

Libraries and the Enhancement of E-learning

OCLC E-LEARNING TASK FORCE

*Prepared and edited by **Neil McLean**, Director, IMS Australia, and **Heidi Sander**, Business Development Manager, E-learning/Cooperative Initiatives, OCLC; on behalf of the OCLC Task Force: **Patricia Albanese (Pitkin)**, Task Force Chair, Chief Information Officer and Executive Director of Library and Information Technology Services, Mt. Holyoke College; **Bradley F. Baker**, Dean of Libraries and Learning Resources, Northeastern Illinois University; **David Cohen**, Dean of Libraries and Academic Information Services, College of Charleston; **Lorcan Dempsey**, Vice President, Research, OCLC; **Susan L. Henderson**, Associate Executive Director, Florida Distance Learning Consortium; **Jenny Jopling**, Associate Director Distributed Learning, University of North Texas; **Paul C. LePore**, Director of Undergraduate Program Development, College of Arts and Sciences, University of Washington; **John MacColl**, Sub-Librarian (Online Services), Edinburgh University; **Richard Madaus**, Executive Director, College Center for Library Automation; **Edward Meachen**, Associate Vice President for Learning and Information Technology, University of Wisconsin System; **Susan Metros**, Deputy CIO and Executive Director for e-Learning and Professor, Design Technology, The Ohio State University; **Scott Siddall**, Assistant Provost and Director of Instructional Technology, Denison University; **Greg Siering**, Faculty Development Coordinator, Office of Teaching and Learning Advancement, Ball State University; **Pat Stevens**, Director, Cooperative Initiatives, OCLC; and **Karen Williams**, Undergraduate Services Team Leader, University of Arizona.*

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6565 Frantz Road
Dublin, Ohio 43017-3395 USA

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Summary

Purpose and Audience

In this paper, the OCLC Task Force explores the relationship between academic libraries and e-learning in higher education. It was written not only for the library community, but also to help those outside the direct library sphere understand the dynamics associated with this relationship. Library services continue today to be vital in the enhancement of teaching and learning. And they will continue to do so in the future.

Introduction

E-learning is becoming an influential force in higher education today; a force, which has some kind of presence on almost every campus and in an ever-increasing number of college and university courses. It is a growing and dynamic environment, one in which fluidity and change are the norm culturally, institutionally and technically. Within this environment, the academic library is still searching for a permanent, comfortable and serviceable position that is nimble enough to be flexible, accessible and continually up-to-date with the wider university structure.

Once synonymous with distance learning, e-learning has quickly evolved to include not only courses that are taught primarily online and over a distance, but also to include traditional “brick and mortar” courses that have been enhanced with electronic elements. In fact, these hybrid courses now outnumber distance learning courses. According to an ECAR respondent summary,¹ 70% of all U.S. institutions offer distance learning and 80% of U.S. institutions offer hybrid courses. The study’s definition of hybrid was fairly narrow; if one uses a more generous definition, the percentage would be even higher.

Course management systems (software applications that manage a course’s electronic elements) have enjoyed an analogous growth. They have moved swiftly from scattered implementations that support a few online classes to enterprise-wide services that support and extend the entire curricula and related institutional services.

The addition of and enhancement to traditional classroom activities with electronic elements—epitomized by the rise of the course management system—is changing the way faculty and students access, create and use information. It is providing new opportunities for libraries to design and disseminate new services. At the same time that libraries create these new services, they will also quickly need to highlight their expertise, abilities and irreplaceable resources in order to take a leading role in the new (e)learning and course management environment.

¹ ECAR Respondent Summary: *Evolving Campus Support Models for E-Learning Courses*, March 2003, (p. 2).

The OCLC Task Force

In order to explore the issue of the academic library and e-learning and what role OCLC might play in this arena, OCLC created an E-learning Task Force in the spring of 2003. The Task Force was comprised of representatives from the libraries, the administrations, the IT departments and the Instructional Design Support Groups at OCLC member American and U.K. colleges and universities. The Task Force met several times over several months and filled in and discussed a detailed institutional survey. This white paper details the findings and suggestions of this working group.

The Task Force members reflected a diverse and complex range of approaches to e-learning. And while there was no “one-size-fits-all” in terms of solutions to interactions between libraries and e-learning environments, there were common themes in terms of the underlying institutional dynamics governing the current state of e-learning.

In addition to its e-learning assessment duties, the Task Force was also charged with suggesting recommendations for OCLC to follow.

Pedagogy, Learning Methodologies and Technology

The term e-learning no longer applies merely to distance learning, but also to more traditional courses that have incorporated electronic elements into the day-to-day teaching and learning process. The Task Force agreed that pedagogy, learning methodologies and technology have become linked and that the interrelationship among the three needs to be better understood and more radically reassessed.

Learning Objects, Metadata and Repositories

At the heart of the learning/technology nexus are learning objects—both a term and a concept that does not have a standard definition or application. But whatever a learning object’s standard definition turns out to be, its use and reuse, its discovery and shareability, its existence as a digital entity and the context in which it can be used are the key elements to creating broader, interinstitutional applications of technology and learning and teaching. In order for learning objects to have any kind of value, they first require the use of semantically consistent, easily created metadata that allows for the objects themselves to be easily found and transported between institutions and repositories. In fact, the management of digital asset repositories, learning object repositories and the metadata governing their use are inextricably linked, and the issues surrounding learning object repositories are equal to and a part of the issues surrounding digital asset repositories. Ownership, management and asset control are the three issues of prime importance here, issues that in the digital world cross organizational boundaries and create institutional tensions.

In addition to the concerns surrounding digital repositories, learning objects and metadata, libraries are also interested in developing ways to integrate and expose (in a technical sense) their existing systems, resources and services in university-wide course management systems. One of the first possibilities for this integration is with virtual reference services. Of strategic importance to these efforts is the understanding and development of service convergence (as opposed to organizational or institutional convergence). The group decided that practical efforts (and experiments) need to proceed despite the lack of current industry uniformity and the possibility of occasional failures. But the group also repeatedly declared the need for the creation of standards and of ongoing functional technical solutions.

Training

The Task Force also voiced a significant need for better and more focused training—for librarians, for faculty and for students. The challenge of establishing relevant, yet scalable training is not new to librarians and there is now the possibility of embedding training support within the learning management system as a part of the learning activity. The idea of “just-enough-just-in-time-just-for-me” was seen as a desirable objective.

Collaboration

The most important point, however, is that institutions as a whole, not the disparate parts, need to work together amiably and constructively to create the complex standards and challenging technical solutions required for high-quality and cost-effective teaching. To that end, the Task Force called for the collaborative mechanisms and collective expertise of the library community to provide not only leadership, but also timely, cost-effective input to the development of institutional infrastructure and appropriately developed and placed services. The collaborative possibilities reside under three categories: exposing library services, creating and maintaining digital asset repositories and creating standards for interoperability.

OCLC Recommendations

Finally there was a call for OCLC to take a leading role in these endeavors especially in creating service openings between and among library vendors as well as in the creation and management of metadata, and digital asset and learning object repositories.

Note on Terminology

Most new fields of activity and intellectual discourse go through phases of terminological uncertainty in the search for common conceptual and practical understandings of the emerging field—and this is certainly true for e-learning.

In the case of e-learning, different stakeholders within their own institutional context can describe the subject matter very differently. The overlays of technology add particular challenges to reaching a common understanding because the technical terms are often unfamiliar to many of the stakeholders whose fields of expertise generally are not technological in nature.

The Task Force members are acutely aware that terms such as “repositories,” “learning objects,” “learning management systems,” “virtual learning environments” and “content management systems” are open to many different interpretations. Such terms are often not yet definable in any specific sense, so it is accepted that a degree of semantic confusion is inevitable in the current discourse on e-learning developments.

Please note, however, that for the purposes of this paper, learning management system, virtual learning environment and course management system all mean the same thing. These terms, however, are not synonymous with content management system. The distinction will be discussed in the text below.

Part I: E-learning and Libraries

Introduction and Background

E-learning is becoming an influential force in higher education today; a force that has some kind of presence on almost every campus and in an ever-increasing number of college and university courses. It is a growing and dynamic environment, one in which fluidity and change are the norm culturally, institutionally and technically. Within this environment, the academic library is still searching for a permanent, comfortable and serviceable position that is nimble enough to be flexible, accessible and continually up-to-date with the wider university structure.

Once synonymous with distance learning, e-learning has quickly evolved to include not only courses that are taught primarily online and over a distance, but also to include traditional “brick and mortar” courses that have been enhanced with electronic elements. In fact, these hybrid courses, as they are generally termed, now outnumber distance learning courses. According to an ECAR respondent summary,² 70% of all U.S. institutions offer distance learning and 80% of U.S. institutions offer hybrid courses. The study’s definition of hybrid was fairly narrow (a course must replace some classroom sessions with online sessions to be considered hybrid); if one uses a more generous definition (a traditional course that keeps all its classroom sessions but adds an electronic presence), the percentage would be even higher.

Course management systems (software applications that manage a course’s electronic elements) have enjoyed an analogous growth. They have moved swiftly from scattered implementations that support a few online classes to enterprise-wide services that support and extend the entire curricula and related institutional services. A striking example of the growth of course management systems (CMSs) appeared recently in *Information Technology and Libraries*. In two years the number of courses using Blackboard at Carnegie Mellon University grew by over 350%—from 150 courses in 2000 to 567 in 2002.³ According to the Campus Computing 2002 report, penetration rates at both private and public universities is just under 35%, at private four-year colleges at slightly under 30%, at public four-year colleges above 25% and at community colleges between 15% and 20%.⁴ Using figures from 2001-2002 on the enrolled population of distance learning students in the state of Florida translates concretely the kind of nationwide impact the Campus Computing Report figures have. In the Sunshine State, there were a total of 197,234 students enrolled in distance learning courses alone—121,136 of them in community colleges and 76,098 of them in state universities.⁵ Projected enrollments for 2004-2005 are expected to reach a total of over 387,000 students. Add in numbers from hybrid courses and private institutions, multiplied by 50 states, and the number of students affected by CMSs is astonishing.

On a more detailed level, course management systems (also known as virtual learning environments or VLEs) allow the faculty to prepare and deliver multimodal educational content electronically to students, who then, in turn, are able to interact with instructors in a variety of ways including participatory learning activities, submitting assignments and completing

² ECAR Respondent Summary: *Evolving Campus Support Models for E-Learning Courses*, March 2003, (p. 2).

³ *Information Technology and Libraries*, June 2003 (p. 80).

⁴ “The Campus Computing Project: An Interview with Kenneth C. Green”, *Commentary*, November/December 2002, Figure 2. <http://ts.mivu.org/default.asp?show=article&id=1055>

⁵ Chart: “Distance Learning Enrollment Growths” from the Florida Distance Learning Consortium, 2003.

assessments. Within courseware environments, faculty are able—at a minimum—to take advantage of a suite of productivity tools to distribute information to students and engage with students individually or collectively. At a more sophisticated level, faculty can deploy a wide variety of communication, tracking and assessment tools. CMSs also provide a collaborative workplace for students to work with each other. They are becoming a tangible place where the work of teaching and learning can occur. When strategically placed, courseware environments provide a logical place for information and knowledge to be created, accessed and used. Students find that CMSs meet many of their information needs and tend to use them as a kind of primary gateway.

Currently, vendors market course management systems to academic information technology units or to individual faculty departments. Typically, libraries are left out of the decision-making and implementation processes. This means that libraries have the challenge of deploying their services in a new learning environment using a technology outside their control. At the same time, in defining the standards and the “cataloging” of the learning objects created within the course management systems, librarians are rarely invited to participate in the ongoing debates despite their strong interest and experience in knowledge management.

The enhancement of traditional classroom activities with electronic elements—epitomized by the rise of the course management system—is changing the way faculty and students access, create and use information. It is providing new opportunities for libraries to design and to disseminate new services. At the same time that libraries create these new services, they will also quickly need to highlight their expertise, abilities and irreplaceable resources in order to take a leading role in the new (e)learning and course management environment.

Additionally, colleges and universities over the last decade have moved toward centering services around the student rather than requiring students to adapt to a teacher-centric model. These new, technology-supported services help students navigate the maze of requirements and hurdles that both large and small educational institutions present to them. Courseware environments have the potential to bring many of the resources the student needs for successful learning, including those offered by the library, into a single Web space. There are several reasons why this should be done. Primarily, it makes the most effective and cost-efficient use of institutional resources binging the library’s traditional role as resource-sharer into the world of digital objects and environments. Doing so, however, is not cost free. An ad hoc informal poll of the Consortium of Liberal Arts Colleges (CLAC) finds an average annual cost of \$31,200 (figures ranged from \$5,000 to \$80,000) for course management systems—not an inconsequential figure for small institutions on tight budgets.⁶ Costs at large universities, however, more than dwarf the CLAC figures. As an example, both the University of Wisconsin and the Ohio State University systems will spend more than \$5 million dollars each over five years for licensing, installation and maintenance of enterprise-wide courseware solutions.⁷ And the \$5 million dollar price tag does not include the costs for content creation nor the projected necessary three-year cycle for hardware replacement.

The financial pressures facing higher education today are enormous. While there are many good reasons to marry information technology departments and libraries, such marriages are

⁶ Source: Scott Siddall, Assistant Provost and Director of Instructional Technology, Denison University, 2003.

⁷ Source: Edward Meachen, Associate Vice President for Learning and Information Technology, University of Wisconsin System; Susan Metros, Deputy CIO and Executive Director for e-Learning and Professor, Design Technology, The Ohio State University, 2003.

symptomatic of fiscal drivers greater than any one departmental cost saving device. As budgets are reallocated (and reduced), the system is clearly shifting toward placing student needs high on the spreadsheet. Libraries must learn to use courseware environments to take their services directly to the student or face budget cuts as their services are seen as less relevant.

E-learning integration offers libraries a powerful medium for reaching faculty and students directly as they engage in teaching, learning, research and outreach. In turn, this integration provides enriched services for an academic community that has used traditional library services and it offers a way to reach those faculty and students who have begun to ignore the library and go directly to the Web for their information needs.

But to that end there are several crucial questions that require assessment. Some, but not all, pertinent questions include the following:

- How can libraries bridge the gap between their own services and systems and those of the courseware and e-learning environment?
- What traditional services and what new services fit in and are of vital importance?
- Which library services need to be redefined to competitively address the needs of the new e-learning environment?
- How can learning objects and their repositories be defined and what role can libraries play in envisioning this new model?
- What are the libraries' best strategies for engaging with their particular institution's e-learning strategies?
- How can the library become a viable and productive community player in the developing e-learning landscape?

Note on Terminology

Most new fields of activity and intellectual discourse go through phases of terminological uncertainty in the search for common conceptual and practical understandings of the emerging field—and this is certainly true for e-learning.

In the case of e-learning, different stakeholders within their own institutional context can describe the subject matter very differently. The overlays of technology add particular challenges to reaching a common understanding because the technical terms are often unfamiliar to many of the stakeholders whose fields of expertise generally are not technological in nature.

The Task Force members are acutely aware that terms such as “repositories,” “learning objects,” “learning management systems,” “virtual learning environments” and “content management systems” are open to many different interpretations. Such terms are often not yet definable in any specific sense, so it is accepted that a degree of semantic confusion is inevitable in the current discourse on e-learning developments.

Please note, however, that for the purposes of this paper, learning management system, virtual learning environment and course management system all mean the same thing. These terms, however, are not synonymous with content management system. The distinction will be discussed in the text below.

The OCLC E-learning Task Force

In order to explore the issue of the library and e-learning and to help answer some of the preceding questions, OCLC created an E-learning Task Force in the spring of 2003. In creating the Task Force there was a concerted effort to achieve a cross-section of voices within the 13-member group. OCLC included librarians, administrators, technologists and faculty from the cooperative's academic institutions. Members represented institutions from across the continental United States and the United Kingdom and from the full range of institution types: research and doctoral universities, four-year liberal arts colleges and community colleges. The Task Force met several times over several months and filled in and discussed a detailed institutional survey that also asked respondents to give their opinions on the current state of and the future possibilities for e-learning and the library. Task Force meetings included an intensive two-day workshop in June.

This White Paper is the outcome of the Task Force's work, which had as its specific mission an investigation of the interactions between libraries and e-learning environments in academic circles. The Task Force was also charged with making specific recommendations to OCLC. The findings of this study, therefore, are being used to assist OCLC in formulating strategies leading to collaborative initiatives by libraries in the e-learning realm. These recommendations comprise the concluding section of the paper.

A number of themes emerged from the two-day workshop and these are summarized in the knowledge that they represent a particular "snapshot" of the dynamics underlying the emerging e-learning environments. A principal aim in publishing this paper is to stimulate further discussion within and among institutions and to assist libraries in terms of exposing their services in the e-learning infrastructure of the institution.

The Institutional Context

The responses to the survey by Task Force members reflected a diverse and complex range of approaches to e-learning. Given this diversity there is no "one-size-fits-all" in terms of solutions to interactions between libraries and e-learning environments. There were, however, common themes in terms of the underlying institutional dynamics that require elaboration.

The Task Force agreed unequivocally that the faculty, the library, and the IT and instructional design departments need to collaborate in developing sustainable and seamless infrastructure. Evidence suggests, however, that very few institutions have systemically attained such a coherent strategic approach, principally because there is no common shared language on which to build strategic initiatives. There have been many attempts with mixed success to overcome these barriers through organizational restructures aimed at convergence. Cultural barriers, including resistance to change, remain the major impediment in most institutions. Most institutional stakeholders still function within their particular views of the world and no consistent pattern of partnership can yet be detected to sustain successful e-learning environments. Digital initiatives are an interesting example—all groups would seemingly have a distinct interest in almost any digital initiative, yet very few of these initiatives include all major stakeholders (the faculty, the library, IT and the instructional design department). Almost invariably there is no common view of the e-learning infrastructure and its associated problems or issues; such a situation, naturally, mitigates against institutional solutions.

The real problem though is not necessarily organizational convergence but service convergence. Identifiable common values and terminology are required to facilitate much more imaginative service solutions that transcend traditional organizational boundaries. A clearer articulation of service from the student viewpoint is necessary based upon the notion of easy, convenient access to services at the point of use—service convergence. It follows, therefore, that service convergence and interoperability of systems are interdependent concepts that must find manifestation across all parts of the institution independently of any particular organizational structure.

During the workshop there were persistent references to the lack of effective policy and fiscal models both to develop and to sustain e-learning environments. This stems in part from the cultural barriers already identified but it can be attributed also to the lack of clarity over e-learning's economic model. There is a growing unease among senior level academic administrators over cost issues associated with e-learning and the difficulty in measuring its success. To date, most institutions have found that the deployment of e-learning increases rather than decreases costs and there are no recognized methodologies for assessing cost benefits. In other words, the value propositions for engaging in various forms of e-learning remain elusive. This fact inhibits the realigning of cost centers and it means that “do-it-yourself” strategies predominate at the faculty level. Libraries are particularly exposed in this emerging e-learning environment because they are seen as a large cost center in terms of traditional service delivery outside of the e-learning model. Also, a constrained economic climate does not readily lend itself to identifying increased or new funding for new digital service initiatives in the institutional context.

Learning Enhancement

There was a general consensus that pedagogy and learning methodologies are now inextricably linked with technology. The nature of these interactions, however, remains little understood and there is a need for much more research into the impact of online learning techniques on the actual learning experience. The various responses to the Task Force survey indicated a growing acceptance that technology can be used successfully to enhance learning irrespective of the mode in which learning takes place. There was also an acknowledgment that online learning can be mixed with traditional learning methods and schedules, and thus the terms “blended” learning and “hybrid” learning now have widespread currency. The search, therefore, appears to be for balance and the aim is to provide an equitable learning experience for all participants, whatever the mode in which the learning takes place. There are, however, many question marks over what constitutes good practice in terms of applied pedagogy. Several Task Force members expressed the need for a much more radical reassessment of the links between learning and technology. Implicit in this call for reassessment is the realization that technology can “free” both faculty and students to acquire, share and reconstruct media-rich knowledge in ways that have been unattainable in more traditional classroom environments.

At the same time it was acknowledged that there were many cultural barriers to overcome in achieving such an aim. One respondent to the survey referred to the “invisible” nature of teaching processes in most academic institutions. Within the existing teaching culture the individual faculty member values (and is valued for) autonomy and the ability to impart knowledge based on discipline-specific research interests. Curriculum objectives are often not readily explicit and the notions of sharing intellectual property, collaborative teaching based on technology and collaborative learning are not widely practiced—as yet. Additionally, faculty who actually are willing to work in the new mode find it challenging to do so since useful learning objects are difficult to find.

Plenty of anecdotal evidence emerged, however, of early adopters who are being highly innovative in the use of technology in collaborative learning environments (many of whom, by the way, did not and still do not use commercial CMSs). The advent of more sophisticated technologies and services, which are at the same time easier to access and use, will provide greater flexibility and increase faculty confidence. These technological improvements will, in turn, likely also speed up the rate of change and help to stimulate more innovative ways of enhancing the learning experience. A successful strategy must allow faculty easily to find and integrate resources and services from multiple environments into their unique course. Libraries must find strategies for making their resources and services readily available in the environments faculty use to create and manage their courses.

Learning Objects – What Are They?

The term “learning objects” invariably dominates e-learning debates, including those within the Task Force Workshop. It is gradually becoming clearer that the discussions surrounding the term learning object have encompassed a complex range of issues that need to be addressed more precisely and ultimately redefined. Over the past few years there have been many attempts to define learning objects and the failure to find any common agreement suggests that an alternate strategy is necessary. The term learning object was commonly applied to educational content by those involved at the systems development end of the spectrum, although it was acknowledged that the content was dynamic in nature and required, therefore, different metadata than that pertaining to the more static world of information objects. More recently it has become evident that learning objects have a life cycle that begins at creation and extends through preservation, with many intervening events. Supporting and extending this life cycle requires complex descriptions.

From another perspective, there has been a common assumption that learning objects will be shareable or at least will be reused or repurposed. This implies that they need sufficient identity to be discovered, located and accessed by educators and learners (and also often delivered to a new environment or to multiple repositories). There has also been the assumption that learning objects need to be described in context indicating that the particular educational framework—inclusive of learning outcomes, activities and assessments—needs to be associated with the object in some immediately recognizable fashion. These assumptions indicate that instructional context is integral to any meaningful interpretation of a learning object.

In terms of developing a metadata standard, all these notions are combined into one data model in the form of the IEEE Learning Object Metadata Standard. In compressing all these concepts into one data model, numerous semantic and implementation challenges have emerged. These challenges have led to the notion of unpacking the concept of a learning object into at least two basic components: the first as digital asset and the second as learning activity that includes outcomes and assessment. The contextual or secondary information may be a third component but it is more likely to be an integral part of the learning activity taxonomy. The conceptual advantage of pursuing this approach is that digital assets can be described once and used many times much in the way that librarians describe information objects. It is too early to know how the learning activities will be developed as a conceptual and practical model but the application of technology to different components of generic learning activity should assist in developing such models over the next few years.

Given this situation, it may be possible gradually to resolve the semantic confusion surrounding the term “learning object” and to impose some kind of “semantic consistency”—one of the Task

Force's fundamental concerns. In the meantime, however practical applications of metadata are required in most institutions and considered levels of pragmatism and compromise are required to implement such strategies. Some of the key metadata issues are canvassed in the next section.

Metadata Strategies

The discussions in the Task Force Workshop confirmed the need for strategic initiatives relating to metadata across a spectrum of digital assets. Higher education institutions across the world have been slow in learning about or adopting any strategies for the application of metadata to learning objects or indeed any other digital assets held outside the library domain.

The cultural barriers described earlier in the paper are a major impediment to the development of metadata strategies for digital assets, including learning objects, which are owned and managed by particular stakeholder groups including faculty members. While librarians generally have the most skills in metadata creation, they also have rarely been asked to apply those skills to developing and tagging learning objects and building learning object repositories. Faculty members, who are not as familiar with metadata and its uses as are librarians, do not in many instances see the need for metadata. This lack of knowledge furthermore can spawn considerable reluctance and apprehension in releasing learning content for description to the library.

On close examination, three primary cultural issues emerge pertaining to creating, using and tagging learning objects. These issues are:

- Ownership
- Management
- Access Control

Historically, it has been unnecessary to separate out the three issues since most knowledge objects have been part of an owner-centered culture. Within an owner-centered culture, generally, the same group administers acquisition/creation, management and access control of the object. But learning objects and digital assets deftly and necessarily cross organizational boundaries and reside in a user/learner or patron culture as opposed to an owner culture. Operating under a user-centered construct compared to an owner-centered model requires a different understanding and perspective on the three activities of acquisition/creation, management and access control. The paradigm for learning objects and digital assets with respect to the three activities, therefore, is shifting.

Within a user-centered culture, different groups may bear responsibility for the three different activities. For example, a faculty member may create an object's content and learning context while an education technologist might design and produce a more appropriate online version that is then handed over to a librarian. The library would then, in turn, manage and control access to the object based on the initial creator and owner's preferences. But the owner does not have direct control over the management while at the same time the administrator of the object, ultimately, does not own it. Consequently, both creators and managers will need to understand each other's role and operate within the boundaries of their particular relationship to the object. Note that Wendy Lougee outlines a similar argument in her 2002 CLIR Report, *Diffuse Libraries: Emergent Roles for the Research Library in the Digital Age*.

In conjunction with this cultural and paradigm shift, the library staff needs to bring its significant knowledge management skills into this new context while at the same time it also needs to

understand that the practices it has used in its previous applications of knowledge management do not necessarily apply in this context. In order to make the transition to a user-centered culture, the library will need to recognize that it may not necessarily own the content that it is helping to manage and to which it is creating access.

Even in the most collaborative environments, the academic community has not addressed the differences between an owner-centered culture and a user-centered one nor have these differences been redressed. Until the community recognizes and deals with this issue, there will continue to be serious challenges surrounding learning objects and metadata, semantic consistency and quality assurance.

On a practical and tactical level, the Task Force appealed persistently and consistently for new and improved metadata creation tools. This area would thus seem to be ripe for collaborative activity, possibly using open-source solutions that can easily be integrated into existing workflows and systems architectures.

At the higher strategic level there is a desperate need for analysis of schema requirements, controlled vocabularies, taxonomies and the widespread adoption of application profiles that draw upon standard elements from multiple domains. The desire to share resources has generally been a driving force in developing application profiles in education worldwide. The relatively low priority that most academic institutions assign to the concept of shareability partially explains the slow adoption of metadata applications (and the lack of recognition of the related cultural issues). There is, however, a growing realization within the academic community that digital assets and learning objects have value as an institutional resource as well as an acknowledgment that the sheer complexity of the emerging digital campus requires some level of managed control. Ultimately success will depend on the forging of working relationships between designers, producers, owners and consumers of metadata. In order to meet this objective, the academic community will require a much greater understanding of the way in which learning activities are created, used and supported in the digital environment and of the systems infrastructure that sustains these learning activities.

Integration of Library and Learning Management Systems Environments

Strategically, the library is keenly interested in integrating its systems and services into learning management systems environments. The Task Force Workshop identified a number of areas where such integration has the greatest chance for success in both the short to medium terms. Unbundling existing systems configurations to allow more of a “plug-and-play” desktop environment is a key component to unifying services. Of equal importance is assessing service provisioning from the perspective of a student engaged in a learning activity within the learning management system (or CMS) environment. This concept is not innate to the library environment that generally functions under a “pull” type service model. Not only are today’s students creating e-portfolios to organize and track their work, but they wish to search and discover from within the learning management systems environment and create dynamic information and learning sets on-the-fly. Integration efforts will have to accommodate these organizational and learning activities.

Students and faculty alike require tools and services to access and partake successfully in information seeking and learning environments. Workshop participants identified systems requirements with both technical and functional aspects as well as requirements with both technical and cultural aspects.

Technical and Functional Requirements

- Consecutively display and integrate a variety of information windows as part of a learning activity.
- Aggregate access (discovery and exchange) to content in any given learning context.
- Provide bibliographic tools that permit easy searching and reference completions.
- Access to tools that render and present content in user-customized formats.
- Integrate plagiarism software into course management systems to encourage good practice and to assess reliability of content.

Technical and Cultural Requirements

- Embed library resources in course management systems.
- Integrate third-party commercial information services.
- Customize portal facilities for storing personal preferences.
- Provide easy access to virtual reference services⁸ at the point of need (for which there was unanimous Task Force approval).
- Embed training modules to assist in information seeking.

Workshop members expressed the need to implement these items as soon as possible, to be pragmatic in seeking solutions and to be willing to take risks and accept some level of failure (and to learn from mistakes). New and stronger alliances with course management systems and library systems vendors are an essential ingredient for success. However, it was agreed that this may take a great deal of concerted collaborative effort.

Content Management

The workshop discussions confirmed that institutions are beginning to think in terms of digital content management or institutional repository management. However, there is still a great deal of semantic confusion over the term “repository,” little knowledge of the capability of the various types of content management systems and a host of unanswered questions about how to manage institutional repositories. Yet it also is clear from these discussions that within the university setting there are distinct parallels between the management of both learning objects and digital assets. And given these parallels, the management of learning objects can be seen as part of the broader issue of digital asset management.

With careful consideration, libraries need to reposition themselves to be viewed by the academic community that they serve as managers and overseers of the repository space. It was clear from the responses to the Task Force member survey that preservation and reusability of learning content are essential requirements in repository management, yet libraries were rarely involved in meeting this management challenge. One responder stated that the library has made little progress in aggregating pedagogical faculty content primarily because of faculty members’ cultural autonomy in developing digital assets for teaching and learning. Issues surrounding the ownership of materials vs. the aggregation for use are widespread. The issues surrounding digital assets and learning objects require a new cultural understanding and a shift in attitudes derived

⁸ Virtual reference services take place between a librarian and a patron over electronic channels via e-mail or chat.

from each institutional stakeholder's perspective. Libraries will have to work at persuading faculty and administrators that their role as institutional resource managers is as necessary (or perhaps even more necessary) in the digital order as in the pre-digital order.

All of the Task Force members indicated a pressing institutional need to become familiar with the latest generation of content management systems. It is essential to understand how such systems store and aggregate information, including digital assets and learning objects and how they might interface with learning management systems. These content management systems are capable of incorporating multiple metadata schemas to handle various types of content. Librarians are well-suited to populate these metadata schemas with the appropriate terminology. Their expertise in aggregating content positions them to be active partners with the faculty in accessing content, in planning courses and in using course management applications. At the technical level, standards agencies are attempting to define the functional requirements of teaching and learning using managed content with a view towards developing appropriate technical architectures and standards for interoperability.

Intellectual Property and Digital Rights Management

The issue of how to manage intellectual property through digital rights management is closely associated with institutional repository management. Education communities around the world are all grappling with this issue and there are no quick and easy solutions because of the complexities involved in developing, sharing and managing digital content.

At the institutional level there are traditional mechanisms for managing intellectual property which do not require digital rights management. There are signs that the library may take a leading role in this area based on their long-standing experience with copyright management. This is an area ripe for further library leadership but it will be most successful if done in tandem with the development of content management systems.

Technical Infrastructure

Each individual college or university technical infrastructure is unique to that institution. Some institutions have a centralized information technology (IT) organization whereas others have a more decentralized one—there seems to be no necessarily consistent pattern. In the United States, libraries often support their own technical infrastructures, but the access to it (the network) resides under the control of a central IT group. Culturally, this situation can often cause friction and territorial tendencies may therefore surface.

Given the fact that IT departments and functions may or may not be centralized and the possible territorial frictions between IT and library systems architecture control, the Task Force determined that solutions for service convergence on a technical level will need to be highly customizable. In light of this situation, several persistent themes for functional requirements emerged from the discussions, namely:

- Quick, seamless access to systems and information.
- Robust middleware to support authentication and authorization across a range of systems and services.
- Better interfaces among systems.
- Flexible, open-source tools for specific functions.
- Stable and comprehensive portal technologies.

During the discussions Task Force members noted that libraries and IT organizations often seem to have very different perceived philosophies for advanced technical infrastructure. Both organizations, however, have as a common goal to provide reliable and equitable access to the institutional resources under their management. While both IT and the library value security and access management—especially in connection with complex interactions with external service providers—the execution of those goals between the two can appear to conflict. In fact, they generally do not. Perceptions can be powerful systemic forces.

There are renewed efforts to bridge this gulf in perceptions through projects such as Shibboleth. The Shibboleth project aims to facilitate access management across institutions and across service providers through shared authentication and authorization routines. The development of supportive policies and business rules is vital to the success of such projects. Projects of this nature represent major opportunities for libraries to participate in formulating the functional requirements of access management that incorporate technical architectures with common services.

Training

The need for better and more focused training for both faculty members and students was a persistent theme in the workshop discussion.

With reference to library involvement, the need for improved and new information seeking skills was seen as essential if online learning is to be a satisfying and successful experience. The challenge of establishing relevant, yet scalable training is not new to librarians, however, there is now the possibility of embedding training support within the learning management system as an integral part of the learning activity. The idea of “just-enough-just-in-time-just-for-me” was seen as a desirable objective.

In order to achieve this goal there will have to be close collaboration among librarians, faculty members and instructional designers. This is not an easy mission, in part, because so little is known about the way students engage in learning through course management systems and, in part, because there is little experience of embedding and thereby introducing auxiliary services into the learning activity. The educational community needs more practical information on how learning objects are used, what sort of practical effort is required to use them and how, in the grand scheme, metadata itself is used.

Some training modules may be designed to be generic and therefore amenable to collaborative development among institutions, but much of the assistance may prove to be discipline-specific or even learning activity-specific. Exchange of best practices would seem a sensible goal through the next development phase, as this may help consolidate partnerships at the individual and institutional level.

The Need for Standards

Until relatively recently, there has been almost no attention on a consensual, international scale to creating technical standards for managing learning objects and processes. There have been various important national and regional efforts (e.g., Ariadne, EDUCAUSE) making significant progress, but generally within the confines of their own particular regional or national groups. Thus, the search for and development of specifications and standards for e-learning communities

on an international level has a very short history beginning with the establishment of the IMS Global Learning Consortium (IMS) six years ago.⁹

Considerable progress, however, has been made within IMS with a range of relevant specifications for key stakeholders within e-learning communities. Initially most of the specification work was very systems-oriented, but within the last year designers have focused their attention on learning design and they anticipate that learning activities will be subject to further specification development over the next year or so. IEEE recently released the first and only real education standard, referred to earlier as the Learning Object Metadata Standard. As with all new standards, a great deal of attention is now being paid to making it a workable standard to be revised and extended in the light of feedback from practical implementations.

Recently IMS decided to reach out to the library communities and formed a Digital Libraries Special Interest Group. This initiative represents a departure for IMS in that it is specifically targeted to a community that has not been traditionally involved in IMS. IMS is currently preparing a White Paper that will form the basis for wide consultation with library communities on their functional requirements in the e-learning space.

Discussions among the Task Force members also led to the belief that EDUCAUSE is an important organization not just for the IT and instructional design organizations, but also for the library community. As the library's reach becomes ever more technology-centric, collaboration in EDUCAUSE and other education-related associations becomes increasingly important.

Strategies for Developing E-learning Infrastructure and Services

The Task Force's analysis suggests that a more holistic approach is required in the development of e-learning within the institution. While there are significant technical challenges to be addressed, the major institutional impediments are cultural and historical in nature. Leadership and vision are needed to make e-learning a satisfying and cost-effective teaching strategy.

In more practical terms there is a need for top-down and bottom-up strategies together with short-term and long-term strategic initiatives. Given the present policy vacuum in many institutions with regard to e-learning, the library community has a major opportunity to articulate its requirements in the e-learning space. In the short term, with the judicious use of existing collaborative mechanisms, it is possible for libraries to make significant progress in integrating and exposing library services in course management systems and learning activities.

At a broader level, there is a need for a coherent planning approach to managing existing and emerging digital assets. There are no quick solutions for addressing this complex issue, but opportunities exist for the library both within institutions and within collaborative frameworks to contribute to the building of infrastructure for digital asset management. It is highly likely that there will be multiple repositories within any one institution, which will require metadata schema and federated searching services to ensure specified levels of interoperability. It is also likely that the institutional repository infrastructure will need to interact with repositories in other institutions; therefore, there will be a requirement to offer services that support a distributed network of repositories across various functional and disciplinary domains. In other words, there is a need for conceptual and technical infrastructures that allow the library to offer pertinent

⁹ IMS Global Learning Consortium, Inc. was originally entitled the Instructional Management Systems project, but the organization found it to be a name that generated a significant amount of confusion. It now prefers to be referred to simply as IMS. See <http://www.imsglobal.org/faqs/imsnewpage.cfm?number=2>.

services. At the same time the library should be well-positioned to update services as new opportunities and viable alternatives present themselves.

While the rate of change will continue to differ across institutions, the underlying challenges of infrastructure development common to all create a strong case for collaborative effort among institutions. The concluding sections of this paper outline a range of functional requirements where the collaborative mechanisms and collective expertise of the library network could provide timely, cost-effective input to the development of institutional infrastructure and where, among this collaboration, OCLC services may be of the most benefit in the dynamic e-learning environment.

Collaborative Opportunities

Collaborative opportunities between the library and its academic partners can be broadly categorized under two principal strategic notions: 1) integrating existing and new library and institutional services into the e-learning infrastructure; and 2) managing digital asset repositories. It should be noted, however, that these are not mutually exclusive categories; there are common services for both areas. We have already noted that the management of learning objects fits well under the general rubric of digital asset management.

Integrating Library Services

The principal goal is to integrate existing and new library services in learning management systems. The requirements identified earlier in the paper included:

- Consecutively display and integrate a variety of information windows as part of a learning activity.
- Aggregate access (discovery and exchange) to content in any given learning context.
- Provide bibliographic tools that permit easy searching and reference completions.
- Access to tools that render and present content in user-customized formats.
- Integrate plagiarism software into course management systems to encourage good practice and to assess reliability of content.
- Integrate third-party commercial information services.
- Customize portal facilities for storing personal preferences.
- Provide easy access to virtual reference services at the point of need.
- Embed training modules to assist in information seeking.

All of these requirements lend themselves to collaborative development. A key to success is to form strong links with library systems vendors and learning system vendors, to articulate the functional requirements and to develop technical architectures and applications capable of supporting the library services as part of the learning activity. There is also a need to monitor the volatile world of open-source solutions in order to sponsor and incorporate best practice developments within the generic infrastructure.

There is already evidence of institutions “reinventing the wheel” in many of these areas. Given the complexities of the technical challenges and the costs of development, collaborative intervention on behalf of libraries becomes increasingly more pressing, especially since they have the advantage of working across disciplines.

Digital Asset Repositories

The analysis suggests that academic institutions will probably require infrastructure and services to support a range of systems all with their own particular capabilities for managing digital assets. These systems include: library systems, course management systems, content management systems, learning content management systems, document management systems and archiving systems. Again, irrespective of the particular capability of the various systems, collaborative initiatives by the library community in developing common services infrastructure are key. Many of these initiatives relate directly to metadata support.

These common services include:

- Development of metadata schema and application profiles.
- Development and maintenance of vocabularies.
- Maintenance of registries for application profiles and vocabularies.
- Provision of centralized metadata and content repositories for learning objects.
- Value-added metadata services.
- Disciplinary-based aggregated services.
- Best-practice metadata development guides.
- Digital rights management languages and architectures.
- Metadata quality assurance services.
- Preservation and archiving services.

It is acknowledged that these areas are not the exclusive domain of the library community, but any concerted collaborative effort by libraries will almost certainly be influential in an e-learning environment that is so full of uncertainties and lacks cohesive vision.

Standards for Interoperability

Given the strong recognition of the need to develop technical standards for interoperability both within and across institutions and between information and learning environments, collaborative input to standards-making agencies is essential. To be effective there needs to be a lead agency or group of experts willing to undertake a systematic gathering of functional requirements who are capable of contributing to the technical development of open standards.

The most immediate point of contact should be with IMS, which, as noted earlier in the paper, has launched a Digital Libraries Special Interest Group to gather the functional requirements relating to the interactions between information and e-learning environments.

There is also a significant opportunity to forge links between library/information standards-making agencies and IMS. The convergence of interest suggests that cross-fertilization will enhance the possibility of true interoperability between the two domains.

Standards in themselves do not ensure interoperability but the collaborative development of service models and technical architectures, based on open standards, will have a significant impact on the future direction of teaching and learning.

Part II: Recommendations to OCLC

Leadership through OCLC

Task Force members unanimously agreed that OCLC should take a leadership role within the wider academic and vendor communities in articulating library requirements and opportunities within the e-learning sphere. As the preceding analysis of collaborative opportunities has shown, OCLC is well-placed to coordinate input from a variety of library service providers into the e-learning environment.

Many of the common services described in the "Digital Asset Repositories" section above, particularly those related to metadata, are currently available. These services need to be extended to support the management of learning objects and this extension would require that library and OCLC staff would also need to develop a commensurate expertise in learning objects. Doing so would seem to be a realizable goal over a relatively short period of time. In fact, both the library and OCLC should consider the management of learning objects and digital assets as a way to learn to extend their already high-level of expertise in the management of traditional knowledge objects. The provision of centralized repository facilities also already exists and with some adaptation should be amenable to interfaces with institutional learning object repositories. The precise balance between local (one institution, one repository) and centralized shared service (one digital repository shared by several institutions) is not yet clear but the important goal would be to establish a distributed repository framework that would sustain various levels of shared assets management.

Task Force Recommendations

The Task Force's overall recommendations fall into two categories: concrete suggestions for OCLC products and services and consensus-building proposals that OCLC, from its position as library advocate, should encourage within and beyond the global academic community.

Under advocacy proposals OCLC should:

- Assist libraries in their efforts to raise awareness within the academic and vendor communities of their ability to provide tangible benefits and enhanced services within e-learning environments.
- Help define the full spectrum of actions needed on an individual, local and national level for the awareness and implementation of e-learning-friendly services.
- Foster the creation and distribution of best practices.
- Work with the various vendors who support the creation of learning objects and encourage them to integrate metadata capture tools into the creation process.
- Create a visible advocacy presence among various global academic, library, IT, learning technology and service provider groups with special interests and impacts on e-learning.
- Promote the idea of service convergence—easy, convenient access to services, whatever their original source, at the point of use—from a learner's perspective.

Recommendations for OCLC products and services are as follows:

- OCLC should consider integrating support for learning object management into its existing and emerging solutions across all of its service categories. Each of OCLC's service areas has solutions that could be effectively used in the management of learning

objects. Clearly, a coordinated approach that incorporates support for learning objects into major core services will have the greatest impact.

- As part of this coordinated approach, OCLC should ensure that WorldCat is able to accommodate and aggregate the metadata that would allow the discovery and exchange of learning objects both within and among institutions and into and out of individual library systems. As a part of this accommodation, WorldCat should be able to accept metadata in whatever standard for learning objects is widely adopted (rather than expecting it to be presented in a MARC format).
- OCLC should embed its services for libraries via course management systems. One pilot already underway is the inclusion of virtual reference services within the learning management systems. A second pilot to include electronic content is in the planning stages. In addition, other services that OCLC could embed and thus surface in course management systems would include those that facilitate the discovery and movement of learning objects/digital assets into and out of WorldCat as noted in the above suggestion. The service would serve as the basis for exchange among OCLC members and for easier access within organizations that do not have digital asset management systems of their own.
- As metadata capture is key to support for the entire life cycle, including the discovery phase, it is critical that OCLC work with the vendors who support the creation of learning objects to integrate metadata capture into the creation process. Any metadata capture tools would be designed for the faculty member, the instructional designer or the researcher whose primary responsibilities are other than metadata creation. In other words, the tools would be tailored for use by someone for whom the metadata is a by-product of their work rather than the actual work itself.
- Finally, for proof-of-concept purposes, OCLC should establish joint pilot projects with a range of colleges and universities that are engaged in learning object creation, storage, retrieval and reuse. The full spectrum of participating institutional organizations—faculty, instructional design and support, IT and administration—should be included.
- Not all libraries are able to integrate library services into CMSs on their own and OCLC's should ensure that it provides services for those libraries as well. At the same time, OCLC needs to continue to value individual library input from all types of member libraries and e-learning users.

For all of the above suggestions, OCLC must also ensure that it allocates the appropriate amount of resources and internal capacity to accommodate these new, but necessary ventures.

With regard to the standards-making processes, OCLC is already a global leader in terms of library standards development and this expertise would be invaluable in the IMS context as a means of furthering the technical agenda identified above.

The challenge now is to articulate and implement strategies based on this analysis in a way that engages key stakeholders in institutions so as to transform current practices and to continue to produce innovative and meaningful learning experiences.