Who Uses What?

Report on a National Survey of Information Users in Colleges and Universities

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Introduction

Time was when ambitious scholars began their research by consulting the paper card catalogs and finding aids of their campus libraries, corresponding by mail with professors, librarians, and archivists elsewhere about available resources, and checking the bibliographies of already published, printed works. Then they holed up in carrels in library stacks to study printed works available there and from others by interlibrary loan, hoping all the time for financial aid to travel to other repositories that contained needed books, journals, and paper documents. In the meantime, yesteryear's professors also put printed course materials physically on reserve in campus libraries for their students, who laboriously scribbled notes to take back to their dorms, where they penned or typed their course papers (making corrections with White-Out), and stayed up late reading expensive, bulky textbooks to prepare for exams.

The advent of Web-accessible, digital information has made all that seem, if not yet obsolete, at least quaintly inefficient. Today's professor may sit in the comfort of a home or office to do research, employing a computer to search electronic card catalogs, e-journals, and huge databases of digitized scholarly information. Also said professor may prepare "distance-education" courses and PowerPoint presentations, post class assignments and reading materials electronically through "courseware," and send e-mail answers to questions from students, who use computers both to find information and to write their "papers." At least this is the expectation of colleges and universities that are investing heavily in computer infrastructure and digital resources for research, teaching, and study. But to what degree is the supposed transformation really happening? How extensively are professors and students using the new digital resources? How comfortable are they with electronic information technology? How radically is it changing how they teach, study, and undertake research? And what are the implications of these changes for higher-education administration?

A National Survey

Answers are available from a major information-use survey of 3,234 faculty members, graduate students, and undergraduates in 392 doctoral research universities, public and private, and private liberal arts colleges. The list, though not representative of all higher-education institutions, is national in coverage. The Digital Library Federation (DLF) and the Council on Library and Information Resources (CLIR) commissioned the study from Outsell, Inc., a research firm, which gathered data through interviews (approximating a half-hour each) conducted between November 14, 2001, and February 2, 2002.

The resulting data appear in 659 tables that include break-outs by academic roles, types of institution, and fields of study. The DLF and CLIR (which provides the DLF's administrative home) have published 158 summary tables, along with an introduction by Amy Friedlander of CLIR's staff, in an 893-page report entitled *Dimensions and Use of the Scholarly Information Environment*. It is available in print and also electronically through CLIR's Web site: <http://www.clir.org/pubs/abstract/pub110abst.html>, where all 659 tables also are available.

Three caveats apply to any analysis of these data. First, the statistics characterize what respondents *said* they do when searching for and using information; the study did not include observations of actual behavior. Second, the statistics summarize responses at a point in time rather than over time, providing little trend data; only a few questions elicited information about experienced or anticipated changes. Third, low response rates for some questions render the results only suggestive. Nonetheless, analysts are making detailed studies of this rich data

collection. Library directors, various vendors, publishers and others are scrutinizing the data for insight of value in decision making—about library space planning, to take a known, early example. And the data make possible studies of the information source preferences and use behaviors of particular segments of the academic community: for example, graduate students in the social sciences in large private universities.

What do the data say about academic information use in general? This article will deal with four related aspects of that question. How fully is the academic community accepting and using electronic technologies and their fruits? Are printed materials giving way to electronic information in the work of scholars, teachers, students? What does the survey indicate about the status of and outlook for the campus library? And what do the findings suggest about higher education's information needs?

Comfort with Digital Resources

In answer to the first question, the use by faculty and students of digital information and their comfort with it seem to be great.

In all groups combined, 93.9% of respondents agreed strongly or moderately with the statement, "I am comfortable retrieving and using information electronically." Agreement by faculty members (91.6%) was almost as extensive as agreement by graduate students (94.8%) and undergraduates (94.6%). Strong-to-moderate agreement about comfort remained above 90% regardless of institutional type or academic field, except for a slight dip to 88.6% in the arts and humanities (restricted to foreign languages and literatures, architecture, and the theory, history, and practice of music and art). In fact, the proportion of respondents expressing comfort with electronic information was less than one percentage point below the proportion (94.8%) agreeing strongly or moderately with the statement, "I am comfortable locating and using print information."

A high overall proportion (94.7%) also professed strong or moderate comfort with using their institutions' Web sites. Agreement on that ranged above 90% across the board except for students and professors of law (88.7%). Moreover, 55.1% of all respondents agreed, at least moderately, that "I can find everything I need on my institution's Web site." Graduate students and particularly undergraduates agreed with that statement more than faculty did, and all respondents at liberal arts colleges slightly more than at universities. Also, nearly a quarter of all graduate and undergraduate student respondents—and more than that of undergraduates alone and of all students in business, engineering and social sciences—said they were participating to some degree in their institutions' distance-learning opportunities.

Respondents were asked a series of questions about whether they used electronic resources "all," "most," "some," or "none of the time" in research, teaching, and course work. As shown in the table below, substantial proportions of respondents in all categories said they used electronic resources all, most, or some of the time.

	% who use electronic resources in research	% who use electronic resources in teaching	% who use electronic resources in workcourse
all or most of the time	41.7%	21.9%	42.8%
some of the time	55.5%	67.1%	52.0%

The seeming comfort and substantial use that these figures express is reinforced by evidence from the survey that faculty and students in the higher-education institutions surveyed are well equipped to find and use digital resources. In their offices, 95.4% of respondents (mostly faculty and graduate students) said they had desktop computers; 89.2%, laser printers; 77.8%, fax machines; 71.3%, scanners; and 56.3%, laptops. In off-campus residences, 85.4% of all three groups combined reported having desktop computers; 44.2%, laser printers; 44.8%, scanners; 31.3%, fax machines; and 62.0%, laptops. A quarter of undergraduates (24.8%) reported living off-campus, where 92.5% have desktop computers, 31.2% have fax machines, and more than 40% have laser printers, scanners, and/or laptops.

As we will see, respondents do not all view Internet sources uncritically, and they generally express more faith in information they obtain from their libraries. Nonetheless, the survey indicates that high proportions of faculty and students in all fields

and types of institutions feel comfortable with electronic resources, use them substantially, and are relatively well equipped to do so. Does that mean that print use is correspondingly declining?

Print vs. Electronic

Faculty and students were asked how much of the time they use "hard copy print" for their research, teaching, and coursework. For research, 64.5% of the faculty and graduate students said "all" or "most" of the time; and the proportion rose to 73.1% for teaching. Print use in research and teaching was highest for respondents in the arts and humanities and lowest for respondents in law and business. As for coursework, 71.6% of graduate students and 51.6% of undergraduates purported to use print all or most of the time. The latter, relatively low figure could reflect a preference by the younger generation for electronic resources, or availability online of more of what undergraduates need, or both. However that may be, print use in all groups remained substantial, and that seems unlikely to change soon. More than 90% of respondents overall agreed strongly or moderately that "printed books and journals will continue to be important sources for me for the next five years," although graduate students and undergraduates were not quite as concurring as faculty members. For all groups, concurrence about the continuing importance of printed materials was highest in the arts and humanities, but exceeded 80% in all fields.

Nonetheless, 45.3% of faculty and graduate students said that more than half of the information they need for research is available online, and 30.1% said they can get online half or more of the information they need for teaching. Of graduate and undergraduate students combined, 49.4% said that more than half of current information they need for their classes is available online, and within that figure, the percentage of undergraduates who agreed was higher (57.4%). Thus the continued high use of print for teaching and research does not seem to reflect limited availability of relevant digital material.

Almost everyone doing sophisticated research continues to use printed books and journals, but, at the same time, nearly three-fourths of faculty and graduate students said that they use e-journals, and nearly one-fifth reported using e-books. Moreover, though some variation exists by field, more faculty and graduate students overall use online abstracts and indexes in research than use print abstracts and indexes; and slightly more use online databases, data sets, or data sources than use manuscripts and other primary source documents. Patterns are similar for coursework. High percentages of graduate and undergraduate students use printed books and journals, but significant percentages use e-journals and e-books. Also, by significant proportions, more students use online abstracts and indexes than printed ones in coursework, and more use online databases than use manuscripts and other primary source materials. Specific percentages are in the table below.

	% of faculty & graduate students	% of grad students & undergrads
use printed journals	97.2%	80.6%
use electronic journals	74.9%	53.3%
use printed books	96.6%	93.3%
use electronic books	18.4%	19.8%
use print abstracts & indexes	78.3%	59.1%
use online abstracts & indexes	88.2%	73.1%
use manuscripts/primary docs.	81.1%	64.0%
use online databases/sets/sources	81.8%	80.2%

However, the survey turned up another dimension of this story. Although higher education's users of information may frequently consult electronic resources, they are likely to print out what they find. More than three-fourths (77.2%) of respondents agreed moderately or strongly with this statement: "When I find information online, I print it out to read it." The proportion of concurring respondents stayed above 70% regardless of academic field and type of institution. Conversely, only 27.6% agreed moderately or strongly that they "find reading information on screen satisfactory and rarely print out information."

Another perspective comes from a list of survey questions that ask how people "find information about" materials of use in research, teaching, and coursework, and where they "actually get" those materials. For printed books and journals, as well as

for electronic books and e-journals, high proportions of faculty and students do their searching "online" rather than in "print sources" or by asking someone. But high proportions also "borrow from or use in the campus library" the printed resources they identify as useful.

Library vs. Internet

What else does the survey say about the standing of campus libraries as electronic options develop? Survey respondents were asked to what extent they agreed with a series of statements about libraries. Of students and faculty together, 85.9% agreed strongly or moderately that "my campus library meets most of my information needs"; and 55.4% agreed strongly or moderately that "browsing the stacks or journal shelves in a library is an important way for me to get information." However, 34.5% agreed strongly or moderately with the statement, "I use the library significantly less than I did two years ago"; and only 15.7% agreed strongly or moderately that "the Internet has not changed the way I use the library."

Libraries, of course, have changed the way they serve patrons, offering computer-accessible catalogs, digitized collections, and leased access to e-journals and other resources online, while also continuing to provide traditional materials within their walls. How much of the information that students and faculty members use comes from all resources, electronic and traditional, of their institutions' libraries? Nearly two-thirds of faculty and graduate students said that half or more of the information they use for *research* comes from their institutions' physical or virtual libraries; 44.5% said three-quarters or more. Nearly half of faculty and graduate students said that half or more of the information they use for *teaching* comes from their institutions' physical or virtual libraries; 32.9% said three-quarters or more. Two-thirds of graduate and undergraduate students said that half or more of the information they use in *coursework* comes from their institutions physical or virtual libraries; 46.7% said three-quarters or more.

Use of just the virtual resources provided by libraries is substantial. Between half and three-fifths of respondents, depending on the category, said that more than half of the information they use in research, teaching, and coursework is available through the Web sites of their institutions' libraries. And two-fifths of respondents put the proportion of information they use that is available at their libraries' Web sites at three-fourths.

Another indicator of whether library Web sites are used comes in answer to this question: "Once you've gained access to the Internet, how do you usually get pointed to the right information sources?" "Through search engines" was the top answer, cited by 47.6 percent of all respondents, and by more of the responding faculty (47.4%) than of graduate students (39.9%) but not of undergraduates (54.1%). Second choice, however, was "through the library's Web site," cited by 33.1% of all respondents, though less by undergraduates (27.7%) than by graduate students (41.1%) and faculty (31.6%).

In response to another question—"Where do you get the resources you rely on to stay abreast of current knowledge in your discipline or area of study?"—a third of respondents specified their individual institution's "physical academic library and all its resources," and nearly one-third regarded the library as their "most important" source. Slightly fewer (30.0%) said they go to the "open Internet" for resources on which they rely, and 28.7% regarded it as "most important." Both the library and the Internet outranked other information sources. Undergraduates ranked both sources somewhat higher (particularly the open Internet) than did faculty and graduate students.

Although "Internet information" may not necessarily exclude information available online from campus libraries, high percentages of all three groups—faculty (89.6%), graduate students (84.4%), and undergraduates (87.9%)—agreed strongly or moderately with the following statement: "I am finding more relevant information on the Internet than I did two years ago." In no field or institutional type did that proportion dip below 83%.

Critics argue that reliance on the open Internet is dangerous because information found on some Web sites may be factually inaccurate or dubiously interpreted. How discriminatory are academic users? The survey asked, "How do you determine the authoritativeness of the information you receive from

the Internet? That is, how do you decide how much it should influence your current thinking?" The survey reported that only 6.5% of students and faculty combined were "not concerned with authoritativeness," but the figure was higher (10.6%) for undergraduates. Respondents who were concerned with authoritativeness identified the following means of ensuring it:

- *19.1% said they "only reference known sources"*
- *14.0% said they "check with alternative sources"*
- *13.0% said they "trust the author."*

The survey also asked, "How do you verify the information you receive from the Internet? That is, how do you establish the accuracy of the information you receive from the open Internet?" The answers indicate that 3.9% of all respondents, and 4.5% of the undergraduates, "do not verify information."

Respondents who do verify identified two principle means: 39.3% said they "check it against another source," and 20.7% said they "only reference known sources."Responses to another set of questions indicate that information provided by libraries remains more highly regarded than information found on the Internet. High proportions of students and faculty combined agreed moderately to strongly with these statements: "My institution's library

- *contains information from credible and known sources" (98.2%)*
- *provides high quality information" (97.9%)*
- *provides information that I use and cite in my research papers" (94.8%)*
- *provides information that I use and trust without additional verification"(89.0%).*

Significantly lower proportions of respondents agreed strongly or moderately with the same statements about the Internet. Regard for the library seemed high in all disciplines; responses about Internet information varied by field, with regard generally highest in law and business and lowest in the arts and humanities and biological sciences.

Whether "my institution's library" and "the Internet" in the responses above include or exclude the library's online resources is not clear, nor is it certain how much Internet-information use takes place at computer stations that campus libraries provide. But respondents indicated that many of their libraries are well equipped. When asked to identify equipment available in their libraries, 88.3% of all respondents cited desktop computers; 84.6% cited laser printers; and 60.7% cited scanners. If electronic research tools are available in physical libraries, do professors and students continue to spend a lot of time there? Faculty members said they are in their offices nearly three-fourths (73.9%) of the time that they spend "accessing information," and less than 10% of such time in the "physical library." Graduate students said that their information accessing time is 30.0% in the physical library, 25.7% in residences, 19.9% in offices, and the rest in other places such as labs. Undergraduates spend nearly half (46.7%) of their information accessing time in residences and approximately one-third (33.6%) of such time in libraries.

Information Needs

The survey asked, "What additional information content does your library need to provide to meet your needs?" Of all respondents, 41.0% said "nothing" or "can't think of anything." Other responses were scattered over a variety of perceived needs: 14.3% needed more print journals; 10.7%, more e-journals; and, under 8% each, "more books," more "online information," "more computers," or "better organized reference centers."

In response to another question—"What services would you like your institution's library to offer?"—63.1% of all respondents said they didn't know or couldn't think of anything. Others, but no more than 3.3% in any category, said they would like "more electronic materials," "more electronic hardware" such as computers and copiers, and "information available in different locations." A few respondents also asked libraries to provide coffee shops, and lounge areas. Services such as the following to help faculty and students find information received infrequent mention:

- *"selecting high quality online information" (2.4%)*
- *"consultation on organizing online information" (2.0%)*
- *"assistance in library" (1.7%)*
- *"recommending high quality information" (1.3%).*

Whether such low percentages indicate that respondents do not feel the need of such services or already adequately receive them from campus

libraries is not clear. Although 23.8% of all respondents agreed strongly or moderately that "I often can't get information when I need it," only 13.8% said "I need help finding information 24 hours a day, 7 days a week."

Additional data on needs for help in finding and obtaining information comes from another set of survey questions. When faculty and students were asked to identify their *major* problems as information users, 18.1% said "knowing what's available"; 11.0% said "having access to all information from one place"; 10.7% said "determining the quality/credibility/accuracy of information," and 10.4% said "having sufficient training on how to search for information." From 34% to 50% identified those as *minor* problems.

Fewer than 10% of the respondents identified each of the following as a major problem: "finding information," "accessing information once you find what you want," "being able to compare across information alternatives (e.g., library vs. Web sites)," "having training and advice about the effective use of online information sources," "not enough access to networked computers," "getting information in a timely manner," "all information at my institution is not available from different locations within the institution," "not being able to log onto the library's Web site (lines busy, site down, etc.)," "having people who can help you find information or who search for information for you," and one's own "comfort level with electronic information." The proportion of respondents who considered those things minor problems ranged from 17% to 45%.

The item identified by the highest proportion of all respondents as a major problem was "having enough time" (38.8%). "Having to go to a library" was considered a major problem by only 5.7%, though a minor problem by 30.9%.

The survey also asked, "What types of information content does your academic library offer that you find no longer necessary?" Of faculty and graduate students responding (undergraduates were not asked), 76.0% said that "everything is useful" or they "can't think of anything" or they didn't know. Of the rest, 9.5% mentioned "print materials" such as magazines and journals, and 4.2% mentioned "out of date materials"; no more than 2.5% gave any other response. And when asked—"What types of information services does your academic library offer that are no longer necessary?"—92.5% of faculty and graduate students had nothing to suggest.

The survey asked, "What unmet needs for information types and content [from inside or outside the library] do you have?" More than half of all respondents (53.3%) said none, but 26.7% mentioned "more online journals," especially in biological sciences (38.7%), and 4.5% expressed an unmet need for online materials generally. Only 11.6% called for "more print journals" and 2.7%, for "print materials" generally. To the limited extent that respondents are seeking information resources to meet unfilled needs, they seem to hope to find the resources online.

A stronger indication of perceived needs came from a set of questions about how well certain "features" of current sources of information are meeting respondents' needs," such as speed of delivery, ease of access, search functions, search options, subject coverage, quality, and use privileges. Though from 50% to 90% of faculty and students regarded 12 of 15 features on the list as extremely or very important, just roughly half or fewer rated any feature as currently excellent or very good in meeting their needs.

Conclusion

Responses to the survey confirm, in the aggregate, that electronic information use is substantial and growing in the nation's major universities and liberal arts colleges, without much of the "drag" that some might have expected from methodologically entrenched professors and book-loving humanists. Respondents to the survey are highly comfortable with digital resources, are making use of them for research, teaching, and coursework, and have equipped themselves well to do so. One might even be surprised at the proportions of respondents, though still in the statistical minority, who profess to read e-books and to be involved in "distance learning."

However, responses also confirm that print is not dead, nor is the campus library. The data indicate that large numbers of professors and students go online rather than into the stacks to search for resources they need, but then print out or go to the

library to get much of what they use. Libraries themselves make online searching possible by digitizing their catalogs, and increasingly offer collections online as well. Moreover, when people now go to the physical library, it may be to access information through computers, scanners, and printers provided there, with which, the survey indicates, campus libraries are relatively well equipped. If as indicated, some respondents are using the library less than they did two years ago, many others are using it differently.

As for unmet needs, less evidence appeared in the survey of a desire for particular new scholarly resources and services than for easing and speeding the means of search and retrieval. Some librarians may feel concerned that users find libraries' Web sites less easy to use than commercial search engines, which rapidly come up with more sources of information, if at a more shallow and less dependable level. But strong expressions of need for training and assistance in finding information were not abundant. Undergraduates seemed to feel even less need for assistance than others in the survey, though they were more likely than others to ask a librarian (rather than a colleague) for help. The picture is thus mixed, but proponents of such potentially valuable undertakings as providing "information literacy" training—and of making the future library more a finding service than a repository—could encounter "customer" resistance.

To apply such generalizations to anyone's specific institution, however, requires caution. The survey is properly used as food for thought by higher-education administrators, librarians, publishers, service developers, and information technologists. It opens questions to ask about one's own situation: "Given what is happening overall, is our campus adapting in ways and at a rate that is appropriate to meet needs and expectations of our particular students and faculty? What prospects do the data suggest to which we may need to adjust?"

Survey results also open questions for higher education collectively. Given the survey's evidence that digital resources already are extensively available, used, and valued throughout much of higher education, who will ensure their continuing preservation, and how? Given the technological ease with which digital resources can be delivered to any computerized community, how locally focused does it make sense for any content provider to remain? What will it take, in terms of financing infrastructure and digitization, managing digital resources, connecting sources of content, resolving property concerns, and dissolving access boundaries to provide the professors and students of the future with the libraries of the world?