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Learning in Libraries

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Learning in Libraries

Libraries have long played a key role in supporting the work of individual scholars drawing on book collections and related materials to advance scholarly pursuits (Battles, 2004). More recently, libraries have come to support the activities of learning communities, broadly constituted, whether such communities are in a city or town, a college or university, or a school or business. Over the past decade libraries have begun to evolve into multi-purpose settings for diverse learners (Block, 2007), often spurred by new technologies and new patron interests and demands.

As we progress through the early decades of the twenty-first century, libraries as learning environments will evolve in response to the changing needs of learners, the changing conceptions of learning, and the new opportunities afforded by developments in computing and communications technologies. As they grow beyond their historical and traditional roles as places to house books, libraries offer substantial opportunities for the emergence of new learning environments. In this essay we develop a framework for considering such environments to accommodate a range of existing library learning settings and to show the way to the development of new options and opportunities for settings with rich learning potential.

Elements of the Library Learning Framework

Libraries serve as the assembly point or convening location for three elements that have been key to the modern learning process: learning materials, library patrons, and library staff. Understanding the variability in and evolution of each of these elements allows us to construct a framework for considering library learning possibilities in the twenty-first century.

Materials

Historically, libraries have been places, typically dedicated buildings, designed to house books and other intellectual properties useful for study and learning. Libraries have specialized in assembling collections of such materials that are both larger and more dense than those found in other locations. As such libraries have often been judged by both the size and quality of their collections, and larger richer collections have been thought to offer better environments for scholarship and learning (Johnson, 2004; Hoffman and Wood, 2005).

It is the size and density of library collections of intellectual properties that have led to the investment of time and resources for the development of various schema for the classification and organization of library materials. Such classification systems have been developed to make it easier to place and retrieve related materials in physical locations

within the library building (Taylor, 2004). The placement of related materials in adjacent physical space in stacks to promote efficient access is essential to fostering the discovery associated with browsing library collections. Such browsing is often held up as a key learning experience associated with libraries (Shoham, 2000).

The growth of library collections and the tension between the size of a collection and the ease of organizing it to promote accessibility foreshadowed the challenges confronting libraries and their users from two trends apparent at the end of the twentieth and beginning of the twenty-first centuries. First, libraries and their patrons were both enriched and challenged by the development of inter-library networks that allowed for better understanding of the materials held by many libraries increasingly organized in resource-sharing networks (Webster, 2006). Second, libraries and their users were challenged by the growth of the Internet and the vast numbers of digital intellectual resources suddenly available.

These two trends, which conferred equal and at times greater prominence on intellectual properties not held physically within the local library facility as opposed to those in the library collection, made it clear that libraries are in the business of providing access to patrons and that collecting materials within a physical location was merely a strategy to promote access, not an end in itself.

Two other trends presented libraries with additional challenges and shifted their missions further. Along with the growth of the Internet and networked electronic resources came a proliferation and diversification of types of intellectual properties, including electronic journals, e-books, digital audio and video files, and various other properties in textual and graphic formats. Increasingly, the knowledge artifacts are imbued with greater capacities to engage users and enhance their learning experience (Poltorak and Lerner, 2002). Moreover, the same digital technologies that allowed for the proliferation of forms and formats for intellectual properties also allowed for much greater participation in the process of creating intellectual property by a larger proportion of the population. This later shift allowed more and more people to become creators, not just consumers, of intellectual property (Lai, 2007). These creators are increasingly able to find an audience for their work due to the continued growth of the Internet (Anderson, 2006).

Taken together these trends have left libraries with a range of tasks related to intellectual properties that are at once diverse and powerful for their impact on learning opportunities. Libraries continue to fulfill their function of collecting materials within their local physical spaces while simultaneously providing guidance and access to materials housed elsewhere, materials in electronic form accessed through both proprietary and open networks.

Patrons/Learners

Parallel to the evolution of intellectual properties associated with libraries has been the evolution of library patrons, the scholars or learners who rely on the library as a site for scholarship and learning. Patrons have long expected libraries to be places where study

and learning occurs and places where scholars or learners take a more active role in structuring learning opportunities or activities than would be the case in a typical classroom. Thus it is not surprising that library patrons have in many cases led the way in directing libraries to offer new settings and services for learning (Woodward, 2005).

The patterns of patron expectations and library use as a learning environment have been changing. Patrons still expect libraries to be places where self-directed learning can take place, but they expect the opportunities for learning to be broader and more diverse, and they expect their control over all aspects of the learning environment to be far greater than in prior times. They also look to libraries for more powerful learning opportunities than those found elsewhere at a time when learning technologies and learning opportunities everywhere are becoming significantly more robust (Oblinger, and Oblinger, 2005).

Library patrons are being subjected to two crosscutting forces that are reshaping their interactions with libraries. On the one hand, the rapid pace of development of computing and communications technologies have resulted in richer information experiences across a range of domains affecting patrons. Observers have pointed to a new generation, sometimes referred to as “the net generation,” of individuals born into a world dominated by networked resources and instant global communications (Carlson, 2005; Tapscott, 1998; 2005). Net generation patrons are viewed as more likely to be engaged in multi-tasking, receive their information from multiple media, prefer to interact with peers to learn and collaborate on intellectual tasks, are accustomed to fast-paced access to information other services, have a more global outlook, and prefer to learn by constructing knowledge as opposed to receiving it.

Net generation patrons are also seen as being forced to confront an ever-expanding array of information resources with limited formal preparation and often limited skills to negotiate their way through and manage such resources. From this perspective, library patrons are in greater need of opportunities to learn how to access, evaluate, and apply information resources appropriately (Eisenberg, Lowe, and Spitzer, 2004). Net generation patrons, whatever their range of skills and interests, highlight new horizons for libraries as constructivist learning environments, that is, environments in which the direction of individual learning and scholarship is driven largely by the learner who typically constructs knowledge in the course of pursuing an individual or group project.

Staff/Educators

The contrasting perspectives on library patrons highlighted above, both of which have some validity, create new challenges for libraries and library staff. Library patrons want and need both more and less from library staff in their roles as educators in the library environment. They want less mediation and more self-service and self-direction in accessing knowledge. They want more interaction and more diverse forms of interaction (e.g., virtual reference, instant messaging contacts, walk-around over-the-shoulder assistance, more help materials, more modeling of academic work, and dynamic on-the-fly access to expertise). They often want a single point of service within the library,

flexible and dynamic help, instant everything with no waiting; and they want a broader more diverse set of knowledge worker skills available to them at all times – inside and outside the library building and during and after library hours (Jurewicz and Cutler, 2003).

How are libraries and library staff responding to these evolving patron needs and desires? They too are evolving and making a fundamental transition to new set of roles and responsibilities within the library learning environment. If teachers in classrooms settings have been challenged to become less the “sage on the stage” and more the “guide on the side” (King, 1993), the transition for library staff has been even more daunting. Library staff members have enjoyed far less definitive and central roles in the learning that takes place in libraries where patron self-direction has long prevailed and learning materials, not instructional acts, have been central to most activities. Library staff are being pushed by patrons to interact with them in new ways, and this is requiring both retraining of existing staff and re-imagining of their roles as librarians become more active users of new technologies in performing long-standing tasks of facilitating patron access to the increasingly diverse and more sophisticated intellectual properties. Not only are library staff members becoming knowledgeable about new kinds of materials, but they are also acquiring skills in new strategies for communicating with patrons both within the library building and beyond. For example, library staff members are using email, instant messaging, online reference services, and creating library service desks in virtual worlds in order to communicate with patrons (Foley, 2002; Bryant, 2006; Hurst-Wahl, 2007).

In addition to the new skills and activities of traditional staff, libraries are advancing their educational mission by adding new kinds of staff with entirely different sets of skills to make possible new educational experiences. Technology development and content creation are two of the areas in which libraries are adding staff to meet new patron learning needs. New technologies of computing and communication are opening new learning possibilities, and libraries are adding staff to create new tools and make use of tools being created by others. Content creation in a range of media is also becoming a more central activity within libraries as they seek to facilitate patron activities as constructors of knowledge properties, and libraries are adding staff with more specialized content creation skills whether in traditional publishing, digital publishing, audio and video creation and editing, or software, curriculum, and game development (Barnes, 2004).

Orientation

Consideration of the key elements of learning in libraries highlights the emergence of a new orientation for library activities. Libraries have traditionally been oriented to the assembly of materials at physical locations where staff and patrons might come together to accelerate the pace of scholarly learning. The primary value of such assemblages lie in the efficiencies of bringing together rich and robust collections of knowledge artifacts that might serve as tools for scholarship and learning. Such assemblages offered significant advantages at a time when knowledge artifacts were rare and often widely scattered to the point of making access one of the more challenging aspects of intellectual

work. Moreover, the assembly of intellectual properties within libraries highlighted the need and generated the interest in the preservation of such properties (Branin, Groen, and Thorin, 2000).

Two technical developments have diminished the relative value of the assembly orientation of libraries and highlighted the need for a new orientation to address emerging patterns of patron activities. First, improvements in communications and transportation technologies have reduced the relative advantage associated with assembling intellectual properties in a single location by making it easier for patrons to go to where materials are located and to bring materials in either physical or digital form to patrons (Shapiro and Varian, 1999). Second, the proliferation of technologies that empower patrons to engage in the creation of intellectual property, most notable, low-cost digital production tools, has generated interest in the library as a site for the creation of intellectual properties (Lai, 2007). These trends mean that the orientation of libraries toward the assembly of intellectual properties has been joined by an equally important orientation toward the creation of such properties. Both the assembly orientation and the creation orientation offer powerful opportunities for learning and both, coupled with the development of new technologies have led to the enhancement of library learning environments.

Library Learning Environments

The learning environments developing in contemporary libraries are more diverse and potentially more powerful than ever before as libraries embrace a range of new technologies and services to address patron needs. Drawing on the three basic elements of learning in libraries (materials, patrons/learners, staff/instructors) and the two orientations to intellectual properties (assembly, creation), Table 1 presents a framework for specifying six major library learning environments.

Table 1 – A Framework for Library Learning Environments

		Orientation to Intellectual Properties	
		Assembly	Creation
Elements of Learning	Materials	Collection Environment	Social Archive Environment
	Patrons/Learners	Education Environment	Laboratory Environment
	Staff/Instructors	Instructional Environment	Atelier Environment

We will briefly describe each of these six environments and consider their contribution to learning in libraries.

Learning Environments Emerging from an Assembly Orientation

Assembling materials to facilitate scholarly work has been the mainstay of libraries for generations, and it is no surprise that such work continues to animate much of what they do. We can distinguish environments within libraries emanating from the assembly orientation in terms of the dominant element involved: materials, patrons, or staff. In each case the learning power of the environment is derived from the assembly of intellectual properties that support the kinds of experiences that are possible to advance learning.

At least three different library learning environments can be drawn from the assembly orientation: collection environments, educational environments, and instructional environments. Although each of these learning environments relies heavily on materials assembled in libraries, they can be set apart by the degree to which they involve the active and deliberate positioning and juxta-position of materials to facilitate learning. Collection environments involve the least deliberation and learning-driven activity, educational environments involve somewhat greater deliberation, and instructional environments entail the greatest level of deliberate planning and positioning to achieve particular learning goals.

The Collection Environment

Central to the mission of any library is the collection and organization of intellectual properties to make them readily accessible and easily retrievable for virtually any patron within the defined user community for virtually any intellectual project or purpose (Lambert, Atkins, Litt, and Olley, 2002). This learning environment is defined by a heavy emphasis on materials for receiving information most traditionally through reading texts, but more recently through listening or viewing via a range of ever evolving media. The key feature of this learning environment is that the organization or positioning of materials, and indeed, the juxta-position of materials is designed to facilitate collecting them and to support patron access through a single organizational schema developed for general access as opposed to a tailored schema designed to facilitate a certain kind of focused learning.

The Physical Collections

The library organizes its physical collection or collections following a standard schema such as those developed by the Library of Congress which groups materials together according to a classification system based on content areas (Mann, 1994). This arrangement permits physical browsing of the collection in those cases where patrons are granted direct access to the locations where the materials are kept, and it permits easy staff retrieval in those cases where patrons are denied direct access. Both browsing and

retrieval are made easier (or at least less physically taxing) by locating materials on the same subjects near each other since patron interests and requests are likely to be driven by projects and assignments requiring multiple items on the same topic.

Although patron learning is facilitated by organizing materials according to subject in adjacent spaces to ease physical browsing and retrieval, some library arrangements rely on other technologies to ease access without organizing materials by subject. For example, in some robotic retrieval facilities, materials are organized by physical size to allow greater density of storage with physical access facilitated by detailed electronic tagging of materials (Amrhein and Resetar, 2004). Other organizational arrangements are based on the likelihood of materials being used, and in these cases little used materials are located in remote facilities while more frequently needed materials in the same subject areas are located closer to patrons (Nitecki and Kendrick, 2001). These arrangements illustrate the pattern of organizing materials to permit their efficient storage and maintenance with patron learning needs less of a priority or addressed by other means.

The Online Catalog

Libraries employ online catalogs (and formerly card catalogs) to represent their physical collections in ways that make inspecting the collections easier for patrons. These tools allow patrons to move across the metadata for large numbers of items in highly efficient ways. Such catalogs rely on the classification system to retrieve records for materials relevant to the immediate interests of patrons. Patrons can use multiple operations to manipulate sets of records to arrive at sub-sets of materials that most directly conform to the needs of the particular project at hand. Such record sets can then be used to retrieve materials from the physical collection held at the library (Large and Beheshti, 1997).

Increasingly, libraries are presenting patrons with online catalogs of materials that are not held within the immediate library facilities. These catalogs can contain materials from others libraries or materials from the Internet in general. Such catalogs can be specifically referenced on the library website, or they can be contained in less general and less public materials. Of course, patrons can bring knowledge of a range of catalogs and their corresponding resources with them to the library and use the library computer work stations to access and retrieve such materials. Taken together, the set of catalogs of materials held both locally and remotely, and both owned and not owned by the library now represent the range of resources available to library learners as they pursue their particular project needs. Most notable among such resources is WorldCat, the catalog of the holdings of member libraries of the Online Computer Library Center (Perrault, 2002).

Other Electronic or Digital Collections

Libraries also have collections of materials in electronic or digital form, and these materials are more and more offered to patrons through networked connections either within the physical library facility or remotely wherever patrons happen to be working, for example, at their own office or home. These digital intellectual properties can take

multiple forms, including text, audio, video, and others, and the forms taken by these materials are evolving. These materials have become part of the total collection environment available to support the learning of patrons (Fenner, 2006).

The dramatic increase in possible resources represented by multiple online catalogs and other digital resources present new challenges for patrons and their research needs. Libraries have responded with several new strategies to help patrons deal with the rapidly expanded knowledge resources.

Focused Collections

One strategy to help patrons cope with the proliferation of intellectual properties is the creation of more focused or specialized collections (Sudduth, Newins, and Sudduth, 2005). There are patron-learning considerations that dictate departures from the fully schema-driven organization of materials. For example, in some cases libraries will create reading areas or reading rooms in which materials are gathered to anticipate the learning needs of a particular set of patrons, such as students in American Studies, and in such cases materials may be assembled from various locations in the overall cataloging schema. These special collections or gatherings of materials are created with more deliberation about the learning needs of patrons. Sometimes entire libraries are created in the same way, and such libraries can be libraries within a system of libraries or “libraries” within a library, i.e., within the same single building. Arrangements such as these are attempts to align library collections and patron interests more directly.

In addition to physical collections and locations devoted to patrons with certain interests or needs, libraries have developed digital, typically online, collections dedicated to particular topics. These collections can be represented among a set of such collections from which patrons select the one or ones that most closely align with their interests. Such collections are typically presented on library websites, and they usually include both onsite and remote resources on a topic or subject area. A notable example of a special digital collection is the American Memory Project of the Library of Congress which collects materials related to the history of the United States (Shneiderman, 1997).

Search Engines

Search utilities or search engines are another strategy that libraries use to help patrons locate intellectual properties for their work. Indeed, the online library catalog was the original search engine available to patrons long before Internet search engines came on the scene. Libraries offer the searchable online catalog of their collection as well as the collections of other libraries and various searchable electronic collections of materials. These specialized search engines offer focused or directed searching of defined collections of resources. To overcome the problems presented by multiple search engines libraries increasingly offer federated or consolidated search engines that allow a single search to be conducted over several or all of the resource collections held by the library. Such search returns a single list to the patron, and the list of results itself can even be

automatically sorted into major thematic categories to facilitate patron work (Boss and Nelson, 2005).

Search engine development is still in its early stages, and major projects in the years ahead are likely to enhance the power of online search significantly. Efforts to develop more intelligent search strategies that result in much more precise location of just the materials patrons need are likely to dramatically change the search process. Additional efforts to search full-text in context, visual and audio materials will contribute to a fundamentally different search experience and make the learning connected with the collections environment far more efficient and effective (Fensel, Davies, and Van Harmelen, 2003).

Patron Profiles

Another strategy employed by some libraries to connect patrons with the materials they need for their scholarly work and learning goals is the patron profile. Patrons who complete a profile detailing their continuing and current interests are notified whenever new materials appear that correspond to the profile. In this way patrons can maintain current awareness of new materials being added to both the physical and digital collections of the library in their areas of study (Cohen, Fereira, Horne, Kibbee, Mistlebauer, and Smith, 2000)

Future Directions

The library collections environment has evolved steadily through the growth of collections and the introduction of new technical means of making them accessible to patrons for their learning needs. Future developments are likely to be based on the emerging capacity of intellectual properties to configure and re-configure themselves as a result of interaction with patrons. Such reconfigurations will be driven by automatic capacities built into materials as they are created and to more intense and in-depth knowledge of patrons developed by libraries as they chart patron behaviors and interests. Such developments will allow library collection environments to become both more robust and more personally aligned with patron needs.

The Educational Environment

While the interaction between library patrons and library materials in the collection environment for learning is largely patron-initiated or need-driven, library staff members also play a more active role in shaping an educational environment within the library building and increasingly within the library online presence. The creation of this educational environment involves the deliberate positioning and juxta-position of intellectual properties and technologies to create new learning opportunities. Patron learning in the library educational environment is rooted in patron interaction with these intellectual properties with only indirect involvement of library staff, but the staff presence is evident in the formation of the setting itself. Patrons encounter learning

opportunities in the educational environment as they move through the physical and digital or online “spaces” of the library.

Regular Displays

Patrons entering and moving through a library building offer a nature point of contact with the materials and services of the library. Library facilities can be organized to incorporate spaces and opportunities for the display of library materials and services on a regular basis (Everhard, Hartz, and Kreiger, 1989). When patrons encounter such displays they have the opportunity to learn from the knowledge embedded within them.

There are various examples of regular displays employed by libraries of different kinds. Many libraries offer a display of new books or new journals recently added to the collection. Some libraries set aside space, often a special reading room or alcove, for patrons to consult daily newspapers. These materials are typically selected by library staff with an interest of both meeting and enhancing patron tastes. By juxtaposing materials known to be valued by patrons with materials that are new or unfamiliar to patrons, staff can broaden or extend patron interests. Library staff function as editors or curators of materials in such cases. Large libraries can segment such displays by topic area so that patrons learn where in the facility to go for the latest materials in their field of interest.

Collection Driven Periodic Displays

In addition to regular displays of materials to enrich the learning of library patrons, libraries also engage in periodic or special displays. These displays are often driven by the particular strengths of the library collections. Library staff engage in special projects to create displays that accentuate or highlight some part of the collection in order to raise its profile in the eyes of patrons. Through such displays patrons can be introduced to aspects of the intellectual properties held by the library that they might never encounter otherwise (Brown and Power, 2005).

Special collections of rare or historical materials that are seldom the target of the searches of library patrons can be an important part of collection-driven displays as the library staff curates the collection and adds educational value both by assembling parts of it in special ways and by often contributing introductory, orienting, or explanatory materials. Sizable libraries with deep collections can organize any number of such displays, but even libraries with more limited holdings can create learning opportunities by temporarily assembling parts of their collection in ways that engage patron attention as they move throughout the library facility (Allen, 1999).

Event Driven Periodic Displays

Unlike collection driven displays where the materials available in the library collection are the starting point for thinking about an educational display, with event driven displays the identification of materials to assemble for a particular display to patrons is inspired by some event or events that occur outside the library itself. Such events can be recurring

such as Black History Month which might lead to a display of books about Black leaders, or the World Series which might inspire a gathering of books on baseball. But events can also be single occurrences such as the Millennium which might generate a set of readings on how different civilizations treat time and its passage (Leslie and Wilson, 2001).

Event driven displays seek to capitalize on momentary patron interest spurred by a particular event. As such they take advantage of a teachable moment to extend the understanding of patrons about an occurrence or issue that is already salient in their thinking. Key to succeeding is an understanding of the patron population and its various segments. For example, a library that understands that its patron population contains a significant number of school children will assemble a set of materials around topics that they are encountering in school, while a library with a patron population dominated by scientists may develop a display connected with the 100th anniversary of an illustrious member of the scientific community. The library environment is configured to create learning opportunities as patrons move beyond their everyday understanding to use the resources of the library to probe more deeply into an area.

Events

In addition to responding to external events to create educational opportunities, libraries also create events within that serve as educational experiences for their patrons. Such events include relatively well-known formats such as book talks in which an author of a new book is invited to discuss the book as well as lectures and talks on more general topics of interest to patrons. Other events that may be offered include book clubs that bring groups of patrons together to read and discuss a shared book, interactive seminars that engage patrons on topics of mutual concern, and gallery exhibits that feature the art, music and other cultural artifacts present in the library.

Libraries have experimented with a range of events designed to appear to their particular base of patrons. A childrens library might feature story reading or story telling sessions (Briggs, D. 1993), a public library might sponsor a set of events to teens (Edwards, 2001) community read-in where all members of the community are invited to read and discuss a single book, and various types of libraries might offer film series that explore ideas of interest to the community of users. Events of these and other types are typically woven together into a program of activities that generates a constant flow of patron activity within the library and opens various opportunities for direct and indirect learning.

Electronic Displays

The displays of physical materials that have long been a part of the library program are now joined by electronic displays of materials that offer some new possibilities for enriching the educational environment. Electronic displays typically take the form of electronic boards that might be mounted anywhere in the library facility or online displays that may be shown on any computer connected to the Internet, whether in the library building or in a remote location. Electronic displays are growing in both capacity

and flexibility and making possible a new set of elements for the library educational environment.

Electronic displays offer several advantages to library staff as they configure the educational environment. On the one hand, they make possible the representation of a wide range of materials in a compact space, and they can be dynamic both in terms of rotating materials in the same display page and in terms of featuring intellectual properties such as digital videos that are themselves dynamic. Electronic displays also allow libraries to present their rarest and more delicate materials directly to patrons with no danger of damage or loss.

Tools and Applications

Libraries can also provide tools and applications to assist patrons with their academic work. Such tools can facilitate patron work while simultaneously guiding patrons in their endeavors. Guidance of this type can provide powerful learning as it guards against poor practices and reinforced good practices.

For example, libraries routinely offer software for managing bibliographic records and their use in scholarly work (East, 2001). The management of such materials is one of the recurring chores connected with academic projects, and putting materials in the correct formats is often a tedious and error prone activity. As many tools and applications allow for a more active approach to learning, we will turn to other examples in the creation-oriented framework below.

Future Directions

Advances in technology, the growth of digital knowledge properties, and the increasing sophistication of library patrons portend a new generation of learning opportunities as part of the library educational environment. The introduction of new hardware including video walls, digital paper, the surface computer, and other new form computers will bring opportunities to engage patrons with information in new more highly interactive and exploratory ways (Wisneski, Ishii, Dahley, Gorbet, Brave, et al., 1998). Libraries will have within their reach the capacity to mount interactive exhibitions rivaling the best museums and entertainment venues, all with the potential to create highly engaging educational experiences.

A few possible scenarios for the deployment of these new capacities to enrich the library educational environment will serve to illustrate what might be ahead. Online sites have pioneered in the application of personalization techniques to present end users with information (whether shopping recommendations or updates on their performance of financial accounts) that is individually tailored, and some libraries have already employed similar techniques. Such individually directed information will soon be available via in-building displays that recognize patron identify via signals from their cell phones as they pass by and present real time relevant information such as the fact that a book they have requested is now available to them at the circulation desk.

Massive video display walls will allow library staff to create collections of texts and other materials that can be viewed side-by-side with the comparison sharable with patrons passing through the library building. Such walls will also permit the visualization and manipulation of large amounts of data in ways not before possible. In some cases, exhibits deployed on such walls will allow and even encourage patrons to interact with the display by altering the information and examining the results. Such display technologies will also be deployed across the several walls of entire rooms to create rich immersive environments that will enhance the experience of interacting with rich collections of materials and data in multiple media. These “learning theatre” environments will create new opportunities for library staff to highlight the intellectual properties of the library (Dernie, 2006).

Some libraries have moved to create immersive environments in virtual space where they offer patrons entirely new kinds of interactions mediated by avatars for staff and patrons. These virtual space projects offer unlimited flexibility for patrons to move through combinations of materials and interact in ways not possible in real space (Gibson, 2006). Rising patron interest in such experiences suggest the rich set of new possibilities to which libraries will continue to respond.

The Instructional Environment

The instructional environment in libraries involves direct activities of staff members to provide instruction to patrons in searching, reading, and understanding the intellectual properties in the library collections, and increasingly the world of networked intellectual materials beyond the library, as well as how such materials can facilitate their own growth and development (Dewey, 2001). This learning environment is defined by heavy emphasis on staff/educators using library materials in receiving/reading mode. Like all library services, the appropriate instructional program is dependent on the needs of the particular patron community. The instructional environment has long been an in-person experience, but it is being expanded through the addition of virtual experiences of various kinds, and libraries are now combining elements of both types to create a more pervasive instructional environment.

Responding to Patron Inquiries

Patron inquiries offer an opportunity for library staff to offer instruction in small segments in direct response to a particular question. Often such responses are delivered in person by someone behind a service desk, but increasingly they are also delivered by staff who rove the library building making themselves accessible to patrons wherever they may be as patrons find it easier to approach staff who are nearby. This manner of engaging patrons for brief instruction becomes even more important as patrons come to rely more and more on electronic materials that do not need to be checked-out and so are not passing by the service desks as often (Durrance, 1995).

Patron inquiries are also being fielded online by library staff members who are using whatever means of communications is favored by patrons, including email, instant messaging, cell phone, and web-based platforms that allow staff to guide patrons to and through catalogs, indices, and full-text collections (Ruppel and Fagan, 2002). Such electronic instructional services are provided both by in-building library staff and by networks of librarians who work online with patrons in a large number of libraries, the later option allowing libraries to offer this service around the clock throughout the year (Coffman and Arret, 2004). In this way libraries are providing basic instructional services at any time a patron might need them.

Drawing on their experiences with large number of patron inquiries, library staff members also create collections of frequently asked questions and answers that are accessible to patrons online, and these collections grow and develop with changing patron interests. They provide an instructional resource in the form of a type of patron-originated manual of library operations.

Consultation Sessions

Libraries also offer patrons more extensive opportunities to consult, typically in the form of an interview or consultation session with a reference librarian or specialized expert in some area of the collection. These consultations permit a more in-depth exploration of the patron's project and allow the staff member to offer advice on both the shaping of the project and the identification of appropriate resources (Ross, Nilsen, and Dewdney, 2002).

Instructional Sessions

Library staff can develop instructional sessions or on-going classes to meet the learning needs of patrons. Such sessions can range from basic reading appreciation or study techniques for groups of school children, to strategies for conducting definitive literature reviews for post-secondary students, to understanding the changing regulatory regimes governing the use of published materials in teaching and publication for more established scholars. Instructional sessions can now be offered both in the library building as well as online for patrons who wish to participate from remote locations (Salony, 1995; Dewald, 1999).

Library Publications

The production of diverse library publications can be an important part of the library instructional environment. Library staff can connect with patrons through reports, newsletters, and more specialized publications designed to reach segments of the patron community. Like many other publications, those produced by libraries are now also delivered electronic over the Internet, and they can become an increasingly important component of educational outreach efforts. Such publications can carry news of developments at the library as well as direct instructional articles that teach patrons how to make better use of library resources (Banks, 2002).

Instruction in Other Venues

To reach library patrons who otherwise might not take advantage of opportunities for instruction in use of library collections and services, library staff can move beyond the confines of the library building to offer instruction wherever patrons happen to be. Examples include instruction that occurs in community centers in the case of public libraries or in regular classrooms in the case of school and college libraries. The instruction offered by library staff can also be a part of online course platforms as well as other major online destinations such as MySpace or SecondLife (Shank and Dewald, 2003).

Future Directions

Library staff members have moved a variety of instructional activities online following the growth of the Internet and digital collections. With the continuing development of digital materials and the rise of generations of patrons with greater experience with online interactions, the instructional roles of library staff online are likely to continue to evolve.

Online environments are likely to offer library patrons immersive experiences of various kinds that can advance their learning in new ways – learning world history by invading a virtual country, learning biology by growing a virtual garden, learning the economic structure of an industry by running a virtual company and so forth. Library staff will develop ways to support these learning opportunities by assembling new and existing materials in new ways.

Instructional environments will also be created from the ground up by a range of participants, some with considerable expertise and some with less expertise and more time and enthusiasm as social knowledge networks produce new genres of materials such as Wikipedia the online encyclopedia edited by a vast community of users.

As these environments become more diverse, more numerous, more participatory, and more complex, library staff who once guided patrons through book and manuscript collections, indices and handbooks, and databases and reference works will be needed to guide patrons through vast territories of virtual time and space that have more in common with World of Warcraft than the current library catalog. They will guide learners in the appropriate use of an increasingly diverse knowledge landscape (Gee, 2005).

In a full library learning program, these different assembly oriented environments operate in an integrated and coherent way resulting in a comprehensive set of experiences that maximize the library as an organization that supports and promotes learning.

Learning Environments Emerging from a Creation Orientation

With the development of tools that allow patrons to engage in the creation of intellectual property of diverse kinds, libraries are becoming key institutions in support of such activities. Libraries are leveraging their long-held position as centers for the assembly and preservation of intellectual property to become centers that support the creation of intellectual property. This creation orientation offers a new range of learning opportunities for libraries and their patrons.

Here we can distinguish three library learning environments growing out of the creation orientation: the social archive environment, the laboratory environment, and the atelier environment. Each of these environments is rooted in the creation of intellectual properties, but each is most closely aligned with a different element of learning in libraries. The social archive environment supports the development and preservation of materials, the laboratory environment is rooted in patron-driven knowledge creation, and the atelier environment is driven by library staff modeling knowledge work.

The Social Archiving Environment

Operating from an assembly orientation, libraries gather intellectual properties produced by authors and make them available to consuming patrons. Under the assembly orientation the community of creators of intellectual properties is distinguished from the community of consumers of those properties, hence the distinction between authors whose works are placed in the collection and patrons who seek access to those intellectual properties. Under the creation orientation the distinction between creators of intellectual properties and consumers of intellectual properties breaks down. Patrons are just as likely as book authors to have materials to be added to the library collection to promote access and preservation, and patrons are just as likely to want to draw upon each other's creative work as they are to draw on the work of published authors (Leuf, 2002).

The active production role of patrons makes the need for the library to serve as a social archiving environment quite clear and compelling. The archiving environment is part of a broader development of the library as social intellectual space, a place where patrons can come together to interact around issues of an intellectual nature (Freeman, 2005). The social archiving environment facilitates the preservation and exchange of patron-generated intellectual properties. Since the development of new intellectual properties relies (sometimes heavily as captured by the phrase "rip, mix, burn") on borrowing from existing intellectual properties, locating the social archiving environment within the library makes particularly good sense because it facilitates easy access and licensed use of such existing materials (Bowrey and Rimmer, 2002).

Communities for Creative Interaction

Driving the social archiving environment within libraries is the creative community represented by library patrons (Vaidhyathan, 2005). Patron populations can be viewed as a community of interest or interests with individual members engaged in creating new knowledge and intellectual artifacts. Such communities and their activities will vary

depending on the nature of the library. A corporate library serves a community of patrons whose interests are defined by the nature of the corporation. A school library serves a community of students and faculty whose interests are defined by the programs of the school. A public town library serves a community of local residents whose interests are shaped by common residential location.

Facilitating the creative activities of patrons in interaction with others in the patron community allows the library to play a powerful role in providing learning opportunities, including the opportunity to share one's intellectual work, to exchange such intellectual work with others, and to collaborate in joint efforts. Much, if not most, of this peer interaction can take place with or without the direct involvement of library staff and with or without the direct use of published materials in the library collections.

Sites for Creative Interaction

Libraries can support creative peer communities by providing a site for interaction around intellectual interests and tasks. Such sites can be both physical spaces within the library building and virtual within online spaces hosted and maintained by the library. Locations of either type are most effective when they enhance the visibility of patron intellectual work and foster interaction around common interests. The application of traditional library expertise in the documentation and cataloging of intellectual properties embedded within the spaces make the process of sharing intellectual work with the community less burdensome for patrons.

Examples of physical spaces that facilitate creative interaction include those that anticipate heavy patron interaction such as meeting rooms, conference spaces, project spaces, as well as more generally open spaces such as a library cafe or an information commons (Freeman, 2005). Examples of virtual spaces filling the function include online project spaces, virtual team rooms, co-laboratories, and gaming environments that structure patron interaction around particular goals (Wierzbicki and Nakamori, 2005).

Tools for Creative Interaction

In addition to spaces for interaction among patrons, libraries are well positioned to provide tools to assist such interaction. Tools can be designed and deployed specifically to enhance the peer environment. One class of tools can support the collaborative activities that occur in physical space. These tools include reservation and calendaring systems that allow patrons to reserve shared spaces for particular tasks or projects and maintain a regular set of project meetings. For example, a group of patrons might want to reserve space in which to prepare a report on which they are collaborating. A set of meetings might be scheduled in the library, and notification of the meeting and the project might be sent to all anticipated participants with a more general announcement made available to patrons in general in those cases where there was an interest in soliciting additional participants. Another set of tools might be available to enhance group work process; these might include shared computers as well as shared display

panels and white boards. Tools might also be offered to record and document the progress of the group (Jurewicz and Cutler, 2003).

Virtual online spaces suggest a second class of tools to support collaboration. Such tools include those that support communication such as messaging and message archiving tools, those that allow the sharing of documents and other intellectual properties among the members of a group such as digital drop boxes, and those that allow patrons to make their work more public such as blogs, wikis, and online journal publishing software (Farkas, 2007). Tools that span physical and virtual spaces can be particularly effective in allowing a group of patrons to advance their collaborative work.

Repositories for Creative Production

Libraries can play a key role in supporting creative production by providing a repository for the intellectual properties that result from such patron work. Such a repository is in keeping with the library's role as the institution that collects and preserves intellectual properties. Extending such a service to the creative patron community leverages several strengths of libraries. First, libraries have expertise in collecting and organizing intellectual properties of diverse kinds, and they have encountered and solved many of the problems presented by diverse kinds of materials. Second, libraries have as their mission extending access to such materials with the fewest constraints, and so they are uniquely positioned to help patrons in sharing their work. Third, libraries have experience meeting the challenges connected with the preservation of intellectual properties over long periods of time during which the technologies and means of access are ever changing.

Digital repositories and archives can equip libraries with the means to gather, organize, share, and preserve a wide range of the intellectual properties developed by patron communities. Such repositories can be designed to allow patrons to store their works-in-progress and then move them to permanent archival status when they are complete. The material in digital repositories can be made accessible both locally and globally. Digital repositories can become powerful educational resources for other members of the library community (Natriello, Cocciolo, Hughes, and Chae, 2005). Integrating the repository with the collaboration spaces and tools can provide a seamless learning environment rich in the contemporary intellectual properties of the community of patrons, and further integrating these materials with the traditional collections of the library can create a comprehensive learning experience that spans generations.

The Laboratory Environment

The creation orientation also suggests that members of a library patron community might not only be involved in searching through previously developed knowledge, but also in the active pursuit of new knowledge. Some patrons are likely to be engaged in acts of discovery that involve more active experimentation and creation. The challenge for the library is to provide an environment in which such discovery can take place. The

laboratory environment in libraries facilitates patron learning by reducing the barriers to discovery; it provides an environment where patrons can experiment in their areas of interest with an emphasis on invention and innovation.

The Community of Experimenters

The prospects for discovery and the learning that it implies are enhanced by a community of individuals with shared interests. Libraries can serve as gathering places for patrons who share interests, and patron communities can be as diverse as the realms of knowledge and fields of discovery made accessible by libraries. Such patron communities are associated with libraries in various ways.

For example, when libraries are attached to a larger institution or organization, the patron community of interest is typically defined by that larger entity. So, a library for a medical school will have a patron community with shared interests in discovery at the frontiers of medicine. A library located in a corporation will have a patron community with shared interests stemming from the work of the corporation, and in a large corporation, there may be multiple patron communities of interest representing the diverse interests of the corporate entity. A public library serving a town or city will have a patron community with multiple shared interests, perhaps including but not limited to the operation of local democracy, the development of community institutions, and the growth of commercial entities within the political unit.

Even a library serving a large university may have patron communities with diverse interests who can still share needs for common facilities to support discovery. Thus, the actual laboratory environment that develops within the library may differ depending on patron interests – a laboratory for local democracy may appear quite different from a laboratory for medical discovery. Nonetheless, despite diverse discovery interests, different library laboratory environments may share core characteristics, encompassing experimental space, experimental equipment, and a site of application.

Experimental Space

Libraries can provide space for a variety of experimental activities. Such spaces may be shared academic social spaces, or what some have called third spaces – neither home nor work spaces (Oldenburg, 1999). Such spaces allow individuals to come together in new groupings in the pursuit of particular projects of inquiry, both formal and informal. These highly accessible spaces can be provided to patrons at low cost if sufficient resources already exist, or can be grown and expanded as resources allow.

Library experimental spaces are more effective and useful for the community of patrons when they are robust, reconfigurable, multi-purpose, and when they allow patrons to engage in a wide variety of types of inquiry (McGregor, 2000; Hassanain, 2006). They serve most effectively as third spaces when they foster interactions that cannot take place in home or work settings. Physical spaces within libraries that can host conferences and

meetings, and that can be easily reconfigured to offer a variety of creative interactions among patrons are the most compelling places of discovery (Freeman, 2005).

Libraries also play host to virtual spaces designed to support inquiry and discovery. Often online, these spaces can be configured in various forms to permit groups of patrons to pursue collaborative research using widely available tools. Such tools can include rich collections of materials, communications outlets, applications, and virtual laboratories of various types (Roes, 2001; Zia, 2001). At little or no cost, these facilities reduce the barriers to experimentation and discovery learning for library patrons.

Experimental Equipment

In much the same way that libraries provide spaces that are beyond the reach of individuals and beyond the means of either households or workplaces, they also provide equipment to support inquiry. Such equipment is shared among patrons, much like books and other intellectual properties in the library collections.

Libraries increasingly provide equipment tailored to the research interests of a patron community, as well as more ubiquitous technology such as computers and computer peripherals in laboratory spaces. More advanced installations include visualization labs and geographic information systems (Stoltenberg, 2006), as well as labs to support the creation of diverse media. In addition to sharing equipment, patrons can share the expertise developed in its use. When other library learning environments complement equipment-rich laboratory environments, the library can become an unmatched venue for discovery.

Site of Application

In some cases libraries can also serve as important sites of application for the laboratory work they host. As patron investigators develop new ideas and knowledge, the library community is often in a good position to serve as a test-bed for applying such knowledge. For example, if library patrons pioneer new genres of intellectual property, the library itself can become a first test environment for such materials. If library patrons develop new understandings that require review, the library community itself can engage in the review. While, not all discovery that takes place in the laboratory environment will lend itself to application in the library, it is important not to overlook its potential.

A combination of flexible space and powerful equipment in the laboratory environment, and its proximity to an active community of learners, make the library a unique learning space. As technology becomes more accessible to patrons (in both senses of being ready-at-hand and easy-to-use) the library will grow as a testing ground for new ideas and new solutions to shared problems. Following the assembly of intellectual properties, the laboratory environment will continue to develop as a site of application for new knowledge. Where the education environment supports learning in general, the laboratory environment supports more dynamic methods of discovery.

Another type of learning environment – the atelier environment – can complement the laboratory environment in an especially powerful way. Whereas the laboratory environment is optimally configured to patron use, the atelier environment supports parallel discovery, experimentation, creation, and innovation for library staff. In this environment, the library staff take the lead in modeling the development of new solutions for knowledge work, and are available as experts within the community of learners.

The Atelier Environment

Libraries have always been configured to support knowledge work, and this has often led to the creation of new tools and systems. Operating from a creation orientation, libraries will continue to build support for staff-centered development/production. Under a creation orientation, this support will be distinguished from patron support, and directed toward a wider community of knowledge producers. The atelier learning environment is therefore defined by a heavy emphasis on library staff undertaking innovative and ambitious knowledge projects.

Developing New Tools

With the rapid growth of diverse tools to service the production and organization of knowledge, a new role of innovative production is afforded to library staff. Traditionally, staff roles have been oriented toward patron support and collection building (and maintenance), but the creation orientation suggests new modes of collaboration and production. The atelier model of a master's studio offers a combination of environment and creative mentorship opportunities that is more attuned both to the greater demands of knowledge production and to real-world applications for knowledge tools. This environment also suggests a shrinking of the distinction between staff and patron roles.

As one consequence of the proliferation of new technologies, traditional knowledge tools more frequently give way to new solutions for knowledge management. Perhaps surprisingly, these new solutions are both global and local in origin – existent technologies being adapted to local problems, and local solutions spreading to other communities (Kogut and Metiu, 2001). Thus, as libraries are pulled into the digital age, so must their ambitions for servicing a community of learners. With a wide array of knowledge tools in their arsenal, learners have come to expect great things from the knowledge sector. Masters of these new technologies, programmers and designers who specialize in digital media, have found a new home in libraries. And they are seeking out a more active workspace (Hira, 2007).

Since much of the traditional work in libraries revolves around collecting and organizing information – cumbersome objects such as “serials” and “volumes” – discussions of development trends often focus on the assembly environments. Digitization, automation, and the value of new organizational systems are all highly visible. But parallel to these developments are equally revolutionary changes in the way that knowledge and knowledge tools can be produced within libraries. The cumulative effect of technological

change in libraries is becoming increasingly visible in the arrangement of media and technology experts in relation to the learning that motivates the innovation of new knowledge tools.

Master and Apprentice Roles

Traditionally, an atelier is an artist's studio, a place where students go to learn from master craftsmen. Libraries often have "workshops" – events for conveying and learning key skills. But as the production of knowledge becomes increasingly intertwined with new technology – its hardware and software – it is unlikely that a workshop alone will suffice. Mastery of technology is key to its deployment in knowledge production.

The atelier environment is organized around staff working in creation mode on educational or knowledge-based projects. Additionally, staff also interact with patrons working in a parallel creation mode. The benefit of locating these development efforts in the library is that the intellectual properties of the library and its surrounding community are readily available for deployment in the development process.

Patrons may visit the atelier to work alongside library staff and other patrons. The atelier space, as a porous workshop environment, locates people, materials, and other resources in a powerful proximity where digital media and other technologies can be used to further enhance visibility and communication (Bly, Harrison, and Irwin, 1993; Acker, 1995; Kock, 1999). Project heads, and especially library staff in these roles, are put in a position of disseminating information about atelier culture, the production environment, standards of communication, and collaboration. By outlining these terms, the library sets in motion an environment that functions as a high-level development space. To succeed as co-creators, patrons must be oriented to a collaborative mode of work.

Projects may not always come to fruition or be enhanced by virtue of being incubated in the atelier, but the atelier framework arises from the perceived synergy of juxtaposing projects with a diverse and dynamic community of developers. Multiple viewpoints can arise, feedback processes can be sped up, and expertise can be brought to bear on diverse aspects of a project (Barron, 2000; Lewis, 2006). In contrast to this model, some staff and patrons may require more secluded workspaces, or some work may require a more guarded interchange of ideas – and other learning environments would be better suited for these goals. The virtue of the atelier, therefore, is the range of activity and knowledge that is available, as well as the organization of resources.

A Floorplan for Innovation

Within a library, the atelier environment is typically a flexible, modular production environment. Gone is the division between staff and patrons often signaled by where one is positioned relative to a "service desk." Technology-rich workstations are a key to development efforts, but innovation may also come from the reorganization of existing technologies to function in new and useful ways (Davenport, 1993).

Staff and patrons are invited to work in a setting where there is no exclusive use of workstations and resources. At different times and on different days, a staff member or patron may occupy the same workstation. All members of the atelier share equipment and are responsible for supporting it. The best way to secure resources is continuous communication. Individuals may float between staff and patron roles depending on the particular project and the skills they can contribute. Indeed, in this way the environment mirrors other development environments where specialized skills and creative thinkers are deliberately managed to enhance the potential for innovation (Leonard and Straus, 1997; Karni and Shalev, 2004).

Documentation and Collaboration

Documenting and sharing work is essential in the atelier environment, and a key to developing collaboration. Making work visible, a first principle of documentation, allows for spontaneous communication and other meaningful interactions (e.g., assembling new resources). Additional steps toward thorough documentation include explaining the development process, directing attention to specific problems, and sharing exciting aspects of one's work. Libraries may offer several structured ways of sharing work, including fostering workgroups, group critiques, and weekly seminars.

The relative importance of documentation points to the group nature of development work in the knowledge sector. Practically by definition, knowledge tools are complex objects – both in their creation and implementation. Tools may take months or years to develop, and an equally long (if not longer) time to hand off successfully to a community of users. Fostering successful collaborations among a diverse group of developers, perhaps both on-staff and of the community, takes on a new significance, different than its counterparts in both classrooms and business ventures. In libraries, the twin goals of development and learning must be supported equally well.

To this end, atelier environments are ongoing experiments in social organization. Within the atelier, an emphasis may be given to reviewing collaborations in periodic meetings and conversations with the stakeholders of a project – a project team, an atelier mentor, and an atelier manager. The purpose of such reviews may be to evaluate the strengths and weaknesses of collaborations, and direct staff and patrons toward resources for improving communications and other aspects of creative work. Collaborations may also be subject to ongoing renewal depending on a library's available resources. Librarians, as master craftsmen striving to make the atelier a desirable place for their own creative work, will ultimately set the development agenda. But patrons who gain access to this environment will gain the opportunity to develop a new set of knowledge tools within the institutions that will tend to them now and in the foreseeable future.

Conclusions

Libraries are uniquely positioned to support diverse learning experiences for their patrons. Whether it is by drawing on the intellectual properties in the collection

environment or sharing and preserving new generations of such properties in the social archiving environment, whether it is through absorbing the knowledge displayed in the education environment or discovering new knowledge in the laboratory environment, or whether it is from receiving information in the instructional environment or co-producing such information in the atelier environment, patrons and their learning needs will continue to drive libraries to evolve into more powerful learning organizations. As such they will continue to play a unique role in the constellation of educational organizations available to the citizens of advanced societies.

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