does not want to become involved in advising on legal issues, expecting individual faculty to assume liability. This is a bit uncomfortable” (Literature);
- “Whatever happened to the idea of making a case for fair use?” (Art History);
- “Copyright issues! These are extremely time-consuming, and Information Services is, it seems to me, more paranoid than informed about the laws. I spent huge amounts of time trying to be in compliance, all the while getting contradictory messages from different people” (Literature);
- “Excessive copyright protection—both by museums and image repositories like ARTstor” (Archaeology).

Managing and Organizing

Third on the list of areas of support prioritized by faculty (in the survey question on Support) was assistance in organizing and managing images. The importance of this was also borne out in responses to this question:

- “Since 1999 I have amassed thousands of images and yet I have no image database. I imagine that my colleagues in the History department are in the same pickle of having amassed images with no organizational strategy” (History);
- “Perhaps the most pressing long-term problem is the lack of an established process for archiving and cataloging images for teaching” (Art History);

“Perhaps the most pressing long-term problem is the lack of an established process for archiving and cataloging images for teaching.”

- “I would appreciate further training in using Portfolio and updating and managing my database of images” (Art History);
- “I would like to have a tool to manage my entire personal digital image collection, but I don’t have such a tool” (French);
- “Image management: I have images stored in folders along with the assignments/activities to which they relate. What I would really like to have is some fabulous catalogued image collection of all the images I use so that I can find them easily and they are not scattered around on my hard drive. I also recognize that I just don’t have the time to create such a collection” (Earth Science);
- “Inability to categorize and catalog my personal image collection so that I can have easy access and as well as search by keyword or description capability” (Biology).

Integrated Vision of Digitization on Campus

Overall, perhaps the single largest obstacle for faculty using digital images in a consistent, satisfactory way was a systemic one: a lack of leadership, of organization and of prioritization of resources for digitization:

- “We just don’t have the infrastructure, and we don’t have an administration that listens to our needs. It’s all treated like something that can happen overnight, if we just put in a little more time and stop being ‘resistant.’ Unfortunately, we don’t have the time” (Art History);
- “Budgetary: There is no ongoing budgetary support for improving and maintaining what one has already built. The only time financial support is actually available is when one has a new project or radical redesign of an existing one” (Biology);
- “The full burden of creating digital collections or for searching for images is put upon the faculty member. With analog slides, the slide library staff purchased, cataloged, mounted and filed images. Now virtually none of this work is done by the staff, making the faculty member both clerk and teacher” (Art History);
- “The Art department needs additional staff to implement its massive transition to digital imaging. We need active, constant assistance from IT staff with understanding of what our problems are, intellectual and pedagogical” (Art History);
- “There is no IS support for building a serious digital image collection on campus” (Art History);
- “When our languages and culture building was renovated about 8 years ago, we requested computers and projectors in all classrooms. We were told this was too expensive. Yet, during the more recent renovations of our art building and

engineering buildings, no such excuse was put forth and both buildings are equipped with state-of-the-art projectors, screens, computers” (Literature).

Transition

Finally, many recognize that schools are in transition.

For one faculty member, the situation suddenly improved: “I have been extremely dissatisfied with the options (software, hardware, and especially support) available so far, but this is all changing for the better at this very moment...The main obstacle before was a refusal by all kinds of folks to scan things at the resolutions I requested and the absence of a support system or specialists in the management of digital images” (Area Studies).

However, others are feeling the rub:

- “The big problem right now is that we are in a transitional phase without sufficient support to enable us to move into the digital world smoothly” (Art History);
- “The chief obstacle is that my digital collection is incomplete and so I switch back and forth between slides and digital for teaching” (Landscape Studies);
- “We don’t have a large enough digital collection yet...I’m not sure what the long-term plan is, but it will be a long time from now before I can count on being able to teach a new course with digital images. I will be in transition until the digital collection catches up with the analog collection” (Art History).

3.7 Other Comments

Half of our respondents gave final comments on their experience using digital images in teaching. Of the 196 final comments, some 20 announced that they “loved it!” Some were unconditional in their acceptance: “I adore it and I do more each time I teach each year”; “It’s been life transforming!”; “Overwhelmingly positive”; “I love it! It eliminates the constant noise of slide projectors, enables students to see my lectures, allows me to draw on a wide range of images, and enables me to be more creative with my lectures. Best of all, I like the fact that the lectures once created are always there!” (Art History).

Others, however, had some reservations: “I love teaching digitally and will never go back to slides, but the next few years are going to be really difficult as I re-make my courses to respond to the digital revolution” (Art History); and “I love what I do. I am a visual person, and I teach in a way that helps me learn and that students, in our increasingly visual culture, relate to. But I would like more institutional support, or at least credit, for the technological skill, constant innovation and time commitment required to do this well” (History).

Not Using

A few were not yet using digital, “because the quality is not good enough”; “because the threshold conditions have not yet been met”; because of “unacceptably poor visibility, the time needed to scan, sort and put together entire digital presentations, as well as issues of memory and storage”; and “institutional support needs to be stronger before I embark on using them more extensively in my teaching” (all Art History).

Transition

Many, perhaps most, are still in transition.

Some reported in, mostly with fairly positive experiences:

- “I have been the test case for [my college] and have had problems in all regards, especially in getting the projectors working well. Nonetheless, I am delighted with my ‘conversion’” (Urban Studies);
- “I feel it is great and very helpful in teaching. But it took me a long time to switch” (Asian Studies);
- “The transition to digital teaching was very successful. Staff...was extremely helpful and competent and is always available. Nonetheless...training sessions...[in] PowerPoint, Portfolio, etc., would be a good thing” (Classics);
- “My first experience was the past semester. I spent a great deal of time finding and sorting images, which I expect next time will be not so onerous. I was particularly pleased to be able to find images relatively quickly to illustrate lectures that previously had no such support” (Classics);

“The transition to digital teaching was very successful. Staff...was extremely helpful and competent and is always available. Nonetheless...training sessions would be a good thing.”

“It’s been a nightmare; all the more so given the obvious pre-eminence of teaching with digital images. Why is it so hard for an institution to commit to a program/platform and get things moving?”

- “It is working better than I anticipated and since we are starting from scratch here it has worked well to have AMICO and now ARTstor to provide the backbone of a collection” (Art History);
- “It’s been a nightmare; all the more so given the obvious pre-eminence of teaching with digital images. Why is it so hard for an institution to commit to a program/platform and get things moving?” (Art History).

Others, having waited awhile, feel that now is the time to take the plunge:

- “I have been watching and waiting to use digital images for years...With ARTstor, the time has come. A crucial threshold for me is whether I can reasonably replace analog images with digital images, for, say, a single lecture” (Art History);
- “I tried it tentatively some years ago and it was out of the question, too crude. Now it seems feasible, necessary, and in some ways better (quantity of images available)” (Art History);
- “Until this year the resolution quality of projected images was not very good and I wasn’t too interested in getting serious about ‘going digital.’ But the College has purchased several new, high-resolution data projectors, which has improved this situation markedly. It makes it worthwhile” (Art History).

Some are caught in a hybrid situation: “I like the ease of using digital images, but I often can’t find what I need in digital form. So, I often end up giving half a lecture with slides and half with digital images” (Earth Science).

But several are looking forward:

- “I believe...possibilities [are good here], but [other] demands for time...keep me from taking sufficient advantage of the resources available” (History);
- “This is my first year and I am using the same approach that I did with 35 mm slides (a fixed slide presentation and accompanying narrative). As I get more familiar with the software, and as more functionality becomes available, I may adapt my teaching style to take better advantage of the advantages of digital media” (Engineering).

Improves Teaching

Many commented further on how using digital images was improving aspects of their teaching:

It makes teaching more creative, classes more lively:

- Images “make classes more supple and vivid” (History); and “bring a biology classroom alive” (Biology);
- “It is beginning to revolutionize the way I teach. I actually enjoy putting together creative presentations” (Art History);
- “It is fun, it adds a lot to the teaching environment—especially in biology; students can easily make digital presentations” (Biology).

It engages students:

- “Students have been more engaged since I starting using more images. They often bring up related issues and are more active in direction discussion. I find this mode of instruction much more interesting and pedagogically useful than pure lecture” (Astronomy);
- “I find students typically respond in powerful ways to powerful images; that is, the use of images can, by turns, motivate students to do more research, to address reading material that may otherwise seem distant and irrelevant with a greater sense of immediacy and investment, and even to search for and share other images. In this respect, the use of images can, perhaps ironically, foster greater person-to-person contact in the form of student exchanges in and out of the classroom, and certainly in the form of teacher-student conversations as well” (Film Studies);
- “Availability of digital images has enriched my teaching profoundly, both in terms of the quality of material I can present to students and in terms of their enthusiasm for course materials and thus for the course” (French);
- “Digital images enhance my teaching in a lot of ways. They also tend to engage students’ creativity and interest more” (Communications).

And teaching with digital images generally makes teaching easier:

- “Despite the problems, digital images have made my teaching much easier and richer. I can’t imagine going back to slides anymore, both in terms of the time it would take me to put together presentations as well as the things I can do in class” (Art History);

- “I love the ability to access locally-stored digital imagery during meetings with students” (Archeology).

Pedagogy

There are also elements of the new relationship with materials and students that raise further questions about teaching:

- “I teach a class in remote sensing that is fundamentally all about digital images—the physics of how they are made, the computer science of how they are processed, and the science of how to interpret the data. Students often come in with very little idea of how a digital image is made and stored, but once they see through the image into the data behind it, all kinds of new possibilities open up” (Astronomy);
- “I mainly use images of ‘real’ biological material that require interpretation and raise questions or may be inspiring, novel and appreciated aesthetically; and I also use a lot of images that are not scientific...for humor, instructive or unexpected juxtaposition, outside perspectives, to make broader connections to applications or implications. [I will] insert a snapshot or preview of more advanced, speculative or controversial or even enigmatic concepts and applications or associations, to keep people awake and thinking and challenged in some way, much like a visual digression or annotation, and to help students associate something memorable with the course material/concepts” (Biology/Genetics);
- “Using a presentation tool like PowerPoint has helped me to ‘script’ my classes better. Using images enhances my teaching styles. I use a lot of maps and having immediate access to them saves time” (Anthropology);

“The ability to design pages with multiple images has changed the way I approach information in class.”

•“The ability to design pages with multiple images has changed the way I approach information in class as has the ability to screen text, for example, large quotes from manifestos or Baudelaire, lists of materials, dates, and so on. I’ve found this effective and much better than Xeroxes. Other good things: field trips with students can produce digital images that can immediately be screened and discussed—very nice” (Art History);

- “There is a temptation to use too many images, which detracts from discussion and lecture points, this is not inherent in the technology, but my own reaction to the sudden availability of this technology” (History);

- “When I originally envisioned transferring my old slide collection to a computer based system, I had NO idea how huge the task would be. I don’t regret it; I’ve had such wonderful support from the staff AND I have a dizzying selection of images available from the rest of the database. Do I really need all those images? Not really. Is it worth my time and staff’s time to incorporate all these costume-related images? I hope so. This image collection is used in only part of my course, one hour a week out of 5. Hopefully, the investment of time and labor will pay off” (Performing Arts);
- “The trick, of course, is to actually put the technology to work, so that its abilities are utilized and digital images are not merely ‘slides for the computer.’ To imagine how digital images can be used in new ways is a challenging and creative process. At times, of course, the experience is frustrating but more often I have found it rewarding” (Art History).

Difficulty Reading/Using Images

Using more images sometimes brings teachers face to face with students’ inability to handle or effectively use those images, making them realize they need new strategies:

- “I enjoy teaching with images but I get frustrated sometimes because students are not very observant and do not know how to describe what they see. Geology depends greatly on visual communication. Students don’t seem to understand that they can learn from images, and a lot of them act as though ‘picture time’ is for relaxation and enjoyment!” (Geology);
- “Students get too bogged down with the detail of complex images, and take them too literally—they have a hard time connecting concepts to images, and also get frustrated when an alternative image of the same thing is presented because it’s ‘different.’ Images of ‘real’ things are great, but images constructed as ‘teaching’ tools are usually dopey, misleading, oversimplified, limited, and provide a sense of false security—students think that if they memorize the image they ‘understand’ what it represents. The medium is not the message” (Biology/Genetics);
- “I am trying hard to stay current with new techniques, but there is more to teaching than running pretty pictures in front of non-challenged, and non-seeing, students. One can pour hours into a digital presentation that lasts 10 minutes and has students falling asleep” (History);
- “It’s a huge time investment and is frustrating when students don’t respond: one third of the students ignore assignments to view the images, or consider them a lesser assignment—even when the pictures are the main topic of study. I

also find it frustrating how little they appreciate the work that went into such resources. But the ability to use such images is truly a gift” (Area Studies);

- “I do it more and more—but I have to screen carefully what I ask students to use otherwise they get lost and waste time” (French);
- “Students will always think it is easier and faster to ‘look at pictures’ than to read texts, and history is principally the study of texts, so again, my own needs fall into the category of in-class lecture use” (History).

Languages

Several language teachers emphasized how crucial images have become now that they are so accessible:

- “As a teacher of languages and cultures, I find images are central and until recently not accessible. Now they are accessible and therefore, play an increasingly important role in our curriculum—especially since we create most of our own materials” (Spanish);
- “I am a French language teacher and I would like to devote more time to building a database of digital images that show students culturally relevant symbols. I am using images and digitalized archives about WW2 but find it very time-consuming to build the course and integrate its components digitally” (French);
- “It has been a very useful tool in teaching language and culture courses; they have effectively supported my interactive approach to teaching these subjects” (Languages);
- “I type new words and texts...and project them onto a big screen that can be clearly seen by students. I point out new words, put them into phrases, or sentences, and then ask them to do similar things. This method is particularly useful for beginners in recognizing characters and in combining characters into words, phrases, and sentences. I also use digitized images of a situation to let students communicate about it” (Chinese).

New Approaches With Students

Several teachers have been inspired by digital images to try some new approaches:

- “There are wonderful things you can do with them, especially in the area of student assignments. They can do amazing things, the assignments are very creative and cool, it’s all good” (Social Psychology);

“There are wonderful things you can do with digital images, especially in the area of student assignments. They can do amazing things.”

- “Student production of images was central to my class and raises important issues. Mostly, those of privacy. I want students to feel comfortable using images without them being examined by the general public” (Anthropology);
- “Weblogs for Photo II students have been an exciting experience for the students, something that grew directly from my experimenting with my own blog. They love how posting an image puts it out into the world and gives their efforts a broader impact, outside the usual bubble” (Art History);¹³
- “We are...experimenting with putting images on iPods for students in the first-year Japanese language class” (Languages).

Using Own Images

Many enjoyed being able to incorporate their own digital images and photographs into their classes:

- “I enjoy the challenge of using the digital camera, downloading the pictures, etc. I just purchased a good camera last spring, so this technology is relatively new to me. I do find it exciting to create these pictures and display them” (Psychology);
- “I enjoy this aspect of my work immensely, from traveling to collect the images through sharing them with students in my classes, during guest lectures, and in special library displays. I have also tried to invite student digital creativity through a cross-cultural collaboration between our senior majors and a group of students at Sherubtse College in Bhutan” (Religious Studies);
- “I love digital images! I am so much more likely to take photos, for example, photographing the same tree at different times of year; with a print camera I’d be concerned with wasting processing chemicals, etc., but digital gives me much more freedom to experiment” (Earth Science).

Resources

As for finding images, some were delighted by what they could find, others still had difficulties:

- “Luna and ARTstor are not very helpful—they do not comprehend my needs and uses and almost nothing they supply is useful. Their reference is art historical and they are not aware of the contextual information (metadata) needed for scholarly purposes. They are too centralized. I prefer an organic, open-source approach” (Archeology);

¹³ See <http://ssad.bowdoin.edu:9780/courses/f04/vart280/>

- “Everything would be perfect if ARTstor had far more images” (Literature);
- “I like them [digital images] but they’re not utterly crucial to the effectiveness of my teaching. I’d like to have access to a great database of 19C-20C Russian art as ARTstor’s Russian collection is laughable” (Russian);
- “One of my courses involves appropriating, manipulating and changing images using digital means, electrostatic copying and hand lithography. Having a means to collect, manage and manipulate these images would greatly enhance the curriculum” (Studio Art);
- “The available digital resources are incredible...This is much less true for upper level courses. It would be great to have more developed digital resources for advanced classes and specialized topics” (Psychology).

Support

Many went out of their way to praise good support they had received, but several still pointed out problems:

- “All of the IT, media, and library staff who have assisted me with various projects have been extraordinarily helpful” (Math);
- “I am largely self-taught because support was so bad here for so long. It is vastly better now” (French);
- “I have been transformed by going digital. I give the credit to our instructional technology group, but...this unit’s success requires more resources. It is clearly overworked and needs more staff in order to continue its mission of enhancing teaching at [this college] via technological innovation. It is a model program for how it tries to help instructors achieve their own pedagogical objectives via new technologies rather than impose a one-size-fits-all approach. Without the personal attention that staff provided me, I would never have gone this far. Yet, I doubt today that kind of attention

“I have been transformed by going digital. I give the credit to our instructional technology group. It is a model program for how it tries to help instructors achieve their own pedagogical objectives via new technologies rather than a one-size-fits-all approach. Without the personal attention that staff provided me, I would never have gone this far.”

would be possible as more and more faculty make demands on this unusually talented cluster of people” (American Studies);

- “I think using digital images has helped my teaching greatly, and I appreciate all the support IS staff members provide us—they are great” (Physics);
- “Quality of support is essential. Because I use images only intermittently I constantly have to relearn things and have never become comfortable working with images” (Classics);
- “The key piece...is the technical support from IT. The classroom hardware is thoughtfully set up, and easy to figure out and use. [If it fails] the IT support staff are immediately available by phone and come to the classroom immediately. The support system and attitude of our IT staff is just amazing.” (Earth Science);
- “I have a great deal of technical experience and never worry much about technical issues; however, I believe that many of my colleagues are intimidated and/or discouraged by technical obstacles or a lack of training. It seems that some don’t seek out the training that would allow them to make better use of digital images because they perceive it to be too difficult” (Music).

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Training

But still, very many were still interested in much more thorough training both in technical and pedagogical aspects of using digital images:

- “I’d like to have more training in the pedagogy of images...I want them to be real texts in the course rather than mere illustrations” (Asian Studies);
- “I love teaching with digital images. I feel that there is more to learn, and would like to take courses for faculty, but these are not offered on campus other than individually” (Art History);
- “I think there needs to be more training for the faculty on how to work with digital images, how to create a website, how to organize images in Portfolio” (Art History);

- “I liked the workshops the IT people here used to organize. Perhaps we could organize a series of them (let’s say two a semester), so that these would not be a one-time event” (African Studies).

Potential

Related to the need for training is the sense that there is great potential awaiting their discovery:

- “I feel my use of digital images is a little behind the available options and would like to learn more. I do think that [the college] has ample support, however I am not using these resources to my full benefit” (Landscape Studies);
- “I have really enjoyed teaching with digital images. I think [they] have the potential to enhance lectures greatly, and that if they are used properly, they can be an extremely effective educational tool” (Biology);
- “Great potential that has yet to be fully utilized—in terms of the technology, and in terms of my own teaching” (Literature);
- “I like using digital images and I have had relatively good success with it (except when the computer or the browser acts up...and then I get really upset!). But I don’t think that I have mastered the technology well enough to use it the most efficiently...I’m working on it though because I want to be able to use digital images more and more” (Literature);
- “In my situation, teaching with digital technology represents a qualitative improvement, not necessarily greater efficiency. To optimize the possibilities, I need ready access—and in turn need to know that my students will have ready access—to high quality, reliable equipment and experienced support staff” (Art History).

Frustration

Because the visions were sometimes so potent, the frustrations were felt more poignantly: “I find it frustrating and difficult in almost every way, and yet recognize that it’s vitally important to the kinds of teaching I want to do” (Cultural Studies). Many felt isolated or out on a limb:

- “It is frustrating—though there are individuals on campus who offer a great deal of help and support, at the institutional level there is almost nothing: I feel I do everything myself, and resent that I am having to use student research assistants to carry out work that our Library collections should be doing” (Art History);

- “Huge discouragement thus far, despite efforts to support a transition. [My college] tried to digitize 10,000 of my 30,000 personal slides this summer, ended up scanning less than half, half of which again remain unfiled, and all of which remain uncatalogued (estimated time required 650 hours). There seems to be a consistent failure to come to terms with the enormous amounts of time and money involved” (Art History);
- “It has a great future, but at this institution we are behind the curve in implementing this technology in a satisfactory way in our classrooms” (Photography);
- “I used digital images more some years ago than I do now. I have been frustrated with the lack of support, and have used images less in the past 3 or 4 years. My best experience using images was the year I had a student assistant to troubleshoot technical stuff” (Literature);
- “Images have made it easier to get difficult material across. However, the technical hurdles and inconsistencies on campus are a deterrent to really efficient use. Why invest in preparing 15 full lectures when on a given day I might not have a remote control to move slides from across the room?” (Asian Studies);
- “In concept, it’s much easier than overheads. But if the computer doesn’t work or something doesn’t transfer over correctly, than you’re stuck for the class, or you lose a lot of time” (Earth Science).

Finally, while some are worried that the book and the library will be left behind (“It concerns me that students go to the Internet to look for images rather than the library. Without a book, they have no context for the images, and the quality of the images is terrible”), others look forward, stressing the importance of moving images: “the more striking changes occurred when it became possible to use videos, animations, three-dimensional modeling and other multimedia techniques without having to employ professionals to create that stuff.”

4. Results: The Interviews



4.1 Introduction

The survey results were supplemented by 326 interviews; 296 with individuals and 30 with groups, half of which were attended by different mixes of instructional technologists, faculty, librarians and administrative staff.

The purpose of the interviews was to deepen our understanding of the survey responses and clarify developments on campuses and within disciplines. In addition, they had a catalytic effect. Under the banner of digital images, discussions (and revelations) among staff about campus infrastructure issues flourished and, fielding questions about developments at other schools, the project expanded the networking among faculty and staff who were becoming interested in digital image pedagogy or deployment, or both.

The interviews were open-ended but generally covered the areas of how faculty use images in their classrooms, how students respond, how faculty find the images they use, what tools they use and still need, what kind of support they receive and what their goals and obstacles were in teaching with digital images.

Some new themes emerged, along with elaboration of some of the themes already uncovered by earlier studies and by the survey. They fall into four categories: sources, teaching and learning, training and support and local infrastructure.



4.2 Sources

One of the biggest issues, widely discussed and at the core of the research studies reviewed for this project, is the supply of digital images.

4.2.1 National Resources

On the national level, there is a thirst for discipline- or subject-based image databases that are reliable, of high quality, with good metadata, and that are both free and copyright-free. Many of those that exist are organized by scholarly societies, government agencies or discipline-based institutions, some by individuals or groups (see separate Resources listing in Appendix Two).¹⁴ Some faculty are willing and interested in feeding such databases or even creating them, but they need support to do so.

For example, Yale biologist Stephen Dellaporta uses images extensively, finding them especially useful in explaining complex concepts. He particularly admires the images produced by the National Center for Biotechnology Information, of gene and protein structures and sequences that can be rotated and animated. But he feels strongly that there is not enough non-copyrighted material publicly available in the sciences. Some commercial firms are trying to fill the void, especially with animations. Dellaporta hasn't yet found what he has needed in public learning object repositories. When he cannot find what he needs he makes his own—both vector graphics and images—and would like, for example, to animate images of chromosomes to demonstrate how recombination works. He said that it “would be nice to put these into some central database structure where they would be available for others to use, especially if it could be reciprocated.”

Dellaporta's colleague in Molecular, Cellular and Developmental Biology at Yale University, Douglas Kankel, has been making computer animations for decades. Teaching “complex changes in space and time that are often part of very complex 3-D objects (such as embryo development)” would be difficult without these images. He felt there was an urgent need for a good library of such animations, but there was a real problem of standardizing them for widespread use. His own, he thought, were very idiosyncratically built, for use by himself, often in an ad hoc manner: “I just sit down and build them.” Although he had been encouraged to make them available commercially it would take him too long, even to give them away. For general use, there would have to

¹⁴ Note should be made of efforts within the museum community to ensure that digital versions of public domain works are made more freely available in high resolution and with rich metadata to fulfill museums' educational missions. The Getty Museum has proposed doing this and launching the works via the Open Archives Initiative protocol allowing anyone to harvest descriptive metadata and images from the Getty's OAI server. The Metropolitan Museum is launching a free “Scholar's License” for an initial set of 2000 digital images for publication and display in educational settings. See Kenneth Hamma, “Public Domain Art in an Age of Easier Mechanical Reproducibility.” *D-Lib Magazine*, 11 (11) <http://www.dlib.org/dlib/november05/hamma/11hamma.html>; and Jennifer Howard, “Picture Imperfect,” *Chronicle of Higher Education*, Volume 52, Issue 48, Page A12 (August 4, 2006) <http://chronicle.com/free/v52/i48/48a01201.htm>.

be another element in the design phase that would have to recognize some standard interface. So, in conclusion, he thought “someone has to spend some money to set up such a usable database.”

One possibly useful mechanism for these biologists might be found in the structure being created by the National Science Digital Library through its Biological Sciences lead organization, the American Association for the Advancement of Science, to encourage and assist scientists in contributing resources.¹⁵

Easier perhaps is producing a simple image database. Bowdoin plant biologist Barry Logan expects students in his plant physiology class to have a working knowledge of local flora, together with an understanding of remote (e.g. desert/alpine) adaptations. He used to show slides and overheads (taking his own pictures and having them developed in Portland as transparencies). Wanting his students to be able to identify a core set of images, Logan took a cue from many art history classes that have an image gallery available for review. Using a small Mellon grant, he built a modest collaborative botany database with colleague Bob Thomas at nearby Bates College, showing some

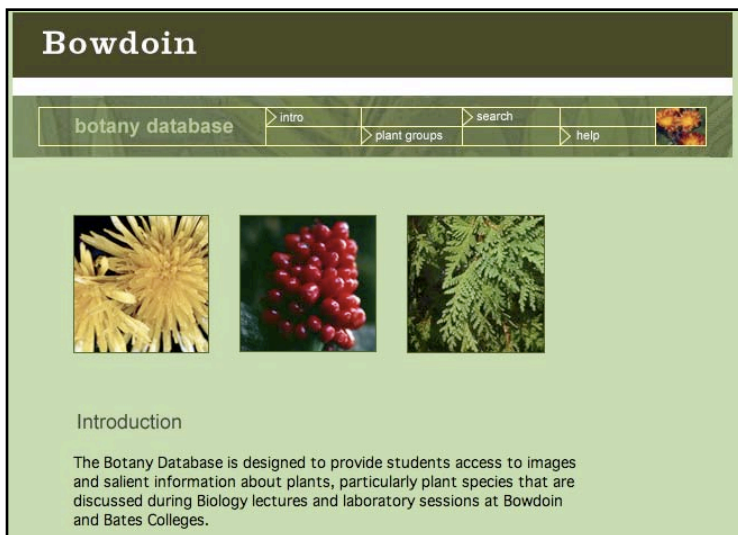


Figure 15. Bowdoin College's Public Online Botany Database

200 species with names, distributions, medicinal and historical uses, etc.¹⁶ With few copyright issues at stake, the database is available for all non-commercial use (Figure 15). Another impetus for Logan to build this resource was his strong memory of the frustration as a graduate student in seeing slide presentations in courses and then, “click! they’re gone and you never see them again.”

Another model for faculty-run databases is the wiki. Although not built as a wiki, the Asian Historical Architecture website¹⁷ was originally created by faculty at the Univer-

¹⁵ See the BiosciEdNet portal, <http://www.bioscienet.org>

¹⁶ <http://ssad.bowdoin.edu:9780/projects/cbb99/Plants/cgi-bin/intro.pls>

¹⁷ <http://www.orientalarchitecture.com>

sity of Virginia in order to invite contributions of photographs of Asian architectural sites. It currently has 9,000 images of 595 sites in eighteen countries, supplied by 35 contributors, complete with background information and bibliographies. Contributors are encouraged to correct and comment on submissions, directly to the webmaster or via a guest-book. High-resolution versions of the images are available for some two-thirds of the collection.

Faculty are also sharing images directly. An anthropologist at Smith College, for example, commented that he trades pictures with colleagues across the country: “I’ll trade my pictures from Ethiopia with what you have on the Masai.’ We’re all lagging on this. But I’d like a service where you can communicate around the world and around the country to do this.” Penn State University’s experimental LionShare project set out to do just that.¹⁸ An in-house experiment at Penn State that is working well on campus, LionShare has now expanded as a collaborative open source project to enable legitimate file-sharing among individuals and educational institutions around the world, “using Peer to Peer (P2P) technology and incorporating features such as authentication, directory servers, and owner controlled sharing of files.” Broad institutional sign-up, software installation and dedicated servers, together with active participation by faculty will be required, however, to make the rich potential of LionShare come to fruition.

“I’ll trade my pictures
from Ethiopia with what
you have on the Masai.”

4.2.2 Licensed Resources

The common issue behind the studies reviewed for this project (Penn State’s “Visual Image User Study,” The University of California, Berkeley’s “Use of Digital Resources in Humanities and Social Science Undergraduate Education,” and RLG’s “Out of the Database, Into the Classroom”) was the general underuse of expensively-produced digital resources, especially resources licensed by universities from third parties. Certainly in the interviews it seemed that faculty were often not aware of available licensed image resources. The RLG study, for example, reported that faculty would find low-resolution versions of images they needed in Trove.net, a subset of its Cultural Materials licensed resource that they made available for free on the Web. Faculty would then be surprised to find that high-resolution versions of the images were available to them for free

¹⁸ <http://lionshare.its.psu.edu/>

through their own campus library. Campuses signing up for these licensed resources might do a better job both in advertising the resources' existence and demonstrating their features.

Another lesson RLG learned was that no matter how good any individual resource, it will never be the sole resource used by any faculty. A key to success is to make the resource as interoperable as possible. Inflexibility and systems' inability to import and export images are big deterrents. One visual resource curator stressed that no one database could answer all needs and that, as faculty could not be expected to work with several interfaces, the ability to combine resources was key.

4.2.3 Local Resources

Although there were a number of exceptions, most institutional digital resources (where they existed) were not getting a lot of use. Many faculty expressed great frustration at the slow pace of transition from analog slides to digital. Many, having seen the light, scan or copy from the Web into their own personal collections, rather than rely on institutional collections. Campuses do show evidence of growing enclaves of digital images (in departments and with individual faculty) with few means of their being conjoined on campus. With no support on campus, one art historian worked mostly from home, but with virtually no effective cataloging, her digital collection was inaccessible to colleagues. For her it was like reverting to a "community college situation where everyone carries around their own slide collection. Whatever resource we had as a department is now gone. And I really dislike this." But as another art historian put it, we need to move beyond even an integrated art history collection: "All disciplines need to be able to access a variety of images and learning objects they can use in their classroom or Web environment." Students too, we learned at another group meeting, "would be happy to have an image collection that was stable and reliable as they have a lot of difficulty right now finding images from trustworthy sources; searching for images is quite haphazard and they feel very frustrated."

However, when the decision had been made to pool resources and create a central digital image resource center, there was concern that the college had not thought through all the implications. Here is one Visual Resources specialist on the mandate that the art history visual resources center now organize the digital image resources for the whole campus: "The level of complexity is much greater and requires collaborating with many, many more people and requires a lot more money...[A] lot of things go unrecog-

“Right now there’s no sharing, no centralized digital storage. We have a bunch of digital images all around campus but they don’t communicate; there’s no interaction between them.”

nized, especially by the people that can make the difference in terms of funding and staffing.” This discussion continued: “The slide library now has the mission to serve all—but it’s still in its nascent stages and still not yet recognized completely by the people who have the authority to make these things really work...Right now there’s no sharing, no centralized digital storage...[W]e have a bunch of digital images all around campus but they don’t communicate; there’s no interaction between

them...No way to get to everything...There’s no overall strategy—no plan.”¹⁹

4.2.4 Museums/Special Collections

The role of campus museums and library special collections in providing digital resources for faculty varies quite dramatically from campus to campus, with different dynamics between museum, faculty, administration, and IT. The Smith College Art Museum is one example of a museum hard at work digitizing its entire collection and conscious of its responsibility to students and faculty. It collaborates closely with the Smith Imaging Center, especially in cataloging what it digitizes and making it available in the main Luna Insight image database. One art historian praised the museum, the library, archives and special collections for being “very generous and helpful in digitizing and allowing us to use digital images.” Another new art historian was impressed that he was quickly contacted on his arrival by the Imaging Center, the museum and the library, each asking how they could help his teaching. On the other hand, another campus with an established art museum seemed more reluctant about making digital images available and usable by faculty. At a third campus, a museum with half its 5,000 objects digitized was trying to get its digital collection into the hands of faculty but was stymied by a cumulative lack of resources (money, time, technology, standards—and attitude). Ironically, because of a public schools-funded outreach project, only public school teachers are actively using the images. Faculty only have access to a small group of specific, low-resolution images for particular uses, but the images on

¹⁹ For some integrative strategies, see presentations by the University of Colorado at Boulder, the University of Virginia, Columbia University and the State University of New York at Buffalo from the 2006 Visual Resources Association conference session, “Cross Campus Collaborations in Building Digital Image Collections: Strategies, Challenges and Benefits” http://www.colorado.edu/arts/vrc/vrc_2006vrac.html.

the server so far are not accessible. The museum director and his staff felt frustrated that their resources were not recognized as critical to teaching at a high enough level.

4.2.5 Management of Personal Collections

Clearly related to resources is the large issue of the management of personal collections and their relationship to institutional collections. As is apparent from the survey responses and confirmed by the interviews, there is great frustration among faculty about not having the tools to effectively manage their own collections. Here, for example, is one Asian Studies professor: “I’m often frantically grabbing images I want and putting them into what I thought would be the right files but then later I’m unsure of what I put where and then without the full information [about the image] I often have to go back and redo things). So it’s very frustrating.”

Some institutions have given faculty some tools to help. Yale University has supplied art historians and others (now deprived of their slide library) with Extensis Portfolio software to enable them to do basic cataloging and management of their personal digital collections. Early results seem encouraging and Smith College is planning to follow suit. Art historians at Yale using Portfolio can download material from the the Visual Resource Collection (one of several institutional digital collections) into their personal collections and, in theory, vice versa. One art historian, disappointed that the institution’s digital visual resources collection is not growing faster, describes her ideal world as one in which she can combine images from both in her class presentations: “The interface of those two collections is going to be really crucial for any teaching with images in art history because we’ve always had our own personal slides, our own personal quirky areas, that only we are working on and would show in class and would never be in an institutional collection—and so that compatibility is really, really crucial.”

Faculty’s personal digital image collections are clearly a reality that must be dealt with. The relationships between these collections and emerging institutional collections will develop along various lines. Williams College, for example, has been using CONTENTdm as its image collections manager since 2003, so far quite successfully. The well-staffed Instructional Technology group (and a cadre of properly-trained students) assists in bringing personal digital collections into CONTENTdm with a range of different interfaces and breadth of metadata. Faculty appear very pleased with it (Figure 16). However, Williams Collections Online is not so much a true, institutional collection as

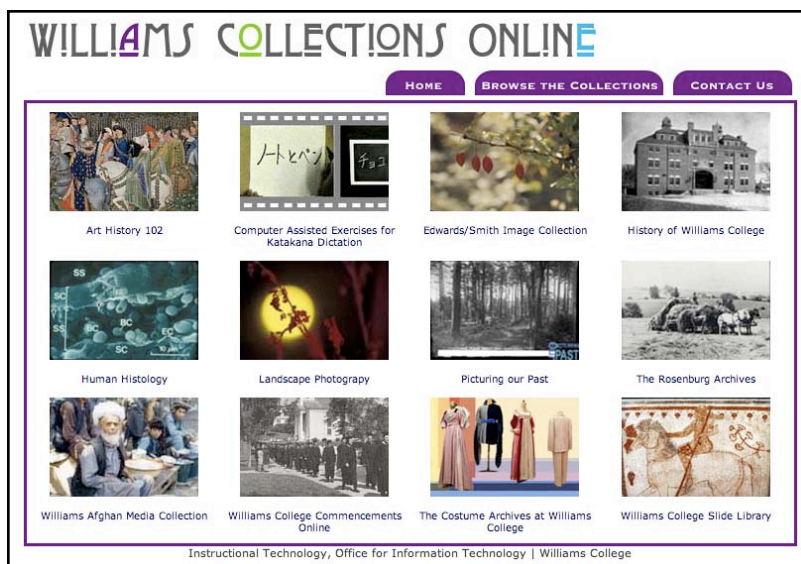


Figure 16. Williams Collections Online

it is a diverse “collection of collections” from faculty, departments and the administration, some accessible to the outside world, some not.²⁰ Similarly, Wesleyan University’s Media Database is an Oracle-based system where faculty can upload their own images or collections and catalog them. Faculty on many other campuses are still waiting for the institutional vision, staffing

and funding that would make such systems possible.²¹

4.2.6 Copyright

Although one campus had mistakenly posted digitized copyrighted video files on a public site, and one professor had received a “take-down” notice for copyright material displayed on his public website, overall campuses were more prone to err in the opposite direction of becoming quite risk-averse. The harshness of the Digital Millennium Copyright Act (imposing criminal penalties for circumventing any electronic protection of copyrighted material, while at the same time declaring that fair use still applies); the complexity of the TEACH Act (laying out how digital works may be used in distance education);²² and the activism of the Recording Industry Association of America in prosecuting thousands who illegally copy copyrighted recordings, have all contributed to a decidedly chilling effect on the use of copyrighted digital material in the classroom and in visual resources collections. One faculty member commented, in great frustration, that “the slide librarians here have become fixated on copyright.” When he asked them to digitize a *New York Times* photograph of recent French student riots (to

²⁰ <http://drm.williams.edu/>. See a recent story detailing how Williams has used CONTENTdm to bring 25 special collections and 30,000 images online: “Turning valuable faculty collections into digital teaching and research tools,” *OCLC Abstracts*, May 22, 2006, <http://www5.oclc.org/downloads/design/abstracts/05222006/williamscollege.htm>.

²¹ http://www.wesleyan.edu/its/media/guide/mediadb/what_is.html

²² See, for instance, North Carolina State University’s “The TEACH Toolkit,” website, <http://www.lib.ncsu.edu/scc/legislative/teachkit/overview.html>.

give incidental, contemporary commentary on 19th-century paintings), he was promptly told that it was out of bounds. A librarian reported that “fair use hasn’t been re-negotiated in our new world; I mean fair use is still under the old contract which really doesn’t apply.” But one young IT specialist at another school declared: “Fair use will get weaker and weaker if no-one is using it...I can cite 3 or 4 examples of faculty deciding not to use something in teaching because they’re afraid.”

Many factors have contributed to a decidedly chilling effect on the use of copyrighted digital material in the classroom.

Most visual resource collections do the right thing in not conducting a blanket digitization of their slide collections. When requests come in, they typically check whether a given slide was bought from a vendor and if so whether it is available in digital form. The slide could well have deteriorated and so they try to go back to the original source and scan from that. Some schools will even make part of their slide collections available on a public website, with a clear copyright statement, while others categorically refuse to digitize any existing slides at projectable resolutions because of copyright fears.

The importance of putting into place clear and well-thought-through copyright policy, created by all parts of the campus community and informed by copyright lawyers, cannot be overstated. Further, educating the community about that policy, and the principles behind it, should be part of every college’s responsibility.²³



4.3 Teaching and Learning

Does learning happen differently through images, and if so how do faculty adjust their teaching?

²³ See the 2005 American Association of Universities white paper, *Campus Copyright Rights and Responsibilities: A Basic Guide to Policy Considerations*. http://www.aau.edu/reports/Rights_and_Responsibilities_2005.pdf

4.3.1 Image Review 24/7

One of the first forms of adopting digital images, and perhaps the most widespread, is the posting of images on a course website for student review. This is perhaps most common in art history where a digital image-base has replaced the traditional review of slides in the slide library (or even photocopies posted on a bulletin board) for limited periods before a test or examination. Digital images (from lectures, textbook and other sources) can be made available to students on the course website for the duration of the course, 24/7, with notes and in many cases with self-testing routines so that students can turn on and off the identifications and test themselves at their own pace. For many, this is the first step in going digital. Some schools have done this for years before any faculty started projecting digital images in the classroom.

Art historian Robert Nelson at Yale was quite emphatic that his first use of digital image review at the University of Chicago marked a turning point in his teaching career. Student recall of images dramatically improved: all students got an A the first time he tried this, something that had never happened before. Convinced this was just a fluke, he tried it again with the same result and has never looked back. Students somehow possess the images more: they can often self-test, with routines created for them, and they can move slides around, creating and adding to their own collections. For Nelson, it seemed, in his words, that the “visual information is going to them seamlessly without the enormous trouble we had in the past,” and he can now move on to deal with the ideas, the analysis and narratives that he is most interested in, knowing that his students have the visual information tucked away—and knowing that if there is a question they can go check the image online.

Lillian Tseng, another Yale art historian, commented that she thought that in the traditional routine of reviewing slides at the slide library, students would often get anxious and the slides would get out of order; it may be fun to jostle other students to view the slides, but on the Web they have all the information at their fingertips and she feels it is much more efficient. Slightly to her amazement, feedback from students has not only been positive, some students even “confess that they enjoy studying for the mid-term and final,” something they have never experienced before.

4.3.2 Images and/or Words

But is this simply convenient for students or does it transform their relationship to the material? Do images, as one Yale historian wrote, “sear ideas and moments into stu-

dents' brains," or is it the act of handwriting that inscribes content into the brain?²⁴ Or do you need both? Three art historians discussed this at Skidmore College. One now likes to put text alongside the images, though she said she is a little unnerved by the quietness in the room when text goes up and students busily copy it. A second refuses to put up any text, focusing on the images alone. She likes her students to download, annotate and even draw on the images later. Art historian Guy Hedreen at Williams College feels quite strongly about the need for students to write. "My experience is that students don't remember things if they don't write them down. So I prefer not to have text up on the wall. I like them to listen and write. They remember things better that way. Writing is an essential part of the process of committing things to memory."

But another art historian, at Dickinson College, whose classes have been transformed by going digital, is quite adamant: "I tell them 'Don't write down facts—you have them in the book and on the slides and on the Web.' And this completely releases them from being a stenographer." For this teacher, his classes have completely changed because as he neatly put it: "Students look up, they don't look down...They're not looking at their notebooks, but at the images and we're discussing." So for him the dynamics of the class changed and learning was happening because the students were actually looking, were looking better and getting to grips with the issues at hand with their peers in the room. He also claimed that students' performances on exams: "skyrocketed, because a) when they wanted the facts they knew that they could get them; b) they began to listen and discuss the matters in ways that were meaningful...rather than just creating a rolodex of images and facts."

A psychologist with a background in architecture and film animation agrees with this notion of keeping the words at bay. "If you give them the words, they just write it down, and that doesn't work." And, as a former animator, he believes "you can tell a good story with still images" and keep students engaged by not putting up the words you want them to write. He very much believes in using the filmmaker's technique of storyboarding: using a few essential images to make the pitch. "I'd rather they synthesize it in whatever framework they have." He believes that we all bring different backgrounds to any teaching/learning situation and students will have different pegs to hang ideas on, so that by using imagery, they can use their own words. "I hate making them think like me."

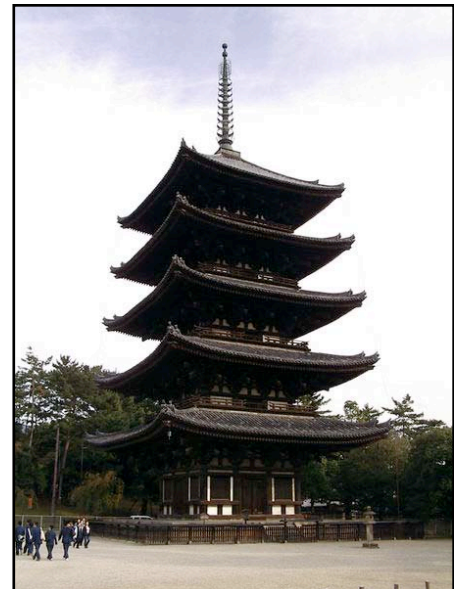
²⁴ As, for example, physical chemist Jay Thoman said, "If you're writing something down there's a certain processing that takes place in the brain."

However, a biologist disagreed with this. He fears that moving images, in particular, mesmerize and put students to sleep: “I augment the blackboard with a digital picture of what I’m describing or the process. But not Flash; Flash is too fast and students can’t take notes from it and, this is very important, the student needs to be able to write down what you are saying...It’s important to use digital images to show them what reality looks like, but good old pencil and paper is getting lost.”

In some cases, the well-chosen image can do the work. A teacher of Asian literatures remembers the case of a poem that mentioned how a young woman looked “with her beautiful dark skin.” She pointed out that there is a complicated history to the variety of complexions in Asian cultures. In this case, to demonstrate the resonance of the words, in the middle of the class, she projected some Ajanta cave paintings (3-5C AD) from ARTstor that included paintings showing a range of complexions, and, she said, “students just gasped,” even those that knew East Asian art. The phrase in the poem, declaring a princess to be “beautiful like a dark cloud,” was dramatically illuminated by the images. “Here,” said the teacher, “the picture is doing the work and all will remember the image.”

Several teachers mentioned the ability of key images to act as mnemonic devices, enabling students to capture and recall information. Sometimes one complex image displayed for an extended time can serve to absorb information, discussion and the student’s own thoughts. One East Asian historian is discovering the effectiveness of images to store and release meaning: “Often I’ll start a new class from just a couple of images from last class—to elicit the content of the discussion, for example, the pagoda is symbolic of different levels of enlightenment—so I think it really does work for them.”

Figure 17: Kofukuji Pagoda, Nara, Japan.
Source: http://commons.wikimedia.org/wiki/Image:Kofukuji_gojunotou.jpg



4.3.3 Interactivity

However, it seems that very often it is the combination of the right image with active class discussion that has excited many faculty. Having a plethora of “malleable, mutable, and mobile” images on tap imbues teachers with added creativity, and they feel less tied to a linear textual narrative. Using images to structure their lessons they find

they can have more interactive classes. Students appear generally less intimidated by images to begin a conversation and an exchange of views, as this literature professor attested to in discussing the changing dynamics of his classroom: “students are more engaged and more responsive when they see images on a screen than a text in front of them.”

Because of the Web and email, this interactivity often extends beyond the classroom, strengthening relations between teacher and students. Middlebury art historian Kirsten Hoving learned Dreamweaver to create a comprehensive website for a History of Photography class that included student assignments, images, links to resources and online exhibits, video clips and visual prompts for students to write to. Students would log on to a course management system and would typically have to respond with two paragraphs to an image. Students would then respond to other students’ writings and Kirsten would respond to all of the students. As a result, she found students were much more interested and engaged (“they had a personal investment in it”) and more frequently saw connections between works. It also opened her eyes. Released from doing so much grading, she spent an enormous amount of time in conversation with students: “We could get a real exchange in a way I never had.” So for Kirsten, this “was a whole new way of teaching.” However, this took a great deal of time and she is trying to find ways to be more efficient. She is also working on a research project taking images of photographers working in their dark rooms with vintage processes and is looking to incorporate these into her website and her teaching, collaborating with colleagues and students at other institutions.

An earth scientist had commented in the survey that he feels more efficient with digital as he can cover more material in more detail, but added that he could do this both because he made all his images available online and because he made himself available at all hours for questions. William Coleman, a chemistry professor at Wellesley College, would also be on email call, often sending students alternative images of molecular structures to the ones they had in their textbook. Often, he said, the students just need another perspective, another way of seeing. “All they have to say is ‘I don’t see this’ and, if it requires that I do mathematics, I do the math, take a picture and send it; if it requires me to make a molecular structure, I make the structure, take a picture and send it to them.”

4.3.4 Language Teaching

While many disciplines are being affected by the inclusion of a wider array of material artifacts and a broader cultural approach, no discipline seemed to have such sudden, intense and varied use of digital images as language teaching. Using images to get students to speak a new language was the central thrust—and it was working.

“Real Life Images”

Many that I spoke with found the availability on the Web of images from everyday life in the country whose language was being taught an immense boon. One popular re-



Figure 18: The REALIA Project's homepage <http://www.realiaproject.org>

source site, specializing in the everyday, was that of the REALIA project (Rich Electronic Archive for Language Instruction Anywhere). But projected images had a power of their own. Teachers in Chinese, Japanese, Italian, Russian, Spanish and

French found that very often students opened up with an array of projected images: “Projecting images gives my teaching a different form...and students’ motivation seems to have increased with projection. The way I teach now is more effective in the way I relate to students at a different level and the classes are more interactive.”

A Website

Others create their own resources. One of the most remarkable creators of image resources is Barbara Nelson at Colby College, for whom images “work like magic, both to stimulate conversation and to help with study.” She projects images (often supplemented with sound and video) typically for half the class time to stimulate conversations, usually in groups of two, and to do short grammar-based exercises (she had just done a section on prepositions using a beach scene, when I spoke with her). She admits she is a bit obsessive about images. In 2005, visiting Ecuador with students, she took 8,000 digital images and 12 hours of video, which she brought back for her website and PowerPoint presentations. Her very popular website, used she says in 191 countries and responsible for one-quarter of all visits to the Colby website, is modestly ti-

tled “Spanish Grammar Exercises.”²⁵ It uses an image-based, study module approach to Spanish Language and Culture. One module, for example, has been constructed around the Ecuadorian and Mexican Day of the Dead rituals featuring a popular song, an essay of images, an interview, and grammar and cultural activities. For Nelson, “images are so great because they they are amazingly effective...you see the results in the classroom...The students are lured into conversation and are engaged—they have no choice!”

Paintings

Using paintings to stimulate conversation and develop language and thinking skills has become a specialty at Bennington College. “The Art of Spanish: Language through Painting” introduces students to the Spanish-speaking world through the works of its painters. Framed by the questions “what is a nation, how is it created and how represented?,” paintings are the major text. They might compare one painting with others, but mostly they get to know one painting at a time very well (such as the Anonymous, 15th century, *Virgin of the Catholic Kings*)—developing a relationship with it over four 90-minute sessions. Sonia Perez Villanueva, one of the teachers in the program, admits the students show a certain level of frustration with the tension between trying to say something in the language they are learning and trying to work at an intellectual level beyond the words they know. They do need a lot of time as they learn how to look at the image, read its cultural, technical and linguistic information and then express it in Spanish. But once students get engaged with one of the characters, then it really takes off.



Figure 19: La Virgen de los Reyes Catolicos (*The Virgin of the Catholic Monarchs*). Anonymous. c. 1490. The Prado, Madrid. <http://museoprado.mcu.es/ivcatolicos.html>

²⁵ <http://www.colby.edu/~bknelson/exercises/>

The challenge, according to program creator Carol Meyer, is how to “push student thinking at a high level with a much lower-level introductory language ability.” One of the keys for her is that while students have to decode or translate all the words in a text, they don’t have to decode images in the same way. Thus, within a painting, the larger concept and the supporting details are all in the same place, more easily accessible through the visual medium. By slowing down, looking and focusing on creating a relationship with the image, students have easier access to concepts than they do through texts. Meyer sees the advantage of this approach in foreign languages enabling the teachers to slow down the thinking skills and the analytical abilities students have to develop to be good thinkers. It is not just about learning a language—it’s much more embracing and fulfilling.

Student activities include keeping a diary of discoveries throughout the class, creating a gallery of images on the Web, selecting a painting to describe the U.S., discussing it in the same way they discuss the Spanish paintings, and making a class presentation on a Spanish painting they select from a website on, say, issues of social class.

Carol Meyer’s central mantra is: “Just look at it.” In workshops she gives on teaching with paintings, this is the hardest thing for teachers, she says, as they always want to jump to the next step—that of interpretation.

Digital Storytelling

The third activity in language teaching that I should mention here is what is known as digital storytelling or multimedia narrative. This is generally understood as selecting and then organizing a small set of still images, writing a simple but compelling narrative that connects them and then assembling images, spoken narrative and sometimes music on iMovie or an equivalent. For a good, short example see the web-page for the Center for Digital Storytelling.²⁶ It is becoming particularly popular as a composition tool, telling a fictional or autobiographical story (for example at Lafayette and Middletown Colleges).

At Mount Holyoke College, Professor Nicole Vaget not only allows her students to replace a term paper with a digital storytelling project, she uses the technique for very rigorous group research projects. For example, in a seminar on France during Nazi occupation, students conduct research, including picture research, on such subjects as

²⁶ <http://www.storycenter.org>

the propaganda posters of the Vichy Government, the black market, and the French Resistance. They write and record a verbal narrative, storyboard the images, select appropriate musical accompaniment and record the product onto a DVD. One advantage Professor Vaget sees with this method over the traditional term paper is that the teacher can oversee the production at every stage, providing continuous quality control. The final product is a true cooperative effort between teacher and students as well as a multimedia showcase for the course.

4.3.5 Visualization

Another component of learning through digital images is the power of visualization. The digital format gives us greater tools for visualizing concepts or the invisible (things too abstract, too small or too big to otherwise see). This is true for chemists, geologists, biologists and astronomers, but also for art historians, like Anne Dunlop at Yale, who works a lot with wall paintings. She is eager to visualize the 360-degree spatial reality of a room and to project “with a sense of size and scale beyond what you can get with the slide experience.”

Chemists seemed to feel strongly about this and articulate it well. For one, “Because it is easier to incorporate images into my presentation of material, I do it more often. I think this has led to an enhancement of my exposition of many chemical concepts and a deepening of student understanding.” Another felt he could “reach students whose learning style in chemistry is more visual than mathematical,” and for another, “my understanding of many chemical principles comes from my model or ‘picture’ of the microscopic world. Being able to relay that to students easily helps me explain concepts.” And finally, chemistry professor Matt Cote, at Bates College, referring to the fact that understanding molecules ultimately relies on the ability to visualize the intricacies of their shapes and behaviors, put it perhaps most succinctly when he said: “Molecules are interesting to visualize, but almost impossible to understand otherwise.”

4.3.6 Making Images

Another way of learning is through a much closer working relationship with images: manipulating and constructing them.

In Matt Cote’s advanced level quantum class at Bates College, students write some of their own computer programs to animate the behavior of simple quantum mechanical

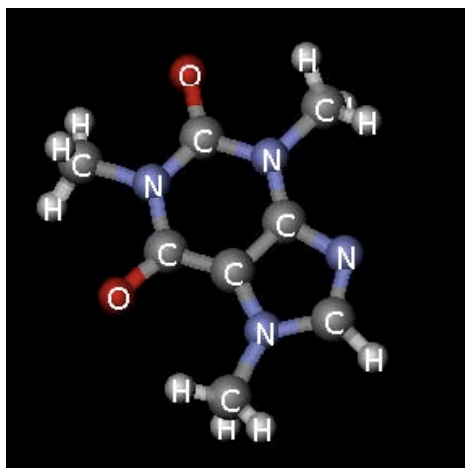


Figure 20: Model of the aspirin molecule ($C_9H_8O_4$) that can be viewed and rotated in Chemis3D Java Applet. See <http://www.worldofmolecules.com>

systems. In addition, he uses several canned sets of images of molecular activity and uses the Spartan software package for molecular modeling. For students at the introductory level, Cote has written some labs to walk his students through the process of spinning an orbital around in three dimensions or, when measuring molecular vibrations in spectroscopy, to enable them to animate the molecule to demonstrate how a certain peak in the spectroscopy results corresponds to certain molecular motion.

As Cote says, at the introductory level in chemistry it is useful to show the image of how a molecule works, but at a more advanced level, unless you are the one who developed the software, you're not exactly sure what is being depicted, so there's nothing like telling the computer "this is what I'm saying," to convince you that you understand what you are doing. "The thing about the computer," he said, "is that it gives you direct feedback: it's quite the task-master. They have to understand the theory well enough to be able to turn it into computer code and to create the graphics."

Similarly, a central aspect of David Domozych's microscopy classes in biology at Skidmore is the production of a hardcopy portfolio by each student of 25 perfect micrographs, labeled, with a scale bar and explanations of what the image is of and how it was prepared, complete with in-class critiques of other students' PowerPoint presentations of portfolios.

In sociology classes at Wellesley, students are creating magazine advertisements: "They learn how to use Photoshop...come up with their ideas (using social psychology theories, etc.) and literally make the ads—find images, write copy, arrange it artistically, etc."

Geographic Information Systems (GIS) comprise another new suite of image-related tools that is being used across many disciplines, and here a conversation with Phil Nyhus who teaches GIS in the Environmental Studies program at Colby nicely points out two issues: first, how students wrestle with image making and image analysis; and second, how he does the same. His students have two-part assignments—first making a

visual map using GIS data, as part of Colby's Atlas of Maine project,²⁷ and then making a more dynamic computer map that allows more analysis, with layers that can be turned on and with zooming capability. Students also give a web-based presentation where they share their maps with their peers.

4.3.7 Pedagogical Issues

But how does this new medium really work? Several faculty, not used to working with images, are determined to discover the rules and the rhetoric, as well as the tricks of the trade that make images so effective as teaching tools. One Asian studies professor declared that he wants these images "to be real texts in the course rather than mere illustrations." And although one religion professor declared "I am learning how to read digital images and how to use them as 'texts,'" for others it's not so easy. A historian admitted that "Visual images are different kinds of texts and they require a different method of analysis." And another admits he is often "at a loss to explain to students how I expect them to use these images."

And, to return to Phil Nyhus at Colby, as he teaches his students how to make maps from GIS data, he says, "I'm thinking I'm surely re-inventing the wheel in thinking about ways in which images can be used: whether I'm standing in front of a class with a 100-year-old Swiss map asking them what are the elements that makes this so effective or they're making a map and they're soft critiquing and I think there must be ways to more effectively share these ideas."

Two classicists, each with a literary text-based background, struggled with this. One, Michael Roberts at Wesleyan University, sees that digital images are helpful, students like them and do good work when they are taught how to read them. But he feels he needs training in the use of images; he already notices the dangers: "You can linger too long over an image, or get sidetracked by iconographic matters not relevant to the point being made." He is very interested in "how visual evidence from antiquity can augment our knowledge from literary texts" and is eager to find out how best to do it. Going digital allowed him to think about how to use images a little more widely and about what he wanted to do with them throughout the course. But, he said, "it's difficult for someone not used to working with images not just to have a slideshow." However, he is finding his way. "So with the relationship between Christianity and Classics in the fourth century, you can make a specific point through text, or through social

²⁷ See <http://www.colby.edu/environ/courses/ES212/atlasofmaine/>

ritory. He had the inspiration to put up images of two paintings that he knew, which while he was thinking about the issue apparently just came into his head: a 1918 Mondrian painting (“Composition with Gray and Light Brown”), and a 1914 Paul Klee (“Remembrance of a Garden”). The very controlled rectilinear grid of the Mondrian contrasts with the apparent confusion of an overgrown garden in the Klee, where “you can just figure out where the lettuce is, but it all blends in together.” Niemann reported, “So I just threw these two pictures up on the projection screen and asked ‘So when we speak about nationalism and other forms of political organization—what do these paintings remind you of?’—and it turned out to be the most wonderful discussion: so it worked well.”

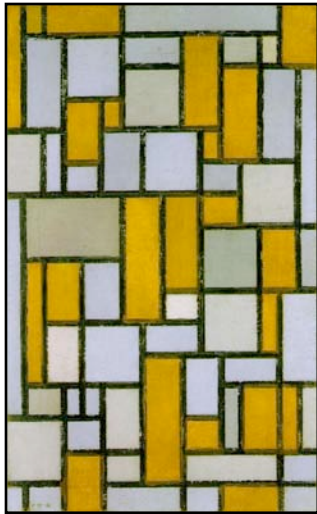


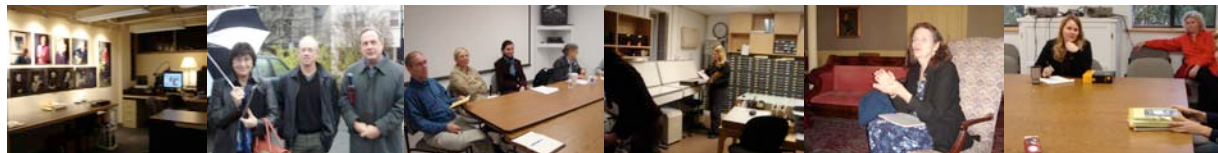
Figure 23:
Piet Mondrian,
Composition
with Gray and
Light Brown,
1918. Museum of
Fine Arts, Houston

Figure 24:
Paul Klee,
Remembrance
of a Garden,
1914.
Kunstsammlung
Nordrhein-
Westfalen,
Dusseldorf



However, later in the interview he felt frustrated because he had no way to do this again: “I have the gut feeling,” he said, “that there’s a whole lot more I could be doing but don’t know where to start. I’m not afraid of it; just daunted that there are these unknown possibilities but I don’t know how to make them work.” Like others, Professor Niemann felt the urgent need for some organized local support in order to learn and exchange ideas about how to most effectively use images in the classroom.

As one history professor put it at the end of her interview, “I would like to be better informed about how professors at other universities use images.” And of course, this is part of the function of this report and our forum on Academic Commons—but there is also clearly room on individual campuses, or among groups of colleges, to continue faculty talks and demonstrations and conversations about how they marshal digital images.



4.4 Training and Support

4.4.1 Pedagogical Support

Where should this training in pedagogy come from? Clearly one source is fellow faculty. A few times, people spoke of individual faculty whose use of the new technology was an inspiration to their colleagues. At Yale, for example, two colleagues cited art historian Lillian Tseng. One was turned around by Lillian’s job talk at Yale: “It was clear she had very carefully selected her images, and had very strategic and selective use of text; she was also looking at Chinese poems and juxtaposing original Chinese with translations, highlighting aspects of the texts she was discussing; highlighting areas of images; very understated, but very useful in helping the viewer get into the material and made me feel that I was looking at the Chinese characters in a somewhat informed way, just because of the presentation mode.”

Another source can be instructional technology staff. I have seen some terrific examples of idea-sharing between faculty and IT; there is clearly great potential here. But often, as one faculty member mentioned, “They’re all very helpful—but I could use more help with pedagogical solutions—there’s just too much about hardware sometimes.”

Many instructional technologists report a great willingness to be engaged in this arena, but say that in some situations faculty are not as open or as willing to take the advice and expertise that is available. At Vassar College, one educational technologist described how delighted she is to be asked to really engage in pedagogical situations: “It’s something we try to make ourselves available to do at Vassar—but we find we don’t get asked to do it often enough for our own liking and given the skills and professional background that we bring to our work.” At Smith, an educational technologist described this fluid environment this way: “We’re living, breathing intellectuals, we can be helpful, and we’re trying to find our way in defining our role in thinking and learning on campus.”

The faculty-IT relationship is a key relationship that needs to be nourished with frequent, ongoing conversation and exchange about new possibilities, both in pedagogical methods and goals as well as technologies. There were several points on my visits where I was very impressed by the degree of engagement by my IT guide with faculty in thinking about new approaches. That outlook needs to be more widespread. However, the relationship is one that is also subject to the political situation and the campus culture. This cluster of dynamic relationships, especially those between faculty, instructional technology, the library and visual resource collections, is nicely drawn in a paper on “The Visual Resources Environment at Liberal Arts Colleges,” by Roger Schonfeld. In discussing evolving campus roles and responsibilities, the author cites the problem of the frequent “vague definition of the responsibilities of the instructional technology group,” which “vary by institution and are often unclear to the staff and user base within individual institutions.”²⁸

4.4.2 Technical Training

A related issue that goes beyond the regular support expected from instructional/academic computing is the need for more direct personal assistance and also for much higher-level workshops—as one faculty member put it, something “beyond PowerPoint.” A few I met felt they had really been stymied. An ethnomusicologist commented, “I started out running with this and I hit a brick wall: there wasn’t the time and the training opportunities on this campus to take this small group of people up to the next level. In another world, four years ago, I would have moved it all to DVD and would have constructed things more seamlessly with teaching modules—but it hasn’t been worked into the program—and my schedule.”

The faculty-IT relationship is a key relationship that needs to be nourished with frequent, ongoing conversation and exchange about new possibilities.

Money, staffing, and how digitization is prioritized can be major impediments. Even well-staffed places with good systems need more. As this professor put it: “IT here is a model program for how it tries to help instructors achieve their own pedagogical objectives via new technologies rather than impose a one-size-fits-all approach...However,

²⁸ Roger Schonfeld, “The Visual Resources Environment at Liberal Arts Colleges,” *Transformations*, April 3, 2006. http://nitle.org/index.php/nitle/transformations/2006_4_3.

this unit's success requires more resources. It is clearly overworked and needs more staff in order to continue its mission of enhancing teaching via technological innovation."

New Tools

Somewhat allied to this is faculty's demand for new tools. Although there were a few demands for some specific tools, like annotation and 3-D software, generally there were two themes in the expressed needs for tools. First, faculty want presentation tools that can pull together and integrate many sources and many media. Second, there was a general call for simplicity, for software that cuts the multiple features and focuses on what it can do well—for example, sophisticated tools that can render 3-D forms from tunneling microscopy shots but that can do it, as one biologist put it, "without months of training."

4.4.3 Visual Training (Critical Literacies)

One of the largest themes of this study is the discovery by many faculty that their students are at a loss about how to read, analyze, discuss or use images. It is somewhat paradoxical that many faculty found images a terrific way of stimulating discussion and interactivity, but when it came to analysis, students often did not know where to start. There are in fact three areas of competency that need to be addressed: 1. the ability to analyze or read images (Image Literacy); 2. the ability to handle and manipulate images (Digital Literacy); and 3. the ability to create and communicate through images (Image Composition).

1. Image Literacy

Students have not been taught how to read and analyze images. A Skidmore biologist quoted previously in this report discussed this in his survey response. As mentioned before, he often found his students getting bogged down with the detail of complex images: "they take them too literally—they have a hard time connecting concepts to images, and also get frustrated when an alternative image of the same thing is presented because it's 'different.'" He uses a wide range of different types of images to keep students on their toes: "more for inspiration and illustration than explanation," and when he does use biological images he selects those that "require interpretation and raise questions." But he also uses images drawn from other disciplines and everyday life, "to keep people awake and thinking and challenged in some way." He raises an important point when he says it is too easy for students to think that if they memorize the image they "understand" what it represents.

Also at Skidmore, an English professor who uses images of paintings in her courses finds her students are excited about having images in class “but [they are] timid about interpreting them. They’d rather point out that this is surrealist art than think about why these certain images are there rather than others.”

Online maps constitute another image type increasingly used in the classroom. For example, Indira Karamcheti, teaching post-colonial literature and literatures of the South Asian diaspora at Wesleyan University, uses maps in her classes and incorporates them in her course websites. In class, she uses them both as supplementary information, a visual reference she tries to make as transparent as possible, and as material for in-class analysis. However, she has realized that for the analysis of maps she has to take significant time out to teach students how to read and analyze them. Although she has some background in film and therefore some visual analysis skills, this makes her uneasy. She has to step back from teaching the subject to deal with a different methodology. She is tempted to teach a history of mapmaking—but that would take significant time and be a distraction from her main intellectual objectives. So, ironically, this kind of work ends up cannibalizing her core activity and she feels she is giving too much weight to images and maps, even though they are useful tools.

Also at Wesleyan, European intellectual historian Cecilia Miller has maps displayed during class and uses them as an integral part of class discussion. She is thrilled by the increasing availability of digitized maps even though she still carries huge paper maps down the hall to class. Students are required to have a map reference in every paper they write—they must make an argument that supports their thesis based on information in a map, and they draw maps in quizzes and exams. “They just have to know about the geography.”

However, Professor Miller reports, “The students find this all very difficult to do. They find it hard to make the connection between the map and the theoretical argument. Students in my Political Fiction class seem to find it easier to make a connection between images and texts than students in my more conventional history classes.” So the question is how to teach them about maps. Her analysis is that reading and using maps is “another form of creativity and the students just haven’t been pushed that way: they need practice and a little more guidance.”

2. Fluency

Students often lack what might be called “digital literacy.” Dana Leibsohn, an art historian at Smith College, showed her concern about this in a conversation about her students’ capacities. She pointed to two sides of the issue. “It’s hard for students to produce images that they can then repeatedly find, access and share over at least the length of their college careers, and in multiple formats, say a TIFF made in Photoshop that should be portable to a website or Flash or GoogleEarth. And this alone assumes students will know where to find and how to make digital images, which is in itself no small presupposition. Then, secondly, there’s the issue of how they develop a suite of digital skills that can be carried from class to class, place to place. And complicating that is the fact that what students know now may be impressive, but it is not necessarily what they need to know in 4 years. So that’s why I believe that developing ‘digital curiosity’ and the skills needed to satisfy that curiosity is as important as developing facility with any particular software.”

“I believe that developing ‘digital curiosity’ and the skills needed to satisfy that curiosity is as important as developing facility with any particular software.”

Leibsohn has spent quite a bit of time teaching some of these skills herself to students, and appreciates the students who do come in with some digital skills in place. Yet problems persist: “I love to have students who have used Photoshop. There are programs here where certain software programs are taught but they’re small and have other goals. But can they find the images again? Can they transfer them to a program where they could be usable to another class?”

Her colleague Bob Newton, in Geology, elaborated. He is convinced that students need to know some basics about how computers work and how images are stored. “We expect them to know that but they don’t know that and we all end up teaching them Powerpoint and Excel because there’s no place where this happens: we expect it because they all know a little bit but they don’t know enough. They lose images—they lose everything! They download stuff—but then they don’t know where it went.” Two biologists agreed. They felt that knowing more about image files is critical. One remarked, “One of the biggest problems is not understanding resolution and image size—especially as students try to email 25MB images to themselves.” Another biologist quipped, “Their PowerPoints are so pixelated you have to stand miles back to make them out.”

3. Composition

Students need to know how to wield images themselves to make effective presentations: to understand visual rhetoric and how to make an effective argument (something that has nothing to do with the technology). Anthropologist Elliott Fratkin at Smith College made this point when he said, “I don’t find students get stuck on the technology so much. Their problem is how you make an argument; so if you’re going to make a PowerPoint it’s not just a bunch of pretty pictures but it’s a constructed argument.” In one of his courses, students make a group PowerPoint presentation. He sends them to a PowerPoint tutorial (which is more about using the program); but that isn’t the point, he said. “It’s how to make an argument and how you communicate an idea through images: it’s a tool for me; the technology isn’t the problem.”

For Flip Phillips, a former animator and architect, the answer is teaching Design: “I think every student should learn Design...Design writ large—not graphic design, but ‘Why is this a fabulous pen?’ or ‘Why is this book so good?’ And from that you learn what makes a good PowerPoint presentation—it’s not the little puppy, it’s what gives the information.” He points out that it’s clearly not the tools: “Microsoft Word does not make you a writer...The tool doesn’t give people what they didn’t have in the first place.”

Coming from a background in storyboarding, pitching an idea with a progression of key images, Phillips thinks one good place to start would be a class in Visual Storytelling, in which students would learn how to understand visual grammar, i.e., that there is a set of rules for how shapes and objects can be combined to communicate an idea.²⁹ It’s important too to be able to have a command of both sides of this: to be both a good critic and a good practitioner: “We do that in the sciences: we teach you to read and understand and criticize science but then I also teach you how to do science. And that seems a good symmetric.”

Some Approaches

So who should be teaching this and how? Some teachers do take considerable time out to teach how to make an effective presentation in PowerPoint, or, for example, how to create a professional-looking portfolio of microscopy images. For her upper-level courses in earth science, Rónadh Cox at Williams College insists that her students

²⁹ Educational technologist Ginny Jones at Vassar College, for one, uses storyboarding when helping students create webpages for class projects, “so they really reflect on the way they put their content together before they actually start doing it.”

make class presentations using PowerPoint, but she gives them some basic training: “We talk a bit about how to build effective slides, how to find images, how to correctly attribute images to their sources, and then how to work those into a presentation.”

Her colleague, plant biologist/microbiologist Claire Ting, similarly works very closely with her seniors who make an honors thesis presentation. “Just about at every step, I work with them to finalize their talk. Though they know PowerPoint, they need help with what’s most effective in terms of fonts and font sizes, what sort of images they should have, how cluttered or uncluttered it should be and how accessible it will be to everyone in the audience—how much depth they should go into.”

Jeffrey Blankenship, teaching Landscape Studies at Smith College, has realized that he has to take on the teaching of technical skills himself, especially with the higher-level programs. With his students, however, he also stresses how the programs can be used to communicate effectively:

In 3-hour design studios, there’s a heavy emphasis on producing images that communicate the students’ ideas. Last year, I didn’t spend enough time explaining the technology and there were these students spending hours trying to figure things out. So this year I took two 3-hour lab sessions on going from scanning to Photoshop to InDesign. There’s a difference between PowerPoint and Excel, where you can start with a little knowledge and work your way through, and very high-end programs where there’s a very steep learning curve—where if you just give them a little information, they get lost. One thing we teach is AutoCad. Students in architecture, theater, landscape studies, and engineering all have a need to learn this: they can’t get internships without it. But it’s such a high-end program that you can’t integrate it into regular classes. And I do this. I.T. doesn’t do it. I give an intensive one-week class (8 hrs a day for 5 days) just to get them to a point where they’re literate enough that they can use it in class.

In the realm of moving images and sound, Colgate University has a successful program in “Developing Media Literacy.” John Knecht, professor of art and art history, asks “How do we know what we know?” Film and media studies provides a way of decoding

the complicated sea of moving images and sound students are surrounded with in TV, film, and the Internet.” In an introduction on the Colgate website, Luca Caminati, who teaches in the course, explains the approach. “In the introductory course, students gain an understanding of the power of images by learning to apply a series of methodological approaches...We did a semiotic analysis, of a publicity picture from the White House of President Bush wearing a hat, that lasted two class periods. At first, students can’t believe you can talk for so long about one picture. But with this forceful beginning, I can show that a single image can have the same power as an entire text...Then, when you’re in a studio class like video art, you’re deciding what the construction is because you are the artist, but you need to articulate that to the class and to your professor—why you chose this setting, that camera angle, these particular props? That discourse on form and content can take place for work produced by students, by culture, or by artists.” Knecht and others are now working on making such a media literacy course required for all students at Colgate.

St. Lawrence University has recognized this as a necessary set of skills that is core to undergraduate training and has set about adopting policies and programs that can put in place a broad and effective approach to training students and faculty in “critical literacies.” One working definition of this is borrowed from the New Media Consortium’s definition of “21st Century Literacies,” as the area where “aural, visual and digital literacy overlap” and that encompasses “the ability to understand the power of images and sounds, to recognize and use that power, to manipulate and transform digital media, to distribute them pervasively, and to easily adapt them to new forms.”³⁰

There are two components to St. Lawrence’s approach. One is a “critical literacies” top-down approach, for example, expanding the sphere of operations of its Munn Writing Center to include teaching of image, research, and technology skills, and then programmatically connecting the Writing Center with other centers (for Teaching and Learning, for Arts & Technology) and with the Library and Art Gallery. The second component is a more bottom-up approach, offering “Rhetoric and Communication” training and support to faculty committed to pedagogical innovation, including teaching with images. Here faculty workshops have been established together with a training program for student “peer mentors” to work with these faculty and their students in a course to explore new and more integrated pedagogies. Fortunately, there is considerable overlap in the membership and activities of the two groups and apparently, one of

³⁰ New Media Consortium, “A Global Imperative: the Report of the 21st Century Literacies Summit.” April 26-28, 2005, San Jose, CA. Available at http://www.nmc.net/pdf/Global_Imperative.pdf.

the benefits of this top-down/bottom-up arrangement has been much-improved communication among various campus constituencies, allowing the initiative to proceed in a more intentional and efficient way.



4.5 The Big Picture: Infrastructure and Transition

Perhaps the biggest challenge of all is the central one of institutional response: of change management and of large-scale, strategic thinking about infrastructure planning. “Going digital” necessitates strategic change, but it seemed clear from my conversations that many individuals and departments are reduced to bit-by-bit, incremental change, often waiting for institution-wide strategic vision to lay the groundwork for the transition to an effective and unified provision and support of digital resources campus-wide. In the way that digital technology brings together heterogeneous forms and formats, disciplines and administrative functions, it demands an integrated service response. But that was often not provided.

One museum director called the challenge a case of “change management,” but one that needed a larger canvas and a larger vision: “Where will we be in 2 years? Many on campus are reacting strongly to what they see right now—the state of the projectors is the current big issue, as the whole projection area is still immature. But once that matures then it’s going to be data management and then...”

At one college, central administration had given the go-ahead for the art history visual resources center to organize the digital image resources for the whole campus. However, one visual resources specialist thought that this was not being thought through sufficiently: “The level of complexity [for dealing with the entire campus] is much greater and requires collaborating with many, many more people and requires a lot more money. Obviously, there are a lot of positive trade-offs for making the transition, but a lot of things go unrecognized, especially by the people who can make the difference in terms of funding, staffing, etc. It seems now that the college is committed to [solving the issue of providing sufficient high-quality digital] projection but it has yet to look in a clear and strategic way at what the implications are of all of this.”

This discussion, with several others in the room, continued: “Yes, the slide library now has the mission to serve all...but it’s still in its nascent stages and still not yet recognized completely by the people who have the authority to make these things really work.” “Right now there’s no sharing, no centralized digital storage...Right now we have a bunch of digital images all around campus but they don’t communicate; there’s no interaction between them...No way to get to everything. There’s no overall strategy—no plan.” “And the college, as so many institutions, has yet to recognize how much of a sea change this whole issue is and how much it means in absolutely affecting every level of the institution...Too often digital imaging is seen as an art history thing: it’s not seen as strategic.”

Several campuses had various, often ad hoc, groups that were trying to work on cross-department, cross-campus planning—but sometimes with insufficient buy-in or understanding from the highest levels to move very effectively. One of the strongest appeared to be at Bowdoin. There, a “Digital Asset Management” group had been in existence for several years, dedicated to getting the technology infrastructure in sufficient order to meet the pedagogical needs of faculty. With many representatives from the library, from special collections, the museums, faculty, the dean’s office and the visual resources collection, the group found it hard to get much done. But then in the last year, with a highly motivated core of individuals, they made tremendous progress by forging ahead “by sheer willpower.” Their strategy was to divide digitization into five parts: hardware and classroom set-up; software, hardware and cataloging decisions and integration; testing the hardware-software-metadata-scanning combination; producing broad digitization guidelines; and conducting a number of pilot projects. Three target groups were identified on campus (the administration, the museums, the Art History department), to be “managed” in terms of which standards to follow in scanning quality, file storage, control of projects, etc. In addition, the faculty at large formed a fourth “unmanaged” group that the DAM group would strongly encourage to follow its digitization good practice guidelines.

During the summer of 2005 the Bowdoin DAM group undertook a pilot project of scanning 15,000 slides for two faculty members, cataloging with Portfolio to determine where the kinks might be. Although one of the faculty said initially that she did not need a catalog (“I thought I could keep them all in little files”), she soon changed her mind and the pilot concluded successfully. The DAM group plans to bring all personal collections onto the campus server, to offer to digitize slide collections, and to give

faculty their own private spaces, accessible from off campus via VPN. During the summer of 2006, two other pilot projects moved forward: producing complete digital resources for Art History 101 (digitizing slides, and licensing and scanning digital images); and digitizing a History of Photography collection at the Bowdoin Art Museum. Separately they will be also digitizing at high resolution a set of 250 images from the art museum's collection for its website and for use by faculty.

Some were frustrated that Bowdoin is still without an on-campus centralized production center for any major project; nor does it have access to an effective regional digital production center. The group is also conscious that this is still mostly a technology-driven project. Until it becomes faculty-driven, it will lack both the requisite buy-in at the higher levels of the college, and the recognition that because digitization cuts across all departments a broader approach is required. However, they recognize that had they waited to solve all the issues before they started on their work, they wouldn't have moved at all (a state of paralysis evident at a number of other campuses).

Organizational structure and campus culture are the two key variables noted by Roger Schonfeld in successfully deploying digital images on campus. Often, the implementation of digital resources in all institutions brings individuals and departments together in new ways. Renegotiating roles and responsibilities can be perilous and calls for wise leadership. But it also depends on campus culture. This report underscores Schonfeld's finding that a "user-centered" campus culture is much more likely to achieve successful deployment of digital images than a "collection-centered, resource-centered, or technology-centered" culture.³¹

³¹ Schonfeld, *op.cit.*, p. 20.



4.6 Imaging Centers

A building can often focus attention. The construction of what are often called imaging centers on campuses has some potential for focusing some of the thinking about the campus-wide provision and use of digital images.

Smith College has an excellent facility that opened in its new Brown Fine Arts Center in 2002. Though housed in the Art department, the Imaging Center was conceived as serving the entire campus. Containing not only the digital image collection, the 280,000 35mm slide collection and 73,000-item photo-study collection, the center also includes an image production studio, an image preview room, an image study room and a digital image development center, for training and for developing and incorporating digital resources into the classroom. Although there are still pockets of insularity on the campus, and while there are a number of parallel developments in developing image resources in different discipline areas, the center is serving as an effective catalyst for bringing instructional technology and the library together and for reaching out into other disciplines. The Smith College Imaging Center has an excellent website³² with guidelines for finding, scanning and using images in teaching.

Colby College is bringing together much of its disparate GIS activity into a central lab and computer classroom in a new interdisciplinary social sciences building. GIS has made rapid leaps in the last few years, demanding very large data processing ability. As screens have grown in size and resolution and as computer speed and memory capacity have advanced, Colby's more reliable central server now enables students to focus on the visual dimension of their data, rather than on "is it going to run?" The new centralized GIS facility will offer state-of-the-art technology for research and teaching, and with 15-16 workstations, students will not have to battle other students at computer labs to find machines, and they can stay on a given machine day and night, if

³² Smith College Imaging Center <http://www.smith.edu/imaging>.

need be, to finish a project. Faculty offices will now be right next door to the computers, facilitating much closer consultation and collaboration.

At Skidmore College's fabulously-equipped, but slightly misnamed, Microscopy Imaging Center, there are light, confocal laser, and scanning electron microscopes used mostly by biologists but also by geologists, chemists and physicists. Digital capture and central processing and analysis are all available—but the problem is that everything is very spread out in different labs. The machines run on quite different systems and currently have seven different kinds of analysis software. One of the big issues for Professor David Domozych, who runs all of this, is to have a truly central resource that all could use. He sketches out a plan in which all instruments would be in one place—with light microscopes, scanning electron and laser scopes in some outer rooms, surrounding a central cluster of computers and scanners—a cluster where everything and everyone could come together. The benefits of such a true “center” would be both convenience in troubleshooting and servicing the machines (it's more efficient when there are more people around to figure out a problem) as well as in a greater social and intellectual cross-exchange. The current center is a major resource (the equivalent of what many graduate institutions have) and Domozych has organized a number of open houses and workshops to let anyone on campus come in and see and use the equipment. But “true centralization,” in Domozych's words, “could really make it blossom.”

Such a vision has also inspired the group behind a new imaging center being built at Bates College. Planned as an embodiment of the classic liberal arts idea, involving the fine arts, sciences and social sciences, the new imaging center is being built, with grants from the Alden Trust and Booth Ferris Foundation, in the shell of the old Coram Library. It is designed for those making heavy use of digital imaging, located in an inviting social space and surrounded by the intellectual life of the campus. It will have three components: the high-end cloistered imaging lab with shared microscopes, a preparation area and digital photography for scientists and artists to use; a high-end computer lab/teaching space with individual workstations, podium and electronic links to the work being done in the imaging lab; and, in between these two, a social space and gallery with displays of what is going on. According to Professor Matt Cote, one of the instigators of this center, it should prove to be a place of intense visual and intellectual stimulation that can provide opportunities for intellectual “cross pollination” between scholars in fields that are often isolated from each other; it can also make such intellectual activity more visible to the citizens of the campus.

5.0 Conclusion

Using images has clearly made teaching easier for many faculty. For others the effect goes much further; indeed, the potential for digital images to “revolutionize” teaching is enormous. Images in great abundance—universally accessible, flexible, shareable, and annotatable—could be at every teacher’s fingertips, ready to be retrieved and displayed at a moment’s notice. Many college teachers in this study attest to the powerful advantages digital images are currently giving them in their teaching and the richer experiences the images offer students in the classroom and in their studies.

However, as this report makes clear, there are many issues still to be resolved in the effective deployment of this new medium. To summarize:

- Users must be able to regularly and efficiently find the best image for the job—with accompanying metadata attesting to its identity, authenticity and integrity and enabling its citation.
- The technology must display images with ease in the appropriate resolution.
- The technology must allow users to catalogue, store and manage images effectively for later retrieval and sharing.
- Students must acquire fluency in reading, interpreting, manipulating, and managing images and in communicating effectively through them.

Teaching with images is also a skill that has to be learned—from peers and from instructional technology resources on campus. Creating forums, or other spaces such as Academic Commons, where experiences can be shared should be encouraged.

Through all of this rings a common theme: the necessity of institutional preparedness. Digital technology moves quickly and can take institutions by surprise. Because images can be obtained easily online, it is falsely assumed that there needs to be little supportive infrastructure. Nothing could be further from the truth. Work has been done at the national level in pointing out the complex digital infrastructure needs of the academic community—for example, in the final report of the ACLS Commission on Cyberinfrastructure for Humanities and Social Sciences.³³ This work needs to percolate down to

³³ *Our Cultural Commonwealth: The Report of the American Council of Learned Societies' Commission on Cyberinfrastructure for Humanities and Social Sciences* (July 18, 2006).
<http://www.acls.org/cyberinfrastructure/acls.ci.report.pdf>

the local level. Institutions need to more thoroughly understand the requirements for successful deployment of such infrastructures.

A related theme, equally crucial, is the importance of understanding not just the size and expense of the task but of the difficulty of the transition—for individuals, for the faculty as a whole, and for institutions. Whether it is creating resources for particular disciplines nationally, acquiring and cataloging useful digital image resources for all disciplines locally, institutionalizing effective support expertise on campus, determining an appropriate stance toward copyrighted material, deploying the necessary hardware in classrooms, or creating a generation of digital- and image-literate students, it always takes longer than we think. As Dana Leibsohn, the Smith College art historian, has put it: “This notion of transition is interesting—but it has a really long tail and we have to think harder about it and what it means to be in transition for fifteen or twenty years, rather than for the five to eight years we’ve been talking about. National initiatives will help; peer exchange will help—but I think we’re not thinking about transition as seriously as we should as an ongoing process.”

APPENDIX ONE: Executive Committee & Institutional Contacts

Executive Committee

David Green, Knowledge Culture (consultant)
Rob Lancefield, Wesleyan University
Amy McGill, National Institute for Technology and Liberal Education (NITLE)
Michael Roy, Wesleyan University
Dan Schnaidt, Wesleyan University

Institutional Contacts

Allegheny College, Amelia Carr
Amherst College, Mary McMahon
Bard College, Leslie Melvin
Bates College, Chris Schiff
Bennington College, Oceana Wilson
Bowdoin College, Ruth Maschino
Bryn Mawr College, Martin (Ben) Johnston
Colby College, Maggie Libby
Colgate University, Daryl Simcoe/Ray Nardelli
Connecticut College, Chris Penniman
Dickinson College, James Gerencser
Franklin and Marshall College, Louise Kulp

Gettysburg College, James Rutkowski
Hamilton College, Nikki Reynolds
Harvard University, Paul Bergen/Annie Rota
Haverford College, John Anderies
College of the Holy Cross, Karen Reilly
Lafayette College, Eric Luhrs
Middlebury College, Mack Roark
Mount Holyoke College, Owen Ellard
Sarah Lawrence College, Scott Barnett
Skidmore College, Susan Zappen
Smith College, Elisa Lanzi
St. Lawrence University, Chris Watts/Cathy Tedford
Swarthmore College, Susan Dreher
Trinity College, Scott Vanek
Ursinus College, Jay Miller
Vassar College, Steve Taylor
Wellesley College, Kenny Freundlich
Wesleyan University, Dan Schnaidt
Wheaton College, Christin Ronolder
Williams College, Gayle Barton/Jonathan Leamon
Yale University, Mary Litch

APPENDIX TWO: Online Image Resources

Recommended, Created and Needed

These two appendices of resources and tools do not pretend to be comprehensive or authoritative. Rather, they record Web resources and tools mentioned by faculty, either in the survey or during an interview, as being particularly useful. These lists will be available on Academic Commons as ongoing documents to be built into more comprehensive resources by visitors.

1. GENERAL

Recommended

Library of Congress, American Memory <http://memory.loc.gov>

Well over 5 million sound recordings, still and moving images, prints, maps and sheet music that document the American experience from the collections of the Library of Congress and other institutions.

New York Public Library Digital Gallery <http://www.nypl.org/digital/digitalgallery.htm>

Free and open online access to 480,000 digital images from NYPL collections, including illuminated manuscripts, historical maps, rare prints and photographs and more. Excellent metadata and tools.

Wikipedia Commons commons.wikimedia.org/wiki/Main_Page

Useful media database of more than 700,000 items, available under free license and to which anyone can contribute.

Needed

"It would be great to have something on the site 'About Using Images' for faculty." - Cecilia Miller, Wesleyan University

A good guide with advice and examples from fellow faculty.

Note: See the webpage "Advice—Finding and Using Digital Images," provided by the UK's Technical Advisory Service for Images (TASI). <http://www.tasi.ac.uk/advice/using/using.html>

2. AREA STUDIES

Recommended

A Day in the Life of Africa <http://www.ditlafrica.com>

Some 100 of the world's top photojournalists had 24 hours, February 28, 2002, to document the entire continent of Africa. "I've used this for a number of assignments very successfully." - Michael Niemann, Trinity College

In and Out of Focus: Images from Central Africa 1885-1960

<http://www.nmafa.si.edu/exhibits/focus/index.html>

Online companion to exhibit mounted by National Museum of African Art of images: some 50 images.

Asia Network <http://www.asianetwork.org>

Network of 150 liberal arts colleges teaching Asian Studies. The site “includes teaching resources, links and a few sample syllabi.”

Image Database to Enhance Asian Studies (IDEAS) <http://ideas.nitle.org/>

NITTE cooperative project encouraging submissions and comments to this excellent shared searchable image database: images have rich metadata and useful tools.

Japanese Old Photographs of the Bakumatsu-Meiji Period

<http://oldphoto.lb.nagasaki-u.ac.jp/en/http://ideas.nitle.org/>

University of Nagasaki Library collection of some 6,000 photographs. Also see High-Definition Image Database of Old Photographs of Japan (<http://zoomphoto.lb.nagasaki-u.ac.jp/>)

Kamat’s Potpourri <http://www.kamat.com>

Personal website of Indian culture containing thousands of images (mostly small).

Kyoto National Museum http://www.kyohaku.go.jp/eng/index_top.html and

Nara National Museum http://www.narahaku.go.jp/resources/index_e.htm

Around 100 images of masterworks from the collections of the Kyoto Museum, focusing on pre-modern Japanese and Asian art, together with a few images from past and current exhibitions. Nara Museum concentrates on Buddhist art (English site under construction, July 2006). Includes an image database of its photographic collections, also available only in Japanese. “Wonderful very large images.” - Hank Glassman, Haverford College.

Created

Trico Image Library of Japanese Culture <http://www.haverford.edu/east/tricojapan/iljc.htm>

A database of images related to Japanese culture and history under construction by faculty at Bryn Mawr, Haverford, and Swarthmore colleges, members of the Tri-College Consortium. Built to provide image resources for students studying Japanese language and culture in the Trico as well as public access to high-quality images from faculty and college collections.

3. ART HISTORY/ARCHITECTURE/PHOTOGRAPHY

Recommended

Art Images for College Teaching arthist.cla.umn.edu/aict/

Allan T. Kohl's collection of digital images of his own high-quality photographs of ancient, medieval, and Renaissance European art and architecture, well documented and linked to art textbooks.

Artchive <http://www.artchive.com/>

Commercial website with large images of some 2,000 artworks.

Artcyclopedia <http://www.artcyclopedia.com>

Commercial website with links to some 180,000 artworks. "Good images, with provenance and the ability to zoom." - Linda Simon, Skidmore College

Artnet <http://www.artnet.com>

Commercial website for the commercial auction and art gallery world containing an extensive well-documented image database of some 180,000 artists.

Artserve <http://rubens.anu.edu.au/>

"Art and Architecture mainly from the Mediterranean Basin, Japan, India & Cambodia...A huge number of very large images" [although with no accompanying metadata]. - Nicholas Adams, Vassar College

Asian Historical Architecture <http://www.orientalarchitecture.com/>

A Wikipedia-like collection of 9,000 images of 595 sites in 18 countries from many contributors. "One faculty member in Asian Architecture asked people to send him pictures of buildings, and now it's a wonderful collection, with terrific images—and I found this by accident—and got lost within it." - Michael Marcotrigiano, Smith College

Beasley Archive <http://www.beazley.ox.ac.uk>

*A research unit of Oxford University's Classics department, the archive includes 250,000 black and white photographs, 33,000 negatives, 7,000 color prints of pottery, sculpture and gems. Includes: **Corpus Vasorum Antiquorum** <http://www.cvaonline.org>, an illustrated catalog of more than 100,000 ancient vases. - Guy Hedreen, Smith College*

Cities/Buildings Database <http://www.washington.edu/ark2/>

An image database of some 5,000 medium-sized images from across time and throughout the world.

Digital Archive of Architecture http://www.bc.edu/bc_org/avp/cas/fnart/arch/

The digitized slide collection of Boston University's Jeffery Howe.

Digital Imaging Project <http://www.bluffton.edu/~sullivanm/index/index2.html>

Some 13,000 images of sculpture and architecture from pre-history to post-modern by Margaret Sullivan, Bluffton College. - Amelia Carr, Allegheny College

FAMSI: Foundation for the Advancement of MesoAmerican Studies

<http://research.famsi.org/>

Several image databases.

Fine Arts Museums of San Francisco <http://www.thinker.org>

82,000 images from the collections.

George Eastman House: Photography Collections Online <http://www.geh.org>

"So far a small part of this collection is digitized but it has great potential." - Erina Duganne, Williams College

*Note: Also see collaborative website with International Center for Photography, opening in Fall 2006: **Photomuse** <http://www.photomuse.org/>*

Great Buildings.com <http://www.greatbuildings.com/>

A commercial site documenting 1,000 buildings with 3D models, photographic images and architectural drawings, cross-linked with Architecture Week.

Himalayan Art <http://www.himalayanart.org/home.cfm>

Portal to collections of Himalayan Art.

Metropolitan Museum of Art <http://www.metmuseum.org/>

Some 6,500 objects—highlights from each of the Museum's curatorial departments as well as the entire Department of European Paintings and the entire Department of American Paintings and Sculpture—can be accessed online. Excellent metadata and full descriptions. Zoom tool enables close-up examination of objects on the website.

Search For Images: Yale University Library's Guide to Searching for Art History

Images Online <http://www.library.yale.edu/art/imageresources.html>

"A very useful guide. I haven't seen anything like it." - Sandy Isenstadt, Yale University

Society of Architectural Historians' Image Exchange: World Architectural History

<http://www.brynmawr.edu/Acads/Cities/wld/wccepts1.html>

A community-built resource.

Textile Museum of Canada: Collection Online <http://www.textilemuseum.ca>

Excellent viewing tools for more than 3,000 examples from the museum's collection. "I think this is one of the best. It's a really good resource for me and I'm going to try to build a whole project around it." - Margo Mensing, Skidmore College

Note: See also **Textiles Collection** of the UK's Arts and Humanities Data Service-Visual Arts based on the collection at the University College for the Creative Arts, Farnham with links to other collections. <http://www.vads.ahds.ac.uk/collections/ST.html>

"More than 3,000 artifacts, ranging from Coptic textiles (800-1000 AD) through to British woolen cloths, Kashmir shawls, African strip weaving and Scandinavian furnishing fabrics (1950-1990)."

Urban Design Research Guide of the University of California, Berkeley, Environmental Design Library <http://www.lib.berkeley.edu/ENVI/urbhist.html#images>

A selective bibliographic research guide to Internet sites and library resources supporting urban design research at UC Berkeley. "Very useful." - Jill Pearlman, Bowdoin College

Victoria & Albert Museum <http://www.vam.ac.uk/>

Searchable image database of some 26,000 images from the V&A collections of decorative arts: ceramics, fashion, furniture, glass, metalwork, paintings, photographs, prints, sculpture and textiles.

Web Gallery of Art <http://www.wga.hu/index.html>

A highly-recommended virtual museum and searchable database of European painting and sculpture of the Gothic, Renaissance and Baroque periods (1100-1850), currently containing over 15,000 works.

Created

Scrolls of the Mongol Invasions of Japan <http://www.bowdoin.edu/mongol-scrolls/>

"Project set up with Professor Tom Conlan at Bowdoin. The value-added piece is the guided tour: the faculty perspective and interactive component. It has become very popular on campus; once others see it they become very enthusiastic about using it. The zoom and scroll feature is very useful." - David Israel, Bowdoin College

Needed

"Hard to find sufficient Asian Art resources." - Lillian Tseng, Yale University

"American Council for Southern Asian Art's (ACSAA) color slide project at the University of Michigan (<http://www.umich.edu/~hartspc/acsaa/Acsaa/index.html>) should be digitized." - Phyllis Granoff, Yale University

Note: ACSAA signed an agreement with ARTstor, May 2005; 10,000 of ACSAA's 12,200 slides should be digitized and released by Fall 2006. See announcement at <http://www.artstor.org/info/collections/acsaa.jsp>.

4. ASTRONOMY/Physical Sciences

Recommended

Astronomy Picture of the Day <http://antwrp.gsfc.nasa.gov/apod/>

“A good example of the terrific websites with spectacular astronomy images available today.” - William Herbst, Wesleyan University

Compadre <http://www.compadre.org/portal/Selector.cfm?S=2>

A pathway of the National Science Digital Library (NSDL) for Astronomy and Physical Sciences educational resources.

Hubble Site <http://hubblesite.org/gallery/>

NASA’s searchable database of images from the Hubble Space Telescope. - William Herbst, Wesleyan University.

NASA <http://www.nasa.gov/>

“I frequently use various NASA mission sites; planetary databases.”

“I literally now have hundreds of thousands of high quality digital images from NASA accessible on the Web that I can use for courses and course assignments.” - Barbara Tewksbury, Hamilton College

National Virtual Observatory NVO <http://www.us-vo.org/>

Structure for access to images, other data, and catalogs from many observatories.

Sloan Digital Sky Survey <http://www.sdss.org>

The Sloan Survey will map one-quarter of the entire sky and perform a redshift survey of galaxies, quasars and stars. The DR5 is the fifth major data release and provides images, imaging catalogs, spectra, and redshifts for download. Latest download includes 9 terabytes of images.

Created

Contemporary Laboratory Experiences in Astronomy (CLEA)

<http://www3.gettysburg.edu/~marschal/clea/CLEAhome.html>

A Gettysburg College NSF teaching Web site with downloadable laboratory exercises illustrating modern astronomical techniques using digital data and color images.

Needed

“A website is fine, but an electronic database of astronomical images [is still needed] and would be very convenient.” - William Herbst, Wesleyan University

5. BIOLOGY/Life Sciences

Recommended

ASLO: American Society of Limnology and Oceanography: Image Library

<http://aslo.org/photopost/>

Small collection of generally high resolution images; accepts contributions and comments.

BiosciEdNet

<http://www.bioscienednet.org>

Portal to the biological sciences, managed by the American Association for the Advancement of Science as an element of the National Science Digital Library. Contains peer-reviewed teaching resources.

Botanical Society of America Online Image Collection

<http://www.botany.org/PlantImages/>

Excellent, large images, well-documented and indexed.

Digital Anatomist: Atlas of the Brain

<http://www9.biostr.washington.edu/cgi-bin/DA/PageMaster?atlas:Neuroanatomy+ffpathIndex:Splas h^Page+2>

Flybrain: Online Atlas and Database of the Drosophila Nervous System

<http://flybrain.neurobio.arizona.edu/>

Images, JAVA applets and VRML manipulatable reconstructions.

Images from the Microscope

<http://swehsc.pharmacy.arizona.edu/exppath/micro/edu/imagesites.html>

Southwest Environmental Health Science Center's guide to online collections of images taken with a microscope.

Invasive Species <http://www.invasivespeciesinfo.gov/>

USDA's National Agricultural Library on invasive species.

Microbe Library <http://www.microbelibrary.org/>

American Society for Microbiology's collection of visual and curricular resources of use to teachers of microbiology.

National Biological Information Infrastructure's Digital Image Library

<http://images.nbi.gov/landscape.php>

National Center for Biotechnology Information <http://www.ncbi.nih.gov/>

"One good public resource for gene, protein structures and sequences. Can get for example a 3-D model of a protein structure you can rotate with a program NCBI makes available." - Stephen Dellaporta, Yale University

STKE (Signal Transduction Knowledge Environment) <http://stke.sciencemag.org/>

"This section of the AAAS/Science Magazine website has a very broad collection of digital resources for teaching." - Nancy Kleckner, Bates College

Created

Body Wall Formation in the Chick Embryo. http://learningobjects.wesleyan.edu/musc_dev/
Animated Learning Object. - Anne Burke, Wesleyan University

Botany Database <http://ssad.bowdoin.edu:9780/projects/cbb99/Plants/cgi-bin/intro.pls>

Some 200 mostly local plants and algae used in teaching. - Barry Logan, Bowdoin College, with Bob Thomas, Bates College

Needed

“Would be nice to put some of my own animations into some central database structure where they would be available for others to use. Especially if it could be reciprocated.” - Stephen Dellaporta, Yale University

“A library of Flash animations would be useful; but how to standardize them is the problem: someone has to spend some money to set up a usable database.” - Douglas Kankel, Yale University

“I’m looking for Flash animations—but there’s still nothing as good as on video, such as Rachel Fink’s CELLebration (<http://www.sinauer.com/detail.php?id=1660>), sponsored by American Society for Cell Biology.” - John Carlson, Yale University

6. CHEMISTRY

Recommended

Analytical Sciences Digital Library

<http://www.asdlib.org/list.php?mainCategory=Class%20Material>

Peer-reviewed collection of teaching resources, including images and animations.

Chem Collective: Online Resources for Teaching and Learning Chemistry

<http://www.chemcollective.org/>

Mostly animations and course modules.

Crystal Lattice Structures <http://cst-www.nrl.navy.mil/lattice/>

Index and graphical representations of common crystal lattice structures, with multiple viewing options.

7. CLASSICS

Recommended

LacusCurtius: Into the Roman World

<http://penelope.uchicago.edu/Thayer/E/Roman/home.html>

A site on Roman antiquity, including a photogazeteer of Roman and Etruscan cities and monuments. Mostly small images.

Maecenas: Images of Ancient Greece and Rome

http://wings.buffalo.edu/AandL/Maecenas/general_contents.html

Mostly small images.

Perseus <http://www.perseus.tufts.edu/>

Major assembly of digital collections of humanities resources hosted by the Tufts University's department of Classics. Founded to collect and present materials for the study of Ancient Greece, it has expanded its original scope to include Greco-Roman classics, the English Renaissance, the papers of Edwin Bolles, and the history of Tufts University.

The Richmond University Department of Classics, Photo Library

<http://oncampus.richmond.edu/academics/classics/photos/index.html>

A few hundred large images of the Grecian world—but with little metadata.

8. EARTH SCIENCES

Recommended

Agricultural Research Service Image Gallery of US Department of Agriculture

<http://www.ars.usda.gov/is/graphics/photos/>

Gallery of 2,000 300-dpi images.

American Geological institute: Earth Science World Image Bank

<http://www.earthscienceworld.org/imagebank/>

Some 6,000 images provided by American Geological Institute.

Global Land Cover Facility (GLCF) <http://glcf.umiacs.umd.edu/index.shtml>

Highly-recommended open source dataset for some 28,000 Landsat images—easily searched and accessed using [Earth Science Data Interface](#) (ESDI). The GLCF is also a center focusing on research in land cover science using remotely-sensed satellite data and products to assess land cover change for local to global systems.

Jet Propulsion Laboratory: Planetary Photojournal

<http://photojournal.jpl.nasa.gov/index.html>

NASA's Visible Earth <http://visibleearth.nasa.gov/>
Catalog of NASA's images and animations of the Earth.

National Oceanic & Atmospheric Administration Image Collections
<http://www.photolib.noaa.gov/collections.html>
Some 40,000 images in 20 collections.

PASDA Pennsylvania Spatial Data Access: The Pennsylvania Geospatial Data Clearinghouse <http://www.pasda.psu.edu/access/index.shtml>
Supports search, display, and retrieval of GIS data, imagery, such as satellite images and aerial photographs, and metadata related to Pennsylvania.

Created

Atlas of Maine <http://www.colby.edu/environ/courses/ES212/atlasofmaine/>
Series of layered maps created by students in an introductory GIS course.

The Natural History of the Berkshires <http://drm.williams.edu/nhb/>
Hank Art at Williams College has conducted research on and taught how people and nature influence the ecosystems and relationships among species. This is one of a suite of websites created with students out of local materials. This site, a portrait of the local landscape, was the result of a course teaching students how to read the landscape, identify species and compare their own field measurements with historical materials to interpret changes in the environment.

It accompanies:

- **The Rosenberg Archives** <http://drm.williams.edu/rosenburgarchives/>, photographs taken from 1905 to 1930 at a local farm, now the 2,500-acre Hopkins Memorial Forest.
- **Half a Century of Land Use Change in Williamstown**, a project-in-progress addressing the changes in the biological and human landscape over the past 50 years using aerial photographs, historical maps, and vegetation data as well as interviews with farmers and farm family members who have lived through the experience of abandoning the agricultural enterprise.

8a Earth Science/Political Science

Created

The South China Sea <http://community.middlebury.edu/~scs/>
"Online resource for students, scholars and policy-makers interested in South China Sea regional development, environment, and security issues." See especially maps and images of the region: http://community.middlebury.edu/~scs/maps_images.html, edited by David Rosenberg, PoliSci, Middlebury College

9. HISTORY

Used

Abstracting Africa: Thematic Mapping and British Imperialism, 1870–1930.

<http://www.newberry.org/smith/slidesets/ss30.html>

“A model for the ‘reading’ and interpreting of maps is one of the Newberry library’s slide sets from its Hermon Dunlap Smith Center for the History of Cartography.” - Indira Karamcheti, English, Wesleyan University

Perry-Castaneda Map Collection at U Texas, Austin <http://www.lib.utexas.edu/maps/> - Cecilia Miller, History, Wesleyan University

Created

European Intellectual History Database

<http://www.wesleyan.edu/its/curl/v1/eih/aboutcurl.html>

A portal. “I have a database in European History—I’d like to blend maps into it.” - Cecilia Miller, History, Wesleyan University

Needed

“I would like to have a database on my area of research and teaching (Latin American History) that has a range of high quality images of figures, art, activities, etc, dating from the colonial period to the present. I regularly use online searches (such as Google) to find images that fit the content of my courses, and an all-purpose database to start with, with copyright free/approved images, would be nice.” - Latin-American Historian, Skidmore College

10. LANGUAGES

Recommended

Arte Historia <http://www.artehistoria.com>

Spanish resources on Spanish painting used in language classes. - Carol Meyer, Bennington College

Cervantes Virtual <http://www.cervantesvirtual.com/index.shtml>

Virtual library of Hispanic culture. - Sonia Perez, Bennington College

REALIA (Rich Electronic Archive for Language Instruction Anywhere)

<http://www.realiaproject.org/>

Peer-reviewed media for the teaching and study of modern languages and cultures.

Created

Spanish Grammar Exercises <http://www.colby.edu/~bknelson/exercises/>

"I have a website, created 5 years ago out of frustration with static workbooks (I was as bored as my students were). Using a Mellon grant, ostensibly for a personal page, it is now used in 191 countries and gets 25% of all Colby hits. It started as exercises: now it gives a new look at Spanish language and culture." - Barbara Nelson, Colby College

Russia Today <http://community.middlebury.edu/~beyer/RT/welcome.shtml>

"There are lots of pictures, maps, everyday items and links to interesting sites." - Tom Beyer, Russian, Middlebury College

11. LITERATURE

Recommended

Carthalia <http://www.andreas-praefcke.de/carthalia/>

Excellent site of postcards of theaters around the world: currently showing 3,700 images of 1,810 buildings in 100 countries.

Collage <http://collage.cityoflondon.gov.uk/collage/app>

Commercial image database of some 20,000 works of art depicting London, categorized by theme, from the collections of the City of London Libraries and Guildhall Art Gallery. Visible watermarks and small images.

Gode Cookery <http://www.godecookery.com>

A voluminous site dedicated to medieval cookery, including many small images. - Maud McInerney, Haverford College

Schoenberg Center for Electronic Text and Images (SCETI)

<http://dewey.library.upenn.edu/sceti/flash.cfm>

*Facsimiles of rare books and manuscripts in the Penn Library's collections plus other primary source materials that would otherwise be difficult to access. Also includes: **The English Renaissance in Context (ERIC) (Teaching Shakespeare on the Web)**.*

12. MUSIC

Recommended

Silk Road Project <http://www.silkroadproject.org/>

Silk Road Seattle <http://depts.washington.edu/uwch/silkroad/>

Silk Road, Smithsonian <http://www.silkroadproject.org/smithsonian/index.html>.

“All show a multi-layered, multi-media approach to music and culture. I look at these all the time and think about them and how valuable they are in different contexts and different modes and would like to do more of that kind of thing with my material—but it’s a vastly time-consuming process.” - Jennifer Post, Ethnomusicology, Middlebury College

13. SOCIOLOGY

Recommended

Internet Missionary Photography Archive

<http://www.usc.edu/libraries/archives/arc/digarchives/mission/>

Getty-funded project compiling Protestant and Catholic missionary collections held at a number of centers in Britain, continental Europe, and North America. - Gregory C. Stanczak, Williams College.

Los Angeles Regional History Collections

<http://www.usc.edu/libraries/archives/arc/libraries/regional>

Some two million images documenting one hundred years of Southern California history.

APPENDIX THREE: Digital Tools

Recommended, Created and Needed

The following lists those tools mentioned by faculty as ones they have used, developed or needed by faculty in the creation, manipulation or display of digital images.

1. GENERAL

3-D Construction

Used

Autodesk Maya <http://www.autodesk.com/maya>

3D modeling, animation, effects and rendering solutions. “A student (working with ITS) is building 3-D image from 2-D data—fabulous and greatly-needed but extremely hard to learn and operate—need something simpler.” Ann Burke, Wesleyan University

Geowall <http://geowall.geo.lsa.umich.edu/>

“We are working with a ‘geowall’ to make 3-D images out of 2-D material. We’re digitizing old stereo-images and projecting them onto a polarizing screen and using polarizing glasses to get the 3-D effect.” Bob Newton, Smith College

Animation

Flash <http://www.adobe.com/products/flash/flashpro/>

“I’ve used Macromedia Director, but it seems less suitable for the Web.” Douglas Kankel, Yale University

Needed

A sharing/organizing tool

“Something like E-snips—something where faculty creating their own digital library could access others’ digital libraries at will so we wouldn’t have to have one huge repository. Use RSS and other community-building tools, like Flickr, that can enable the discovery of peers’ material.” - Colby College Library/IT discussion

*Note: See Raymond Yee’s development at Berkeley of a “**Scholar’s Box**” which will do something quite similar, pulling material in from many sources, annotating and otherwise adding and then sharing it for teaching and research. See Yee’s ongoing account of this:*

http://www.raymondye.net/wiki/ScholarsBox_2fEssaySeries_2fCurrentState.

"I would like to have a tool to manage my entire personal digital image collection, and I don't have such a tool." - Alison Murray Levine, Colby College

2. ART HISTORY

Needed

"My dream: a single tool to acquire (from Web, proprietary databases, etc.) manipulate (i.e., crop, color correct), catalog, and present images." - Sandy Isenstadt, Yale University

"Ways to project with a sense of size and scale beyond the slide experience." - Anne Dunlop, Yale University

"I'm now thinking about what to do with NASA World Wind (<http://worldwind.arc.nasa.gov>)." - Mimi Yiengpruksawan, Yale University

3. ASTRONOMY

Used

Starry Night <http://store.starrynightstore.com/>

Astronomy animation tool. "It makes it fairly easy to make animations. In astronomy it's probably the most instructive." - William Herbst, Wesleyan University

4. CHEMISTRY

Used

ChemDraw <http://www.cambridgesoft.com/software/ChemDraw/>

"I use ChemDraw among other programs for making chemical structures." - J. McBride, Yale University

Spartan <http://www.wavefun.com/products/spartan.html>

"Computer software package for doing molecular modeling...can draw a molecule on screen, copy it into a document, calculate orbitals and you can use images to predict where reactions will occur. Typically students build structures and examine images and reach conclusions, don't often copy them into documents; but the program generates the images." - David Henderson, Trinity College

Orbital Viewer <http://www.orbitals.com/orb/ov.htm>

"Downloadable program that can create very effective images." - Matthew Cote, Bates College

5. EARTH SCIENCES

Used

ESRI software for ARCVIEW <http://www.esri.com>

GIS and mapping software.

ENVI <http://www.itvis.com/envi/>

Remote Sensing Exploitation platform.

Leica Erdas Imagine <http://gi.leica-geosystems.com>

Geospatial image processing.

6. MATHEMATICS

Used

Maple <http://www.maplesoft.com/>

"You can make 3-D graphs - and it's very cool. It makes it very easy to present graphs in exams. You can also animate and show complex calculations very quickly. Students use it to do their own calculations and make their own graphs." - Janice Sklensky, Wheaton College

Mathematica <http://www.wolfram.com/>

"You get equations and pictures—you can visualize them while you're doing them." - Flip Phillips, Skidmore College

"It enables you to do computation and graphs and even animations where there's a variable parameter. Can generate 2-D or even 3-D graphs." - Mark Huibregtse, Skidmore College

"Gives you another level of understanding." - Jay Thoman, Williams College

WebWork <http://webwork.rochester.edu/>

"Helps in the analysis of functional responses (enter a function and have it evaluated as correct or not). It's ideal for assignments with quantitative responses. It has an image language and can present several graphs and ask students which is the right one. Can't yet allow students to present a graph themselves online." - Mark Huibregtse, Skidmore College

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