

The Fully Electronic Academic Library[®]

Norman D. Stevens

This description of the planning for the first academic library to contain only electronic resources, and no books and no paper of any kind, is derived from the limitless possibilities of our imagination. The concept of such a library and the dramatic changes it will bring in collections, budgets, staffing, services, and buildings are outlined in detail. Finally a few questions are raised as to whether such a library will best serve the information needs of academic institutions in the twenty-first century.

So let us think kindly of those who would frighten us by slogans and catch-words about the great and growing mass of the world's literature, and of those who would take pity on our benighted state to solve all of our problems with machines they have not yet thought about.¹



Although, historically, most libraries began as collections of “books” in a single format, almost every library has been faced sooner or later with the problem of how to handle information in other formats. In ancient times, a library of tablets had to deal with scrolls and then a library with scrolls had to deal with codices. As new information formats, such as motion pictures and sound recordings, emerged in the early 1900s, many libraries were reluctant to add such unproven technologies to their collections. But by the

end of the twentieth century, almost all libraries had enthusiastically embraced a full range of new technologies while still maintaining sizeable book collections. Most libraries are still challenged by the necessity to handle materials in a wide variety of formats assisted by a wide variety of machines of one kind or another. It has been difficult for libraries to achieve even a portion of the real cost savings that information technology might offer; instead, the cost of new information technology is an addition to, not a substitute for, existing costs.

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Almost from the emergence of the codex, inventions to assist with, or convert, the information in books have been proposed, developed, and sometimes even used with one degree of success or another. Ideas such as Ramelli's scholar's book wheel have regularly appeared and just as regularly disappeared only to be later recalled as interesting anomalies.² In the past fifty years, after a slow developmental phase, computer and information technology have truly transformed libraries. Vannevar Bush's landmark 1945 article "As We May Think," which proposed the scholar's workstation called Memex, foresaw the changes that were to come.³

The Molesworth Institute, which was founded in the mid-1950s just as library automation burst on to the scene, has been one of the chief commentators on various aspects of the more arcane and fanciful library applications of technology.⁴ Its research staff watched with particular interest various proposals in the late 1960s by scientists with only a dim idea of the true nature of libraries who predicted that by 2000 a computer-based national research library would replace academic libraries.⁵ The staff also took note of F. W. Lancaster's equally fanciful 1978 *Toward Paperless Information Systems*, in which he predicted that we would now be living in the first decade of a paperless society.⁶

Creating a Library for the Twenty-first Century

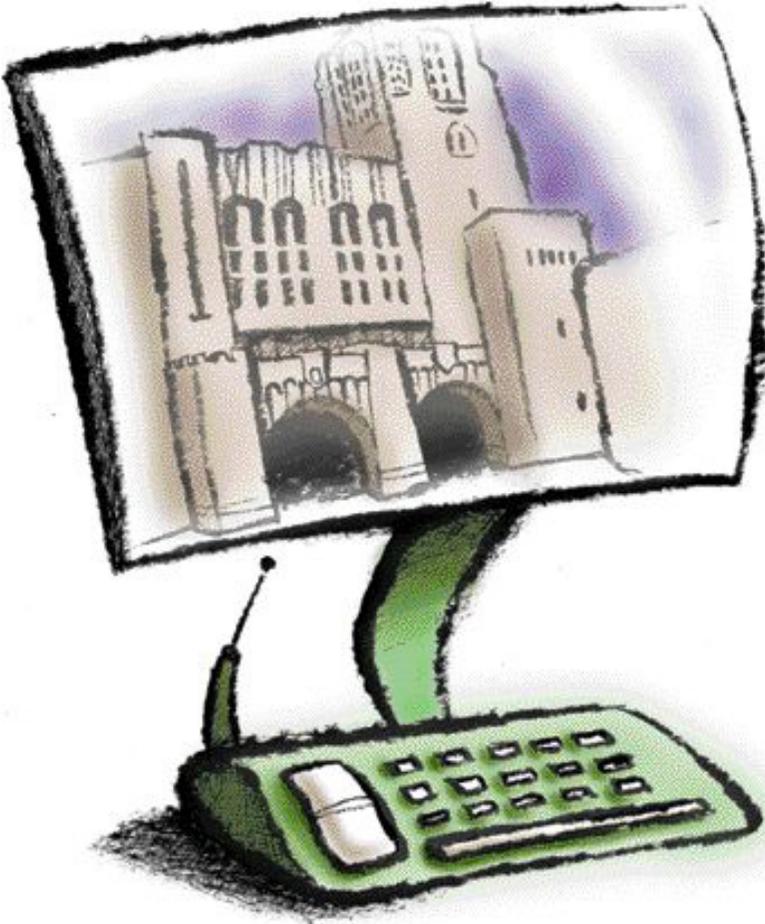
In December 2000, The Molesworth Institute was commissioned by the board of trustees of the newly established Ezra Beesley University (EBU) in Baxter to develop a plan for the creation of its library. From the start, the board emphasized its desire to create a library that would match its dream of a unique institution for the twenty-first century. EBU, which will enroll its first students in 2007, will have a full range of undergraduate, graduate, and research programs. By 2012, EBU is projected to have an enrollment of approximately 20,000 students

and more than 1,200 full-time faculty and to be awarding at least 200 Ph.D. degrees annually. It will emphasize cost-effective applications of computer and information technology in all aspects of the institution's operations with a view to significantly reducing costs, especially to students, while substantially improving their education. No textbooks will be used in the instructional program, thus saving the average undergraduate student more than \$10,000 over four years. Similar savings have been mandated in all areas including staffing, buildings, and administration. EBU is committed to becoming a major, fully accredited, and nationally recognized institution within ten years, but it also is committed to avoiding major startup and operating costs. It is constructing its own wind farm to provide all its electricity. It also is in the final stages of negotiation with Cray Computers to adapt that company's supercomputers to manage all the institution's information and research needs. Other emerging technologies, such as RFID (radio frequency identification) smart minicomputer-like identification cards, Intel's dual-processor semiconductors and 64-bit chips, and LCoS (liquid crystal on silicon) television screens, will be fully utilized as they become available.

Recognizing the daunting challenge of building a major academic library that will meet the institutional goal of membership in the ARL by 2014, the research staff of institute realized that it needed to expand its normal practice of relying solely on its creative imagination. Thus, a number of Fellows of The Molesworth Institute were invited to participate in planning discussions held at its Spring Hill Conference and Research Center in Storrs, Connecticut, from April 1 to 15, 2004. The full report of those discussions, "No Books, No Paper©; The Fully Electronic Library©," is available at www//molesworthinstitute/nobooks©.

The first several days of the planning sessions were devoted entirely to non-structured, open-ended, free-ranging

FIGURE 1
The Library is Inside*

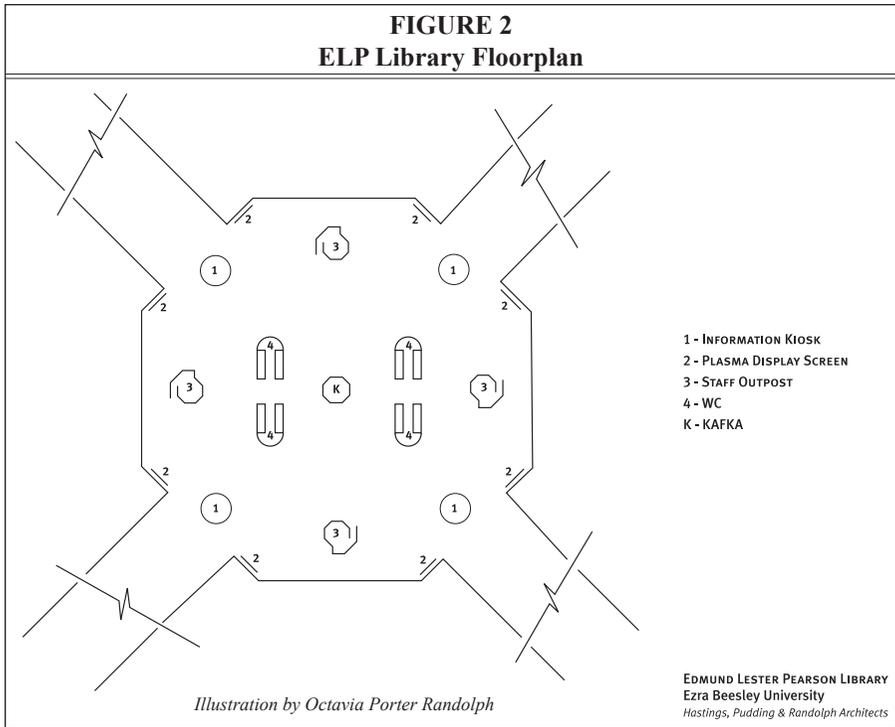


*Remark overheard at the dedication of the Sterling Library at Yale University in 1931 emphasizing that the building is not the library.

Illustration by Jackie Urbanovic

discussions in which each participant was randomly assigned fifteen-minute blocks of time during which he or she could comment on any aspect of what this new library might look like. No visual or written presentations were allowed, no flip charts or blackboards were available, and no one was allowed to use or take notes of any kind. The initial goal, which proved to be by far the most difficult part of the work, was to define the basic concept of

a truly new academic library for EBU and the twenty-first century. There was immediate agreement that the purchase of the book collection of a failing college or university, or any other large-scale acquisition of books, was neither feasible nor necessary. After prolonged discussion, there was unanimous agreement that the EBU's Edmund Lester Pearson Library should be solely an electronic library. The fully electronic ELP Library, which is now



under construction, will be substantially less expensive to build and maintain than any other conceivable academic library. At the same time, the faculty, staff, and students of EBU will have immediate access to a range of information that equals or surpasses that available in all, but a few, of the most prestigious academic libraries in the world. The ELP Library will embrace the historical idea of a library as an institution that deals solely with the dominant form of information and thus will avoid the inevitable complications of attempting to manage a bewildering array of outmoded information formats, including books.

A Further Definition

The ELP Library will contain no printed books or other printed materials of any kind. Those constraints will apply to book substitutes (for example, microforms) and other information formats that require specialized mechanical equipment (for example, films, sound recordings, and

videos). No one, including staff, will be allowed to bring any of those materials into the library. That rule will be strictly enforced, and contraband will be seized at the entrances and destroyed on the spot. All information resources will be available only in digital formats and accessible only electronically. Paper will not be allowed within the library. The library will have no photocopy machines, no computer printers, no provision for the receipt of mail (the library will not have a mailing address), and no wastebaskets or recycling bins. Neither staff nor users will be allowed to bring notebooks or any other form of paper into the library. Only personal data assistants, computers, and other paper-free electronic devices may be used to bring information into, or take information out of, the building. This will require users and staff to use their imagination rather than simply to print out copies of information to take home that they might never look at again. There will be hot air dryers, not paper

towels, in the unisex rest rooms, which will feature the paperless Washlet toilets developed by TOTO that have a heated seat, a streamlined wand that provides a warm aerated flow of water, and a warm air dryer.⁷

Collections

Once the “no book, no paper” decision was made, discussions focused on the nature of the library’s collections. The collections will consist of an array of electronic resources equal to, if not greater than, those currently available in all, but a few, of the world’s largest research libraries. Any and all resources that can be accessed by computer, whether through the Internet and the World Wide Web or in databases that can be loaded locally, will be available through an assortment of computers in the library and, as contractual arrangements allow, to qualified users on campus, at home, or at other locations. Google’s project to make available full-text digital versions of an enormous number of books held by major research libraries reinforced the wisdom of the collections decision. Existing and emerging electronic information resources will more than meet the needs of faculty, staff, and students as well as fully meet the requirements for library resources mandated by accrediting bodies. An annual information access budget of approximately \$2,500,000 will be more than adequate for the foreseeable future; that is approximately \$1,000,000 less than the lowest acquisitions budget of any library among the 113 academic library members of the ARL in fiscal year 2002–2003.⁸

A true research library must contain special collections that will make unique resources available to faculty and students as well as add to the overall store of information available to the world’s research community. To that end, the ELP Library will build a comprehensive database of all electronic resources created within Baxter County from January 1, 2001, on. Major funding from a small group of local philanthropists has established a \$10,000,000

endowment fund whose income will support the development of the Baxter 21st Century Electronic Archive (B21CEA). This archive will contain:

- Anything created electronically, printed, published, or written by a resident or native of Baxter County
- The content of all Web sites based in, created in, or that mention Baxter County or provide information about activities, associations, companies, institutions, organizations, or people associated in any fashion with Baxter County
- Local programming, including advertising, created or broadcast by local media outlets
- The records of all associations, businesses, institutions, and organizations located, or with a major presence, in Baxter County
- Initially on a cost basis, the correspondence, photographs, and other personal papers of any resident of Baxter County
- All aspects of research, published or unpublished, carried out by alumni, faculty, staff, and students of EBU

The emphasis will be on information created on or after January 1, 2001. Electronic records from any date will be included, and efforts will be made to encourage and support the digital conversion of nonelectronic information sources created before January 1, 2001. Paper and other nonelectronic information resources suitable for B21CEA created after January 1, 2001, will be digitized in a special off-site location. A dedicated computer will be programmed to monitor the updating of Web sites and other electronic resources relevant to the scope of B21CEA and create an electronic archive; minor additions or deletions may simply be noted, but a complete version of each Web site will be archived whenever a major update occurs, or at least annually.

The Library That Never Sleeps

The ELP Library will be closed only on February 29 so that it can operate 24/7/365©. That schedule recognizes

the fact that information providers and remote users may be located anywhere in the world and that local users may wish to use the library at any time. The staffing and service costs will be far less than those of a traditional research library. A substantial number of the positions needed in a traditional library, especially those in technical services, will be eliminated entirely. There will be no need for any acquisitions staff, catalogers, serials librarians, processing staff, preservation and binding staff, circulation or reserve staff, interlibrary loan librarians, shelvees, mail clerk, or security personnel.

The 24/7/365 schedule translates into 8,760 hours a year. Each staff member will work forty hours a week for forty-six weeks a year; that allows six weeks for vacation, sick leave, and the several holidays that may be taken to accommodate a staff member's national, religious, or other affiliations. To cover one position for an operating year will require approximately 4.75 people. The initial staffing will provide for 48 positions. That number is significantly lower than the 274 positions for university libraries reported as the ARL median in 2002–2003 and about one-third of the staff in the lowest university library in that category.⁹

Ten staff members will be on duty at all times the library is open. That will provide for staff with the following expertise: archives; arts and humanities; building and equipment maintenance; electronic technology; engineering; information science; instructional technology; sciences; social sciences; and business, law, or medicine on a rotating basis. There will be no administrative and managerial staff, no formal organizational structure to be changed at least every other year, few, if any, meetings, and no memos or reports to be written, read, ignored, and filed. All staff time will be spent on productive service-oriented activities. The elimination of the many meaningless chores now performed in all academic libraries will represent, in itself, a saving of at least nineteen positions.

In lieu of the traditional library director, an electronic constant consensus companion (CCC) will allow all staff to share the required administration of the library, including communication with the university administration and external constituencies. All institutional and library policies and procedures, budgetary and personnel, files, accounting and reporting requirements, information systems controls, building management programs, and other required procedures will be managed through the CCC. All library staff will have equal password-protected access to CCC; and all library staff will be authorized to make decisions on behalf of the library. All decisions will be organized and summarized automatically and distributed via e-mail to staff on a daily basis. Significant changes in policies and procedures will be highlighted in a central electronic file for two weeks. Not only will there be a substantial salary saving, but decisions will be expedited because staff will not have to wait for a library director to make up his or her mind or to return from an inconsequential national or international meeting.

Salary levels will reflect the shared administrative responsibilities as well as the productive nature of the staff's professional assignments. The minimum starting salary will be \$100,000. That is almost double the median professional salary in ARL university libraries for 2003–2004 and approximately 25 percent higher than the median professional salary at the highest ranked ARL university library.¹⁰ The initial total annual salary budget for the ELP Library will be \$4,800,000. That is slightly more than half the median total salary and wages budget for ARL university libraries in 2002–2003. It is only slightly higher than the total salary and wages budget for the Georgia Institute of Technology in 2002–2003; this confirms the fact that extensive use of technology in academic libraries, which is one of the characteristics of the Georgia Tech Library, is highly cost-effective.

The Library Building

It would, of course, be possible to create The Fully Electronic Academic Library as a virtual library with no physical building. That was one of the most contentious issues considered by the research team. In the end, there was unanimous agreement that a physical library building, which could be of a much more modest size than most contemporary university library buildings, was appropriate and necessary. Accreditation agencies, for example, might well look askance at a university without a library building. Moreover, it was agreed that there must be comprehensive off-site access to the collections from other locations on campus; to EBU faculty, staff, and students wherever they might be; and to other potential users as contractual and operational considerations may allow.

The construction of a physical space:

- Symbolizes the important traditional role of the university library as the “heart of the university” as it has been expressed in a wide variety of quotations by hundreds of university presidents for hundreds of years;¹¹
- Provides a central place on campus to serve as an educational and social gathering place for faculty, staff, and students;
- Allows a wide range of the latest information technology to be made available in a setting where assistance and instruction in the use of that technology and the development of information literacy skills can be provided to the entire academic community;
- Provides access to specialized electronic information resources that for contractual, technical, or other reasons cannot be accessed remotely;
- Furnishes quiet, isolated spaces that will allow users to concentrate while carrying out their research or studies; and
- Establishes a central location for the concentration of all the computer, telecommunication, and other electronic products and services that are at the core of the work of EBU and the ELP Library.

Construction will begin in the spring of 2006 and be completed by the time EBU opens in fall 2007. A competition among the world’s leading architects to design the ELP Library was considered but ultimately rejected because it was concluded that although a monumental building might attract attention, it would be frozen in time and incapable of handling the rapidly changing body of information and accompanying information technology. Instead, a local architectural firm, Hastings, Pudding, and Randolph, was selected to design a simple, one-story, modular building that will take advantage in every respect of the most current technology to house the world’s first Fully Electronic Academic Library and that will make a bold statement about the nature of the library. Because no space will be needed to house a massive book collection and the attendant staff, services, and support activities, the 100,000-square-foot building, which is about 25 percent of the size of many traditional university library buildings, will handle up to 5,000 users at any one time.

Located in the exact center of a radial campus, there will be a 45-foot entrance/exit portal on four alternating sides of the 330-foot-wide octagonal building. Each portal will be connected via a walkway and an enclosed domed 750-foot arcade to an adjacent classroom/office building. The arcade that connects to the main classroom building will feature a changing moving sound and light show similar to that of the Viva Vision on Fremont Street in Las Vegas.¹² The exterior of the building will consist of translucent polycarbonate panels to allow for a completely mutable appearance. Using a sophisticated projection system, the exterior walls can be made to resemble traditional brick, dressed granite, adobe, or any other substance. Alternatively, the building can be made to resemble another great library, such as the Library of Congress, or, for example, on President’s Day a Lincoln-esque log cabin. Most often, a substantial portion of the panels will display

educational images dealing with various aspects of information history using primarily collections from the archives of The Molesworth Institute, including postcards of library buildings, quotations dealing with libraries, and postcards depicting books and reading. Faculty, staff, students, and other interested parties will be invited to develop appropriate visual displays for exterior and interior image screens. The ever-changing appearance of the exterior facade of the building is intended to convey the ever-changing information services found within the building. Discrete neon "No Books, No Paper" signs will be located at each entrance to the building to remind users that the library they are about to enter is not their father or mother's library.

The main computers will be hard-wired, but access to all systems will be through a campuswide wireless network, thus eliminating the need for electrical outlets. All the building systems, including a robotic cleaning system, will be controlled through electronic keypads, which can be operated by library staff either in the building or remotely as part of an advanced system designed by Crestron Electronics.¹³ All signs and notices will be posted on flat plasma display screens, and the information on the screens can be changed through those same electronic keypads. A series of voice-, touch screen-, or keyboard-activated information kiosks programmed for more than a hundred languages, as well as access through headsets and tactile screens for the hearing or visually impaired, will provide access to the building's information resources. The kiosks will offer visual and voice responses to basic questions such as the location of the rest rooms, or the time and location of library programs. They also will display, upon request, a digital image of each library staff member that will indicate his or her current location in the library through an RFID system.

The informal way in which access to information will be provided allows for a variety of furnishing options for different

settings and usages. Only a minimal number of traditional study tables and chairs will be provided. A wide variety of seating options, including club and lounge chairs, soft foam cubes and beanbags, bar stools and high tables, and hammocks, will be offered so that each user can find a physical setting conducive to his or her individual comfort and taste.

There will be no fixed office space as, for the most part, staff will be working in various locations throughout the library and, except for storage of personal items, will have no need for an assigned desk, bookcases, or the other accoutrements of a typical library office. In addition to a wide assortment of computer workstations set in various informal arrangements, the library will contain a range of open spaces that can be reconfigured as needed, using visual display and other panels, to provide classrooms, discussion spaces, or other educational, instructional, or lecture areas. The greatest possible flexibility has been provided to accommodate the enormous changes in the availability of technology, information resources, and systems that are sure to come even before the building's completion.

The building design team continues to meet electronically at least every other week to review information about emerging technological concepts and systems with technical staff from Cray, Crestron, and a wide variety of information providers such as Google. Although the building will be completely handicapped accessible, and all systems are being designed to be readily accessible to staff and users with any kind of disability, one area of special interest is technologies, including possible direct machine-to-brain links, that show promise of further reducing—and perhaps eliminating entirely—any barriers to equal access to information for all. The sketch of the library layout accompanying this article will not, in all likelihood, represent the opening-day layout; it will certainly not represent the layout within a year after the building opens.

FIGURE 3
NO BOOKS! NO PAPER!

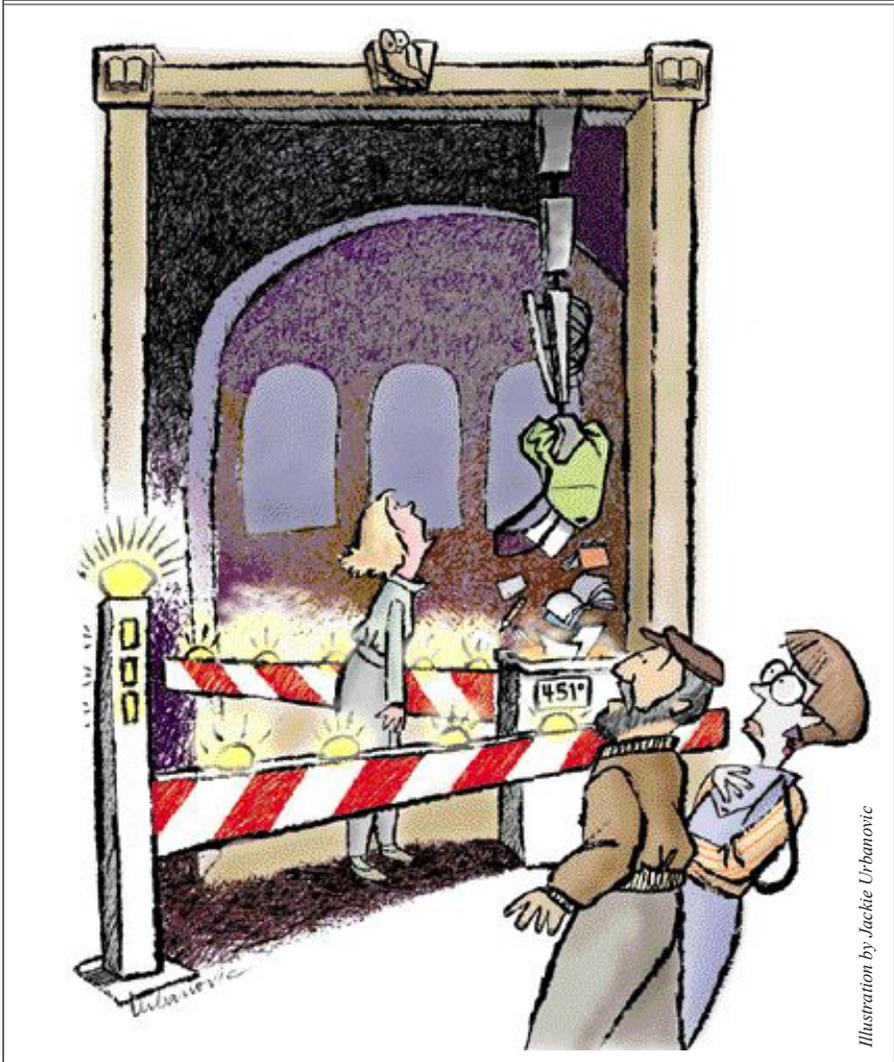


Illustration by Jackie Urbanovic

Security

Physical and electronic security is a major concern given the open nature of the building, the portability of much of the equipment, and the nature of our contemporary information society. A sophisticated electronic, holistic, redundant security system known as KAFKA™ (the meaning of the acronym is a trade secret) will protect the ELP Library. It will use electronic, physical, and visual means of protection

that are capable of instantaneously inflicting a variety of appropriate punishments or restrictions on miscreants. The details are a closely guarded secret and neither the offenses nor the punishments will be made public. Appropriate warnings will appear at random intervals on all system screens. Users beware! Unspecified punishments may even be meted out at random whether or not a user has done anything wrong. It may even be that

KAFKA, like the Edmund Lester Pearson Library itself, is simply a figment of our imagination.

Mousers in Musty Books No Longer

The time was when a library was very much like a museum, and a librarian was a mouser in musty books. . . . The time is when a library is a school, and the librarian is in the highest sense a teacher.¹⁴

Since Dewey first put forth those immortal words more than 125 years ago, librarians have struggled to change their image by eliminating the notion that they are “mousers in musty books” as they have sought to become teachers in the truest sense of the word. The very concept of a library, a term that must be retained to describe a collection of information, even one without books, in whatever physical shape or intellectual form it may take as “an enormous mind. . . [that] is hoarded beyond the of any single mind to possess it,”¹⁵ and of a librarian must focus on the idea of teaching users to unlock the increasingly enormous and complex store

of information available in the world’s libraries by assisting them in every way possible to find the information, no matter how obscure, that they seek for any purpose, no matter how important or trivial. The Fully Electronic Academic Library offers the best prospect for success in such endeavors.

Although, for the moment, the Edmund Lester Pearson Library may be only a fantasy, it will soon be possible to create an electronic library that, without any books, could come close to Ptolemy I’s dream of assembling a universal library containing all known knowledge at Alexandria. The resources of such a library could easily equal—and probably surpass—those of the world’s current major libraries combined, if not in physical form, scope, or size than in terms of easier access to the entire world’s store of information. Such a library also could serve to provide access to that information to a world population far exceeding that which even the largest libraries now serve.

Notes

1. Ralph R. Shaw, “From Fright to Frankenstein,” *D. C. Libraries* 24 (Jan. 1953): 10.
2. Agostino Ramelli, *The Various and Ingenious Machines of Agostino Ramelli* (Baltimore: Scholar Press and Johns Hopkins University Press, 1976).
3. Vannevar Bush, “As We May Think,” *Atlantic Monthly* 176 (July 1945): 101–8.
4. Norman D. Stevens, *Archives of Library Research from the Molesworth Institute* (New York City: Haworth Pr., 1985).
5. See, for example, “The Book, the Library, and the Computer,” *Wilson Library Bulletin* 43 (Sept. 1968): 21–68.
6. F. W. Lancaster, *Toward Paperless Information Systems* (New York City: Academic Pr., 1978).
7. <http://www.washlet.com>.
8. Association of Research Libraries, *ARL Statistics 2002–2003* (Washington, D.C.: ARL, 2004), 40–41.
9. *Ibid.*, 48–49.
10. Association of Research Libraries, *ARL Annual Salary Survey* (Washington, D.C.: 2004), 18, 31.
11. The notion of building a heart-shaped library was considered but rejected as being impractical, although romantic.
12. <http://www.vegasexperience.com>.
13. <http://www.crestron.com>.
14. Melvil Dewey, “The Profession,” *American Library Journal* 1 (Sept. 1876): 5–6.
15. Virginia Woolf, *Jacob’s Room* (New York City: Harcourt Brace, 1922), 7.