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Libraries Dealing with the Future Now

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Introduction

As the realities of reduced resources and increasing expenses continue, many college and university leaders are struggling to find viable solutions for maintaining the vitality of their campuses. Their actions, however, are constrained by the assumption that their fiscal difficulties are short-term (one to two years) and, therefore, these leaders – with the support of faculty and staff – seek short-term solutions. The result, as emphasized by Guskin and Marcy in a recent *Change* article, is what they call “muddling through.”

[A] time-honored practice for dealing with recurring fiscal problems in higher education. ...the immediate response to an annual budget shortfall is to balance the budget by draining all available unspent dollars from existing accounts, making across-the-board budget reductions, and protecting faculty and staff positions.¹

Yet, they ask, what happens when fiscal problems continue? Can such “muddling through” and the assumed fiscal turnaround be justified in the present and projected fiscal environment? Can we afford to continue pursuing short-term solutions if the fiscal problems we are facing are long-term (that is, five to ten years)? Guskin and Marcy maintain that

if this analysis is correct, then the ‘muddling through’ approach, far from protecting institutions, may actually *undermine* the nature of the academic profession....Over time, this will eventually mean that academic offerings will be less and less challenging and that the quality of learning will be seriously diminished.²

To deal with a future fiscal condition of diminished resources over the next five to ten years, Guskin and Marcy propose an alternative to “muddling through” that emphasizes the need for college and university leaders to transform their institutions. They propose a set of organizing principles and transformative actions “that can ultimately offer a more hopeful future for both the quality of student learning and the nature of faculty work.”³

Guskin and Marcy are part of the Project on the Future of Higher Education (PFHE),⁴ a focused initiative that brings together leaders in American higher education to answer the question: “Given what we know and likely future social, technological and economic realities, if we were creating a college or university today, what would it look like?” To respond to this question, the project is developing models that maintain faculty vitality and enhance student learning in a climate of restricted resources. Project members challenged themselves to “imagine a more flexible system in which the educational roles of faculty, librarians, student affairs professionals, and students themselves were redefined in a way that deployed them more efficiently as educational resources.”⁵

As librarians, we have seen and practiced the “muddling through” response. We also share Guskin and Marcy’s perspective that the present fiscal reality is not a short-term problem.

We find the project’s challenge compelling. Not only can we imagine how librarians could transform their own campus roles and units, but we can imagine how they could make significant contributions to the transformation of their parent institutions. We decided to pursue such questions as the following: What are the implications of this shift in perspectives for the future of the academic library? What would it mean for the academic library not to “muddle through” but to become a transformed library of the future within the context of the principles and actions proposed by the PFHE? How can librarians help to break down existing silos and create a cooperatively managed campus environment, one focused on student learning, quality of faculty work-life, and reduced costs per student?

To begin addressing these questions, a small group of librarians (see accompanying list) from different types and sizes of libraries held a retreat in Tucson, Arizona, in September 2003 and developed a proposed set of changes to begin what we hope will become a national conversation. These proposed changes afford libraries an opportunity to restructure their organizations around partnerships with faculty and other campus professionals, and with other institutions to develop new learning environments, teaching methods, resources, and technologies.

To help guide our thinking, the group articulated a list of assumptions about higher education institutions. These assumptions are those we found either explicit or implicit in Guskin and Marcy’s article, heard from roundtable discussants during a presentation by Guskin at the ACRL 2004 conference,⁶ and generated by participants in the Tucson retreat.

Assumptions about Institutions of Higher Education

1. Institutions of higher education will experience a significant, long-term loss of budget and purchasing power over the foreseeable future.
2. Because we face a long-term problem, continuing to “muddle through” with a short-term strategy will only erode educational quality and demoralize faculty and staff. “Muddling through” is not a viable long-term strategy.
3. By implementing the transformative model described in the Guskin and Marcy article in

Change, higher education will maintain the quality of education and faculty and staff work-life, while at the same time reducing the cost per student.

4. Essential to success will be our institutions' ability to assess student learning outcomes wherever learning occurs.

5. Institutions will employ multiple instructional strategies, such as technology-based formats, learning communities, residencies, experiential/service learning, learning with peers, and individual learning.

6. Faculty and other campus professionals will take on new instructional roles, as they create new environments to support student learning.

7. Over time, student characteristics will change. We will see evolving differences in the preparation, abilities, preferences, and behaviors across student cohorts.

8. Transformation will be "messy."

9. For change to occur, faculty and staff must perceive the likely future pain of an untransformed institution to be greater than the pain associated with making the transformation.

10. Transformation will require strong leadership, risk taking, and a revolutionary vision.

11. Institutions must transform their organizational systems, including how and what they count, how they reward and allocate, whom they serve, what they provide, and how they are structured to do this.

12. Institutions will be looking for ideas and models to deal with the problems they face. Libraries are in a unique position to contribute leadership, ideas, and skills to this transformation.

Background

While all campus units face reduced budgets, academic libraries suffer additional pressures due to a unique set of economic factors affecting our budgets. Libraries are experiencing record increases in the cost of scholarly information, with six to twelve percent annual inflation in the price of journals alone. Complex licensing agreements with publishers of online journals and indexes often force the purchase of expensive packages of titles, or of duplicate print versions. Academic libraries have an imperative to invest in a technology infrastructure that will support the delivery of digital content and create high-tech, student-friendly environments. Critical shortages in trained librarians drive up costs for recruiting and retaining professional staff.

Together these elements are "adding, not reducing, personnel and operational costs."⁷ As Stoffle, et al., have written, "We are under considerable pressure from our institutions to reduce staff size while increasing services and access....How will we address these changes?"⁸

Muddling through versus Transforming

Our Tucson-assembled group began to address how libraries could respond to these issues by using a “muddling through” chart presented as part of Guskin and Marcy’s argument to help us distinguish behaviors that we saw as muddling through and those we saw as transformational. These two categories prompted us to consider the strategies we had taken at our libraries or had seen other libraries take in response to pressing issues. We also took into account the statements in *Review of Organizational Responses to Budget Cuts* prepared by Cornell University Library.⁹ We organized all of these ideas into two columns. This exercise highlighted the need to add another column for a middle stage between muddling through and the transformed library. The following lists show responses that are characteristic of each stage.

Transformation Model for Academic Libraries: Recognizing Muddling-through Strategies, Taking Actions to Transform

Muddling through

- Defining “good service” as what we currently provide and measure.
- Chipping away at service and resource levels each year, e.g., hours, serials; closing during slow periods, such as intercessions.
- Cutting whole services, functions, or popular services to get attention and using faculty as an excuse for not doing things.
- Cutting all services across-the-board.
- Protecting the collections budget and continuing to put majority of resources into preserving and maintaining current collections, rather than redirecting dollars to future priorities (i.e., digital resources and services).
- Renting out library facilities, such as meeting rooms, to generate revenue around the margins.
- Continuing mediated services, rather than allowing students to be self-determining.
- Providing more staff to meet demand at service points, rather than developing less-costly alternatives.
- Continuing consortial efforts and remote storage that keep us from making revolutionary change.
- Buying materials “just in case,” rather than “just in time.”
- Believing digital is “just another format.”
- Continuing to place value on static job descriptions rather than flexibility and change in the workplace.

Transitioning

- Streamlining existing processes and eliminating work that can be outsourced or given up.
- Consolidating library units and reallocating staff.
- Changing what we count/measure and what we value.
- Joining campus conversations concerning curricular design and delivery, both at the organizational level and the individual level.
- Integrating services across campus.

- Increasing outreach and education to faculty regarding scholarly communication issues.
- Creating a national network of regional repositories and libraries of record for print.
- Reducing costs for processing collections (e.g., outsourcing cataloging, decreasing scope of binding program).
- Better preparing current staff for change by educating them about trends and directions.
- Communicating vision of future library with staff and invite input into developing a work environment that is responsive to change.

Transformed Library

- Provides a work environment that allows staff to be flexible and responsive to continual change in an environment that changes quickly. Staff serve the mission, rather than a specific job description.
- Continually assesses its contribution to learning and other institutional outcomes.
- Provides both physical and virtual spaces to access information any time, any place.
- Partners with other campus agencies to achieve the collective university goals.
- Serves as a change agent in higher education due to institutional connections, academic values, and cooperative ventures with other libraries.
- Develops new and innovative learning environments and activities through collaboration with other academic and campus units.
- Provides community spaces for inquiry-based learning and out-of-classroom activities, including the creation and design of products by students.
- Develops robust collaborative frameworks for the management, access, and preservation of information resources in all formats.
- Manages a broad range of materials, including traditionally published scholarly materials as well as nontraditional materials like preprints, instructional objects, and data sets.
- Active and influential in the social policy arena, including helping bring about significant changes to the scholarly communication process, copyright laws, licensing practices of information vendors, and intellectual property policies.

Each list gives examples for dealing with budget cuts in that category, rather than showing a progression or one-to-one correspondence of strategies from one stage to another. However, there are some scenarios for which a strategy can progress across the stages of change. Take the following example of serials cuts.

Serials Cut Scenario

- The library needs to cut 10% of its serials budget.
- Serials prices have been steadily inflating at 7% each year.
- Some serials prices have been inflating more than 12% each year.

What does the library do?

*"Muddling
through"*

Transitioning

Transformed

- Cut all subject-area budgets across the board.
- Use multiple criteria for cuts, but target those journals with histories of high inflation.
- Reallocate some of the serials budget to fees for campus authors to publish in open-access journals (e.g., *BioMed Central*).
- Partner with other libraries to offer open access to articles through a federated network of institutional repositories.

Our intention is that library professionals identify the strategies they have taken in the past and consider whether they were transforming or muddling through. If they are muddling through, the list above identifies actions that could be taken. Yet, if the status quo were working, why would a library take a more transformative approach? We believe that if libraries continue to muddle through, they will not ensure their viability on campus, nor will they be seen as leaders in transforming the campus, a role that we need if we are to effect change in scholarly communication and student learning. We also agree with Guskin and Marcy that most state-funded institutions will need to change if they are to keep student-costs low and maintain quality of faculty work-life. Each of these ideas is discussed in more detail later in this paper.

We also intend to encourage discussion among librarians so that we can identify additional actions and come to some agreement on what actions are needed to transform our libraries.

Assumptions about the Transformed (or Transitioning) Library

The Tucson retreat group had to grapple with how to articulate, as well as maintain, professional principles and values in what we called the “transformed library.” During this conversation we acknowledged that there would be a potentially lengthy transitional or transforming stage. We developed a list of assumptions about the transformed library, with the concession that no one list will apply completely across all institutions. Each library will need to consider its own mission, values, institutional setting, and resources in choosing a path forward. It would be easy, however, to dismiss out of hand those assumptions that do not completely reflect past practice. We encourage all librarians to pause before doing so, and ask these two questions about each assumption: What if this were true? How would this change our course of action?

1. Libraries provide information that is just enough, just in time, and just for me.
2. Library staff serve the mission of the higher education institution, rather than a specific job description.
3. Library staff are rewarded for giving up old work to take on new initiatives. (Example: staff purchase records “as is” for mainstream materials in order to reallocate staff time to managing records creation for locally created materials.)

4. For mediated services, people at service points have been replaced with automated systems whenever the human interaction adds little or no value. (Example: using self-checkout machines instead of staff at circulation desks.)
5. Library services are integrated with similar campus services whenever this is feasible and advantageous to students or faculty. (Example: using virtual reference software and staffing to answer student questions about all campus services, not just reference or library questions.)
6. The library collaboratively creates learning environments that help students become self-directed and allow faculty to teach in new, more productive ways.
7. Information fluency is co-owned by the entire campus. Librarians spend less time in front of classes, and more time partnering in curricular and instructional design, and in the assessment of learning.
8. Libraries will support hybrid format environments for some time, but in new materials there will be a continuing shift to digital from paper and other tangible formats. Libraries spend as little money as possible on adding to print collections.
9. Libraries have developed robust collaborative frameworks for the creation, management, access, and preservation of information resources in all formats, including locally created learning objects, preprints, research reports, data sets, gray literature, and institutional data.
10. Librarians are active and influential in the social policy arena, having helped bring about significant change to the scholarly communication process, copyright laws, licensing practices of information vendors, and intellectual property policies.
11. As part of our mission, libraries are committed to continuously assessing our contributions to student learning and other goals of the parent institution.

Libraries are Positioned Well for Transformation

The economic challenges described above cannot be addressed by relying completely on muddling-through strategies. We do not believe our journey is complete by any means, but libraries have had tremendous success in using technology to transform many basic library services. Librarians have improved their processes, reallocated their budgets, and restructured their organizations to keep pace with the rapidly changing environment in which they live. We were delighted and humbled by the recognition of librarians' efforts in a recent *EDUCAUSE Review* article by Ayers and Grisham who state:

If you had told people ten years ago that card catalogs would virtually disappear over the next decade, to be replaced by the systems we now enjoy for the management of all forms of information, they would not have believed you. The real heroes of the digital revolution in higher education are librarians; they are the people who have seen the farthest, done the most, accepted the hardest challenges, and demonstrated most clearly the benefits of digital information. In the process, they have turned their own field upside

down and have revolutionized their own professional training. It is a testimony to their success that we take their achievement for granted.¹⁰

Librarians have a great deal of experience and expertise in collaborating and building partnerships across traditional boundaries. Typically, libraries are organized for effective liaison with each academic department on campus in order to assess needs and provide appropriate collections, instruction, and reference support. Because libraries touch all departments and cross both academic and student services, they

reflect a context in which these issues [of institutional change] converge. This presents them with a challenge of unusual scale and complexity. In response, libraries have embraced new technologies and adjusted to the program priorities of their parent institutions....libraries have also demonstrated broader leadership in bringing their intellectual and service missions to bear on the issues raised.¹¹

This ability to step outside silos and communicate across disciplines and units will be crucial for institutional transformation. Librarians also have tremendous experience managing budgets, personnel, collections, services, and facilities. We believe that this combination of a strong campus position, the vision of an integrated higher education environment, significant experience with evolving technologies, and our skills as management and information professionals positions us to be active change agents in campus partnerships. Following are some examples that illustrate these strengths.

Current Initiatives and Future Directions

Information: Creation, Dissemination, Access

The traditional library responsibility for collection development is broadening to one of information management. The days of purchasing materials “just in case” someone will need them are giving way to providing access to materials “just in time” to meet a particular need. This shift is critical as a recent study estimates that new stored information grew about 30 percent per year between 1999 and 2002, mostly in digital formats.¹² As William Wulf stated in a recent *EDUCAUSE Review* article, “instead of being a hoarder of containers, the library must become the facilitator of retrieval and dissemination.”¹³ In the future, librarians will “manage all types of information, not just the structured, published information we have traditionally been asked to collect, organize, and preserve in the past.”¹⁴ Information management extends far beyond the stewardship of traditional print collections; it includes providing intellectual control, standards, and lasting digital environments for a universe of materials that were previously outside the library’s purview. Examples include locally created learning objects, preprints, research reports, data sets, gray literature,¹⁵ and institutional data. This change in focus is not a choice for libraries, but an imperative. Individual libraries will still maintain unique and wonderful special collections, but our primary investments for the future will be in access systems.

Scholarly Communication

“What do we want our system of scholarly communication to look like in 2010?” was the question posed to John Unsworth and Pauline Yu recently at a Committee on Institutional Cooperation summit. Their description of the ideal system of scholarly communication is this:

In a better world, high-quality, peer-reviewed information would be freely available soon after its creation; it would be digital by default, but optionally available in print for a price; it would be easy to find, and it would be available long after its creation, at a stable address, in a stable form.¹⁶

The authors go on to make the case that it will be difficult to ensure stability unless libraries are charged with managing this information. Libraries can also provide the value-added mechanisms that will make information easy to find. Libraries are already supporting new directions in scholarly communication such as open-access publishing and self-archiving; partnerships between libraries, university presses, publishers and software developers; and the creation of institutional repositories.

Institutional Repositories

The development of institutional repositories has recently emerged as a new strategy for institutions of higher education to intervene in the traditional path from scholar to commercial publisher. A campus-based institutional repository is defined by Clifford Lynch as a set of services and a long-term commitment that an institution offers to its community for the management and dissemination of digital materials created by the institution and its community members.¹⁷ As Joseph Branin, Director of the Ohio State University (OSU) Libraries, describes in his discussion of the university’s decision to create an OSU Knowledge Bank,

What is most important about our story is that a group of senior administrators recognized the need to manage the university’s digital assets and acknowledged the library’s expertise and experience to lead the effort. In essence, we are now taking on new roles as knowledge managers and creating an enterprise-wide knowledge management system for the university.¹⁸

While this movement has begun in universities, creative projects such as DSpace, an open source, institutional repository system developed by MIT Libraries and Hewlett-Packard, will help to ensure that the technology is openly available to institutions of all sizes in the future. DSpace is a “digital library system designed to capture, store, index, preserve, and redistribute the intellectual output of a university’s research faculty in digital formats.”¹⁹ While originally deployed by MIT to store research, this software works equally well for housing collections of learning objects or valuable institutional data. Because DSpace is open source and can be used by any institution, it is easy to envision a federated system of shared information in institutional repositories.

Creating New Knowledge Products

Beyond managing access to existing information, librarians are working with faculty and other content experts to facilitate the creation of new digital information and instructional objects. Below are two of many examples that illustrate this work.

The Tree of Life is an ambitious, collaborative Web project to building an encyclopedic resource on the phylogeny and biodiversity of all species.²⁰ Organized in a cross-referenced taxonomy, the content is peer-reviewed and continually expanded and updated by scholars from around the world. Over 350 biologists have already created 2,600 pages of content that are managed through a system produced by programmers and metadata librarians. It seems relevant to note that a librarian served as Co-Principal Investigator on this project.

The Geotechnical, Rock and Water Resources Library (GROW)²¹ introduces students of all ages to civil engineering through the development, collection, and dissemination of reviewed and ranked interactive learning resources continually enhanced by new technological innovations. GROW was created by a team of civil engineers, librarians, and computing professionals.

Information Access Systems

Library Online Public Access Systems (OPACs) currently provide access to a wide variety of materials through a number of different interfaces. Researchers can select from a library's online catalog, commercial indexes and databases, and freely available Internet resources. Choosing resources can be confusing, and often multiple searches are required to satisfy a single query. Libraries will continue capitalizing on new technologies, building the capacity for users to select and search across systems, create personal individual profiles, annotate and store results, and even contribute comments to the public record. As these interfaces are perfected, librarians will be freed from repetitive, triage-type transactions and will redirect their time into value-added work.

The Scholars Portal is one example of a current initiative with a goal of transforming information access.²² A consortium of seven libraries, working with a commercial vendor, is developing a Web portal that integrates end-user searching of diverse resources. The Web-based software provides an individually customized search interface and quick links to content along with other valuable features. Libraries can build expert guidance into the portal by bundling resources and databases for specific needs and audiences, and by providing context-sensitive online help. The portal offers libraries the opportunity to give academic shape to the flood of Web content and to integrate it with traditional scholarly materials. The shared development of Scholars Portal promises cost-efficiency for participating institutions.

In its broadest conception, providing access to information will also expand the boundaries of traditional library services. As libraries concentrate print collections in analog repositories, library space will become available for the creation of collaborative learning environments, shared faculty development areas, writing centers, advising, tutoring, instructional computing, and other integrated student services. Integrating these different service functions into a common space allows traditional library services such as reference to grow into one-stop shopping for students who can get help from librarians, computing center staff, and student

services professionals, both in-person and virtually.

Teaching and Learning

One of the transformative actions described by the PFHE is to redefine the educational roles of faculty, librarians, other campus professionals, and students themselves to use everyone more efficiently as educational resources. Libraries have been transitioning from storehouses and study halls to networks and services that support an evolving curriculum and pedagogy. We have the potential to play a vital role in fostering student learning. An example of this potential can be seen in the University of Arizona's Teaching Teams Program (TTP).²³ Einstein's Protégés – a program within TTP – brings together staff from many campus units, including the library, office of assessment, learning center, teaching center, writing program, and faculty from across campus. These staff and faculty members work together to prepare student teachers to work with students enrolled in assigned courses.

Although librarians have a long history of offering bibliographic or library instruction to the campus community, there is an emerging need for students to reach well beyond understanding bibliographic access to information. They need to recognize when they have an information need, know how to find information, and, particularly, how to evaluate the information they find. Beyond this, students need to synthesize and analyze information to create new knowledge. The language to describe this collection of skills has not been standardized yet, and a variety of terms are currently in use including "information literacy" and "information competence." We prefer the term "information fluency" to describe this set of lifelong learning skills. Students who are very fluent can recognize the limits of existing knowledge and the need for continuous learning and skill development. Through the various mandates being handed down by accrediting bodies and the national trend to assess competence among college students, it is clear that information fluency has become a critical competency in higher education.

Our society depends on the skillful access, evaluation, and use of information for good citizenship, workplace success, and personal fulfillment. Information fluency is a powerful pedagogical framework for pursuing the development of lifelong learning and critical thinking. Faculty who are very familiar with information fluency can transform their teaching from content-based approaches to learner-centered approaches, with librarians and other campus professionals as strong partners. With everyone working in concert, we can create a variety of educational pathways for students that will include traditional courses, learning communities, peer-tutoring, self-mastery, and service-based learning, all enhanced by innovative uses of technology.

Examples of specific library-driven initiatives include the intra-institutional collaboration used to develop and implement the concept of the "information commons"²⁴ on many campuses. The information commons leverages the library's centrality of place and typically long hours of service, permitting institutions to build large, attractive facilities for student research, study, and collaboration. These learning centers provide just-in-time help with a range of academic and developmental needs: libraries providing reference assistance; computing centers supporting multimedia and other specialized services; tutoring, advising, and writing centers

providing consultation and counseling. The information commons architecture is built for collaboration – a theme mirrored in the integrated management of services.

Two other library initiatives are the development of extensive online tutorials and the use of online chat programs to provide virtual reference service. The Texas Information Literacy Tutorial (TILT) is an acclaimed Web tutorial that teaches library research and information fluency.²⁵ The design is attractive, modular, and based on active learning principles. Its creators at the University of Texas at Austin Library provide a free, open license for other libraries to adapt the tutorial (and the underlying technology) for local needs. Tutorials such as these are available to students 24 hours a day, 7 days a week. They can be used by faculty as course units, or consulted by students as independent study aids.

Virtual or online reference services provide individual help at time of need, no matter where a student is located. Experiments are underway that coordinate this service among libraries in different time zones, in order to extend the hours of service without having to add local staffing. In other experiments, libraries are sharing this software with other campus units like student services to increase the types of questions students can get answered online.

The integrated teaching and learning space that we have outlined here has the potential to extend the library's educational role throughout the curriculum and provide learning opportunities for students that are not tied to seat time in a course. Additionally, it will leverage the library's investment in digital resources by making these resources more visible and easily available to the learning community.

Guskin and Marcy suggest that by focusing on institution-wide common student learning outcomes as the basis of the undergraduate degree, schools can recognize and assess learning *wherever it occurs*, whether it be as a result of service learning, internships, independent study, peer tutoring, online instruction, or other learning experiences. Such an educational delivery model would improve the productivity of student learning at a reasonable cost. Libraries are also committed to assessing our contributions to student learning. In order to address the American Association for Higher Education's conclusion that "assessment fosters wider improvement when representatives from across the educational community are involved," some libraries and library associations are designing measures that will establish institution-wide, student learning outcomes in information fluency as an important component for the undergraduate degree.²⁶ One such example is the Project for Standardized Assessment of Information Literacy Skills (SAILS).²⁷ This project is developing an instrument to measure information fluency, gather national data, provide norms, and compare information fluency measures with other indicators of student achievement.

Conclusion

Faced with continuing reductions in real dollars (i.e., inflation-adjusted dollars), higher education institutions and their libraries need to be fundamentally restructured to survive as vital, high-quality entities that continually enhance student learning while maintaining quality of faculty and staff work-life. Existing processes will be streamlined or eliminated. Libraries

will accomplish this by empowering individuals to work more independently, cooperating with each other to develop shared print repositories, working with vendors to receive shelf-ready books, increasing the amount of information available electronically, and reducing staff at service points. The transformation occurring in libraries will create new environments and resources for learning, scholarly communication, and information access.

Academic libraries have both a vital interest in transforming the campus as a whole and a base of expertise from which campuses can profit. We also have a passionate belief that true transformation will only happen with all campus units working in concert toward a common goal. However, whether or not campuses choose to change, libraries will not have a choice. We cannot continue to conduct business as usual. The rising costs of information, the need to continue building a technological infrastructure, the complexity of finding a balance between print collections and true digital environments compel us to seek a transformative approach to resource management. Libraries must transform because librarians recognize the role libraries have, regardless of mission or size, in continually enhancing student learning using the best available technologies and techniques.

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Footnotes

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 16. John M. Unsworth and Pauline Yu, "Not-so-Modest Proposals: What Do We Want Our System of Scholarly Communication to Look Like in 2010?" presented at the Committee on Institutional Cooperation Summit on Scholarly Communication, Park Ridge, Illinois, December 2, 2003, <<http://www.iath.virginia.edu/~jmu2m/CICsummit.htm>>. [back to text](#)
 17. Clifford A. Lynch, "Institutional Repositories: Essential Infrastructure for Scholarship in the Digital Age," *ARL Bimonthly Report*, no. 226 (February 2003): 1-7, <<http://www.arl.org/newsltr/226/ir.html>>. [back to text](#)
 18. Storey, "University Repositories," 7. [back to text](#)
 19. DSpace Federation, <<http://www.dspace.org/>>. [back to text](#)
 20. The Tree of Life, <<http://tolweb.org/tree/phylogeny.html>>. [back to text](#)
 21. Geotechnical, Rock and Water Resources Library, <<http://www.grow.arizona.edu/>>. [back to text](#)
 22. Scholars Portal, <<http://www.arl.org/access/scholarsportal/>>. [back to text](#)
 23. University of Arizona Teaching Teams Program, <<http://teachingteams.arizona.edu/>>. [back to text](#)
 24. The information commons is probably best understood as part of the larger concept of collaborative facilities. Collaborative facilities integrate the services of information technologists, librarians, instructional technologists, multimedia producers, and many others to serve a wide range of faculty and student needs. The organization and functions of these facilities vary widely, but all include a distinct physical space, participation by at least two separate campus units, and staff members dedicated to collaborative work. Collaborative facilities range from information commons that provide students and faculty with equipment and reference services to distance-education offices that address institutional concerns to centers that assist faculty in integrating teaching and new technologies. [back to text](#)
 25. Texas Information Literacy Tutorial, <<http://tilt.lib.utsystem.edu/>>. [back to text](#)
 26. American Association for Higher Education, "9 Principles of Good Practice for Assessing Student Learning" [2003], <<http://www.aahe.org/principl.htm>>. [back to text](#)
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