Academic Libraries in the Digital Revolution

Libraries in the midst of revolution need new ways of thinking about their mission

By **Richard J. Bazillion**

Technological obsolescence overtook many library buildings less than a decade ago, as campuses created their own networked environments and aspired to give their students ubiquitous access to computers. Faced with the need to modernize aging structures, administrators first tried drilling, wire-pulling, jury-rigging, space-juggling, and other means of postponing the inevitable. When they could no longer defer the decision to build anew, an important strategic question arose: How will a new library add value to the educational enterprise and reinforce campus-based learning?

To design and build a library these days is in fact to re-think the entire educational mission, at least in part with the aim of integrating new technologies that allow digital resources to supplement and expand the library's traditional print holdings.[1] A new building, moreover, can provide space for several facilities intended to help the library fulfill its role as a "teaching and learning instrument" through which students become adept users of information technology. As higher education moves aggressively into technology-enhanced learning, libraries find themselves "in the throes of a revolution."[2]

Essence of a Revolution

Most scholars accord Gutenberg's invention of movable type the status of revolutionary event, an innovation that fundamentally altered the process by which knowledge is created and disseminated. Electronic publication and digital networking are this epoch's equivalent of the printing press, an assertion that gains credibility from the convergence of several recent developments in higher education:

1. the advent of Web-enhanced teaching and learning, which has rejuvenated older faculty and improved student participation in their own learning;
2. the emergence of librarians as information-technology educators;
3. basic alterations to the fabric and internal geography of academic libraries constructed within the past decade; and
4. the adoption, by a growing number of institutions, of universal computer-access programs, whether through laptop leasing or by other means.

Web-based library catalogs, many of which offer access to full-text materials through links to electronic resources like JSTOR, Project Muse, FirstSearch, and so on provide researchers with powerful means of locating sources in any format. The Internet itself, though not a library in any conventional sense, adds another dimension to almost any search for information. So broad have the horizons of knowledge become that teaching faculty, librarians, and students need to cultivate new abilities, sustained by a different kind of library architecture. The outlines of a changed educational enterprise appear in some campus developments of the past five years or so. If they don't comprise a revolution in themselves, they certainly point toward one in the process of being born.

Laptops, Connectivity, and Web-Enhanced Learning

Student laptop programs have been around since 1993, when the University of Minnesota-Crookston launched one of the first ones. Grove City College in Pennsylvania followed a year later. Then came Wake Forest University's "Plan for the Class of 2000," which mandated laptop leasing in 1996. Crookston quickly discovered that the laptop experience "made a strong impact on learning,"[3] and Wake Forest noted "a positive impact on academic achievement."[4] Winona State University in Minnesota followed suit in 1996; planners seized the opportu-

nity to make the new library, then on the drawing board, "laptop friendly" by providing power and data connections at most of its 800 seats, with a total of 1,600 throughout the building. The campus information network now encompasses all residence halls, study areas, and a growing number of classrooms, many equipped with digital projectors and SmartBoards.

Campus-wide connectivity is one aspect of an interlocking set of preparations for a "laptop university"; another critical element is faculty development. For a short time, in 1997–99, Winona State employed a talented librarian/technical communicator, who initiated about sixty faculty members into Web-enhanced course design.[5] A number of "Webcampers" were senior faculty, who felt themselves rejuvenated by the experience. Along with the preparation of physical facilities and the faculty goes the logistical planning to configure, distribute, and administer thousands of laptop computers now available to students and faculty. Coordinated planning is essential — yet somewhat at odds with the nature of higher education.

Given the glacial pace of most academic decision-making, the "plan" always lags behind unfolding reality and is perpetually obsolete. Planning therefore can address only the broadest strategic goals, such as building design, network architecture, classroom renovation, the extent and location of faculty support services, the scope and type of student access to computer facilities, the acquisition of electronic information sources by the library, computer platforms to support, and similarly general themes. Attempts to prescribe course-development software, size of support organizations, staff qualifications, and other details don't work well within the context of the strategic plan, the purpose of which is to map out the territory ahead. The main point of any strategic plan is to ensure that the campus realistically assesses its own resources and draws when it must on those of external vendors.

Potential laptop universities are for-tunate indeed if their strategic plan for campus development includes a new library building. Elderly facilities, constructed a generation or more ago, cannot be adequately retrofitted to function within a networked environment. Inability or unwillingness to replace them will impede a laptop program and the integration of information technology into teaching and learning. Because so many research materials are available electronically, library connectivity is indispensable. Universities also require enough bandwidth to let students fulfill electronic course assignments. Much of this work will be undertaken in the library, where both the resources and expert advice are readily available. The clear implication is that the library will remain a physical presence on even the most wired of campuses.

Portable Computing and the Library

Electronic information sources have quickly established a formidable presence in academic libraries. NetLibrary, for example, permits any member of a subscribing institution to borrow electronic books. Articles from JSTOR's digital archives can be hyperlinked easily to course syllabi. Full-text access is increasingly available through such sources as FirstSearch, Project Muse, Academic Press, and CINAHL. Patron-initiated interlibrary loans let library users order material directly. Web-based resources of all kinds, available free or by institutional license, have made the computer an indispensable research tool. Portability and wireless connectivity simply enhance its power.

Because electronic research skills can become an enduring legacy of one's higher education, campuses are taking steps to ensure "information literate" graduates. A common strategy combines Web-enhanced education with the traditional residential experience. The library is a large part of that picture because it's the one place on campus where electronic scholarship is on full view. As the Web's influence expands, so does the central role of academic libraries — an idea at odds with the apparent thrust of electronic publication.

How can a device that lifts time and place constraints on information access not threaten the physical existence of libraries? Comforting assurances that "the Web is most definitely not a library now, and it probably never will be" may evaporate as search engines adopt the selection and organizational tools that librarians use.[6] Publicly accessible browsers, after all, have been around only seven years, during which time the Web has evolved at great speed.[7] Rather than assume that it never will become a "library," a better response may be to redefine library collections and services in an information environment that soon will be largely electronic and Web-based. If it's true that "the real literacy of tomorrow is the ability to be your own reference librarian," then today's librarians are the educators who can help students create that future.[8] By doing so, librarians are in no danger of putting themselves out of business. Their job now is to encourage a learning style that seeks knowledge through critical interaction with a multitude of sources.

Text is the primary medium at the moment, although the Web delivers ever more sophisticated multimedia formats. Library mediation, through consortial licensing arrangements, helps ensure the quality of electronic resources made available to students. As for the Web itself, critical intelligence offers the best defense against fraud and humbuggery. The laptop computer can help promote critical-thinking skills in the context of online research, selection, and evaluation. Is its widespread use on campus and off also the harbinger of a future without academic libraries?

Printed books have provided libraries with their raison d'être for the past five centuries. Let's assume for the moment, as do Eli Noam and others, that the culture of the book is in terminal decline as scholarly publication migrates to electronic format.[9] Books themselves are crossing the electronic divide: NetLibrary, for example, allows

digitized tomes to be "borrowed," downloaded and read on one's personal digital assistant (PDA); the Librius.com bookstore sells recent publications that you may purchase and store for convenient reading. If these enterprises represent the future to any significant degree, then the circulating libraries whose rise created a mass-market publishing industry may be metamorphosing into quite different institutions.[10] The transformation process is visible in recently constructed buildings that feature network connectivity, teaching of electronic research skills, and access to digitized resources rather than mainly the warehousing of printed volumes. Portable computing that frees people from their dependence on a physical facility is another change agent within academic libraries.

In spite of these developments, the arrival of electronic information products doesn't mean an end to libraries as institutions, although a new kind of library service is certainly evolving. Libraries one day may find themselves out of the business of lending goods (printed volumes) and in the business of providing access, advice, education, and tangible support to researchers. No longer will librarians serve primarily as gatekeepers to locally held print collections, a role they have traditionally played in higher education.

Once electronic media carry the information people seek, and convenient display devices exist (they're very close at the moment), those who want access will quickly acquire the necessary skills to obtain it. Portable computing and easy connectivity will spur this process, which, in any case, isn't completely spontaneous. Skills typically are learned from experienced teachers, whether the activity is music, plumbing, or library research. An essential function of higher education is to impart research skills within the context of a student's education, whether in the liberal arts or a professional/technical discipline. The practical questions therefore are, "What sort of library facility is needed to advance the cause of information literacy?"

"Will Web-based courses and research influence the architecture of library buildings?" In the following section I offer some tentative conclusions.

The Future of Library Architecture

Libraries built after 1995 have a different look and feel that defines "intellectual information centers" where people and technology interact. They likely also cost more to build. Architects who specialize in the design of academic libraries notice "a consistent increase in project costs as a percentage of construction due in large part to the increased demands for equipment and the sophistication of furnishings to accommodate technology."[11] Preparation for extensive use of portable computing accounts for much of this
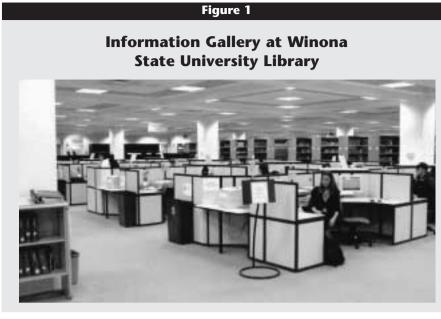

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investment; additional costs stem from high-tech facilities within the library such as electronic classrooms, information arcades, faculty support centers, and, yes, even library cafés. Jeffrey Scherer, an architect who specializes in library design, points out that "wire and bandwidth are the shapers of our libraries today."[12] He defines libraries as "the element in our society which maintains the essential continuity between the ages and the requisite cross-references between all forms of information." Libraries integrate and civilize the technology; they aren't replaced by it. High project costs, moreover, result not only from the provision of technological infrastructure but also from a growing investment in libraries designed to foster a

sense of community by offering a pleasant ambiance. Technology, if blended into the building's fabric, can sustain a comfortable relationship between electronic research materials and those who use them. This symbiosis works best in buildings designed with that specific end in mind.

Until quite recently the impetus for new library construction sprang mainly from a need to house expanding print collections. Electronic storage and retrieval has slowed that momentum somewhat, having matured to a point at which the advantages of digital publication and archiving are apparent. The future clearly lies with enterprises such as JSTOR that maintain journal backfiles on a server. Miles of steel shelving, whether open-stack or mobile, need not be provided for what amounts to dead storage. Warehousing of published materials has assumed a completely different form, one that no longer demands constant expansion of physical space. It's therefore time to take a fresh look at library architecture.

Infrastructure, amenities, and "presence" define academic libraries early in the 21st century. If libraries have learned, as Clifford Lynch puts it, "how to bring bits into the future," then they may confidently embrace digital publication as a burgeoning adjunct to printed volumes.[13] The transition will not be complete for some time, however, because of the large paper collections already in existence and because print publication will continue as long as its economic base remains sound. "We will have hybrid libraries, archives, and other information institutions," according to Christine Borgman, "for the indefinite future."[14]

Physical materials will be stored and access will be provided to publications in a variety of formats. Whether or not library users actually visit the building depends on several factors, including their research-skill level and the type of information they seek.[15] There's no reason to believe that libraries built today will become obsolete or superfluous over their anticipated fifty-year lifespan, provided they're designed so

Figure 1

Information Gallery at Winona State University Library

that, as Scherer advises, "reader space, staff space and stack space ... work interchangeably where appropriate."[16]

The evolutionary capability of a hybrid library depends on selecting a proper building module, which will allow the smooth reallocation of space as circumstances change. A 30-foot building module, which produces 900-square-foot bays, conforms most closely to the dimensions of traditional open-stack steel shelving and "can support," according to Scherer, "up to a maximum of 20 workstations with a computer, monitor, two chairs, shared printer, and paper reference work space."[17] A power/data grid quartering each bay feeds mid-floor study furniture, the dimensions of which should relate to those of the shelving to provide flexibility of space usage. As the need for storage space declines, shelving can give way to furniture. Integration of structural columns into both shelving and furniture configurations will ensure that traffic patterns aren't impeded. The module accommodates either study or storage space and allows interchanging functions. This degree of flexibility is critical in academic libraries that incorporate technology. Without it, there will be trailing wires, obstructions, and general deterioration of building functionality. Pervasive yet unobtrusive integration of technology is the ultimate goal, which is also

served by including special-purpose spaces in a new building.

Winona State adopted from the University of Iowa the idea of an "information commons" dedicated to learning electronic-research and document-creation skills. Called the Information Gallery (see Figure 1), this area rarely has an empty seat. Help from student technicians and librarians is readily available. A similar facility, the Academic Technologies Center located on the second floor, offers support to faculty developing Web-enhanced courses. The library's electronic classroom, equipped for interactive TV and network access, has two digital projectors aimed at separate SmartBoards as well as other projection devices. The room serves as a campus laboratory for teaching technology.

Value-Added Libraries

Adept researchers may rely less on the library and its staff's expertise. It's possible that "time spent in the library building may be for narrower and more specific purposes, and may occur only at critical stages of the search process."[18] If so, then academic libraries will become a value-added component of the educational process, to which they will contribute in several ways:

■ broadening and improving access to electronic information sources,

■ providing special facilities and equipment such as high-end workstations and interactive TV connections,

■ assisting faculty in integrating technology into their teaching and research activities,

■ maintaining a high level of staff expertise concerning developing information systems,

■ helping students distinguish between Web-surfing and electronic research, and

■ providing an atmosphere in which technology enhances education.

These things cannot be accomplished easily in a building inherited from a previous age, when library services focused on custodial and curatorial functions. Warehouses are very difficult to transform into value-added libraries that offer various forms of information access. Without appropriate infrastructure, facilities, equipment, and staff expertise, the task is almost impossible. In many cases buildings of 30 years old or more simply cannot be renovated to suit today's information environment, at a cost most institutions can bear. They have to be replaced.

A significant capital investment in library facilities is justified on the grounds that research materials will exist, for some time to come, in both print and electronic formats. Students using Winona State's Information Gallery obviously like hard copy, judging by the massive quantities of paper consumed by the area's eight printers — some forty cases a month. This doesn't mean that students prefer to consult print materials while doing research; when information is available online, that's the medium of choice. To conclude that libraries are passé because today's students would rather surf the Web is also incorrect. Preservation of the scholarly record, in whatever format it's published, is the responsibility of a discrete institution and its professional staff — a fact that the advent of digital media won't alter. Student use of laptops promotes familiarity with information technology and greater use of the library's electronic resources. At the same time, laptop programs enhance the teaching

role of the library, where research and technical expertise have a central location. Academic libraries therefore should be designed to house facilities that support the university's educational mission, guaranteeing their presence in an electronic future. *e*

Endnotes:

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12. J. Scherer, "Building Now for Relevance in 2020," keynote speech, 1996 LITA/LAMA Preconference on "The Technology-Proof Library," p. 11 [http://www.msrltd.com/litatalk. htm].

13. C. Lynch, "Strategic Issues: Technology, Trends, and Solutions," *Vantage Point* (EBSCO Subsription Services, 2000), p. 3.

14. C. Borgman, *From Gutenberg to the Global Information Infrastructure: Access to Information in the Networked World* (Cambridge, Mass.: MIT Press, 2000), p. 67.

15. Ibid, p. 8.

16. J. Scherer, p. 14.

17. J. Scherer, "Envisioning Technology for Library Buildings: an Architect's Perspective," presentation to the Public Library Association (March 12, 1998), [http://www.msrltd.com/talk2.htm].

18. Borgman, p. 8.

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