CHAPTER 11

From Desk to Web: Creating Safety Nets in the Online Library

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A colleague recently shared a story with me about an interaction she experienced at the reference desk. The patron was a young college student near tears. She had spent hours trying to find enough research to write a paper for her English Composition class and had finally, after many attempts to figure out the library system, come to the reference desk in defeat. She apologized profusely to my colleague, saying that she felt stupid for not being able to find what she needed herself, and that maybe she should not be in school at all.

My colleague did what most of us would do in that situation—rescue the student from distress, restore her sanity, and help renew her faith in the system and herself so that she might come back in the future and try again. The student got the assistance she needed to locate the research that would help her write the paper. That is all well and good, but there is much more potential in this interaction than the application of what is, in the basest sense, merely a band-aid.

Reference librarians have an enormous amount of potential to have a much deeper and broader impact. We encounter a legion of library users through our physical and virtual libraries. These encounters afford us invaluable information that when mined, analyzed, and acted upon can transform the experiences of patrons (like our poor English Composition student) into highly successful, positive, and productive ones.

This chapter is a call to reference and instruction librarians to extend our reach beyond one-to-one encounters and employ our expertise in three ways:

1. To proactively identify and analyze the points in our virtual and physical libraries where users stumble and often give up on the library.
2. To create "safety nets" or support structures at those fail points that gently catch the users and help them on their way.
3. To design more formalized and course integrated e-learning modules that prepare students to navigate and successfully use online resources and services.

Idea of Fail Points

Central to the three roles proposed above is the idea of fail points. To introduce this idea, think back to our English Composition student at the beginning of the chapter. She most likely started her research feeling hopeful. She may have had some good experiences researching papers in the more tightly controlled and highly simplified online environment of her high school media center. Perhaps her past experiences of finding information quickly and successfully in *Google* have helped solidify the notion that research is quick and easy; therefore, the student starts her research with just days to spare before her big paper is due.

It is highly possible, given the density of options on the University of Minnesota Libraries' homepage, that the student feels overwhelmed and panicked at first, but quickly sees the header "Articles and More" and knows to focus on this area of the Web site. However, the links under this header do not make sense to her. What does "Select an Index to Search" mean? She is looking for a text box on the page to search for articles but only sees a search box marked "Books and More." Well, maybe the "more" means articles, so she types in her topic, clicks, and unknowingly encounters her first fail point in the system. Minutes of confusion follow. What is she looking at? What are all of those things on that list? She clicks on some of them, maybe even thinks that some are articles, and tries to figure out how to print them, but there is no print option. She finds a call number, takes that number into the stacks, gets lost because she does not understand how call numbers are arranged, and gives up on finding this item. The student has reached yet another fail point. She goes back to the computer again but this time tries "Select an Index to Search." What she finds on the next page is immediately perplexing. What does an alphabetical list mean? Should she click on the first letter of her topic? She clicks, but the list she is presented with does not make sense. "These aren't articles! This isn't what I want!" With that, the student meets her third fail point.

The story goes on and on. The student tries a different path, gets confused, and goes back. How many times does she repeat this process until she discovers the right path to find an article, finds a person to help her, or gives up entirely? "*Google* is just fine," she declares, and hopes her instructor does not notice the lack of library sources. Giving up entirely, as this student does, represents the "crash and burn" in the illustration below.

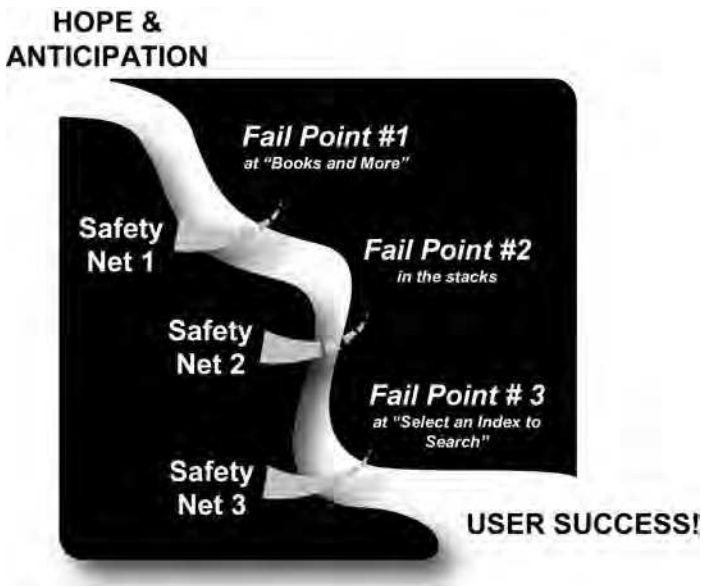
Illustration 1 . The Research Process (The Sad Story)

What this student has encountered during her research process is a sequence of fail points—places in the Web site (and/or physical library) that confound, confuse, and puzzle. They are the points at which the user is faced with a dilemma: possibly waste more time trying to figure the system out, search for help on the system, find a friend, colleague, or library employee to help, or—perhaps finally—just give up and leave the library entirely. We likely have no true idea of the number of potential library patrons who do just that—become so disgusted that they discard the library as their source of information and research and go elsewhere.

My guess from having conducted usability testing for over ten years is that this group is sizeable and growing. They do not come to us at our reference desks, they do not e-mail or IM us. Too frequently they have other places to go.

Traditionally we have addressed this group's research challenges by teaching them through in-person or online training. Today, it is even more important to address fail points directly by doing everything we can to eliminate them and to build safety nets so that the fall is minimal, and at worst, a slight annoyance. In this next illustration, the same research story is illustrated, but this time, with safety nets built in.

Illustration 2. The Research Process (The Not-So-Sad Story)



Ferreting Out Fail Points and Building in Safety Nets

The first step in building safety nets is to identify the fail points that necessitate them. Reference librarians are in a unique position to find fail points that patrons encounter in the virtual and physical library. Years of experience

answering reference and instructional questions provide librarians with reams of analyzable data on the library's fail points. We need to reflect on the most common research-related questions that reference and instruction librarians get. For example:

- How do I find articles on global warming?
- Does the library own this book that I need to read?

These kinds of questions and the subsequent reference interview begin to reveal the many fail points patrons encounter in the virtual and physical library. There are several levels at which a fail point can occur. I will focus on three levels of fail points; the basic Web usability level, the research process level, and the user's mental models level. The table below correlates the two questions above with these three levels of fail points.

Table 1. Reference Questions Mapped to Fail Points

Question	Fail Points
"How do I find articles on global warming?"	Fail Points at Basic Web Usability Level: "I expect to find something that says "articles" on the homepage. The words "index" or "database" or "periodicals" do not mean anything to me." Fail Points at Research Process Level: "I can't get from point A to B to C. Where are the bridges?" Fail Points at the Mental Model level: "I expect to be able to type my topic in any search box and get articles (whether that be the catalog, in the library's site search box, or in the e-journals list). Is this thing broken?
Does the library own this book that I need to read?	Fail Points at Basic Web Usability Level: "I expect to find something that says 'books' on this website. The words 'catalog' or 'MNCAT' [the name of the U of MN catalog] do not mean anything to me and I don't see anywhere on this page to go." Fail Points at Research Process Level: "I can't get from point A to B and actually figure out where this book is. The computer says it's here, but I don't know where to go to find it." Fail Points at the Mental Model Level: "I expect that the library would be set-up like the bookstore and I'd just read the signs, go to the right section, and look alphabetically for the author. Why is this so difficult?"

How do we help users overcome these fail points? The first step is to identify these problem areas. There are three main ways to complete this step:

1. Utilize the knowledge of your reference and instruction librarians. They have a richness of experience in guiding people through fail points. Introduce this notion, and ask them to think about questions they frequently receive at the desk and the fail points that those questions indicate. Encourage the librarians to focus on the fail points at all three levels. Follow up with a staff survey or focus group to gather these thoughts. Next, group and rank the fail points in order of frequency so that those with the biggest impact get addressed first.
2. Inventory and analyze the questions received in digital reference and/or in-person reference if that data is available. For example, with over five thousand questions received digitally a year, the University of Minnesota Twin Cities has a rich and varied amount of potential fail points to mine. Minnesota colleagues Houslon, McCready, and Pfahl identified that the category of chat reference questions called "How to find" reflected twenty-seven percent of the total questions received. An analysis of the questions in this category alone has led to the identification of multiple fail points (Houlson, McCready, and Pfahl 2006, 19-39).
3. Mine data from usability tests in which you study where users and systems are failing. Sometimes these problems can be fixed on a structural level, but at other times they are out of the library's control. Although this mining will elicit a wealth of fail points at the basic usability level (Kupersmith 2007, 1), also look for them at the research process and mental models levels.

Given the volume of literature published on library usability in the last ten years, it appears that librarians are getting better at addressing the simpler fail points, such as those created by library terminology or poor Web site design. Fail points at the research process and mental model levels, however, are much more complex and challenging and can not be easily fixed or addressed with a better user interface; reference and instruction librarians are in the best position to provide leadership and expertise in order to address them. The rest of this chapter will address possible Electronic Performance Support System solutions for these types of fail points.

Addressing Research and Mental Model Level Fail Points: Electronic (Library) Performance Support Systems

A key way to help library users successfully navigate through complex systems and processes is by developing Electronic Performance Support Systems (EPSS). EPSSs are, in essence, "safety nets" that can be embedded into other applications to provide support or guidance. They may include tutorials, expert systems, or hyperlinks to reference materials. In the library context, these systems could be interwoven throughout the online library. EPS Systems might appear in the catalog, on the front-end of an SFX menu, or as a stand-alone application that communicates with a database unbeknownst to the student. Key components of EPS Systems might be "unlocked" and reused from existing e-learning tutorials.

Unlocking content from an existing tutorial and repurposing it for use in EPS Systems may be a viable way for libraries to populate EPS Systems that also provides a way for libraries to stretch their e-learning efforts.

An example of commonly used EPSS in the non-library world is tax preparation software. This software anticipates where the tax preparer is likely to encounter fail points and provides safety nets. The tax preparer is alerted to a myriad of deductibles in easy to understand language, given access to interpretations of the tax code, taken through the process, and then given a final product at the end. The tax preparer cannot fail with this system. These EPS Systems do not simulate paper tax forms, nor do they provide tutorials on tax forms. Instead, the software helps you *successfully* fill out your form by taking your metaphorical hand and walking you through the process step-by-step. You learn as you do your task.

Google also understands the importance of preventing user failure. If you misspell something, *Google* provides alternative likely spellings that can avert failure and correct the error. That is a great safety net. *Amazon* is another good example. When you look for a book in *Amazon* but cannot find it, the system suggests two or more books that you did not know you wanted but which satisfy your need. When you end up buying them instead, the safety net becomes a profitable one to *Amazon*.

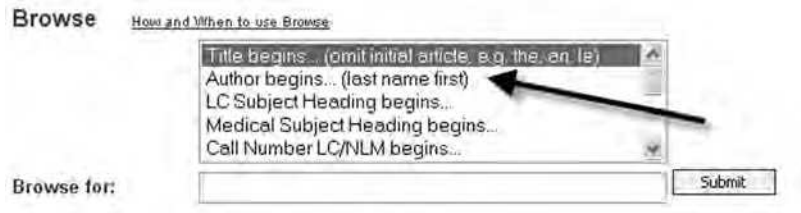
As with tax software, *Google*, and *Amazon*, we need to build performance support into our library systems in such a way that users cannot fail. Many can be built easily, inexpensively, and with minimal IT assistance. The next section focuses on these small-scale Library Performance Support Systems.

Small-scale Library Performance Support Systems

There are numerous examples of small-scale LPS Systems that pull together relatively basic safety nets that range from simple graphics and terminology to light-weight programming solutions. These safety nets can often be identified during usability evaluations.

The library catalog is a common place of fail points for our users. For example, a simple author search can be a trying experience for users who do not know to enter the author's last name first. The EPSS safety net in this case is the addition of three little words—"last name first"—at the point where the user will see them in the search box. There are numerous other fail points that might be addressed by threading these simple safety nets throughout the catalog to create an LPS "system" that helps the user to search more successfully.

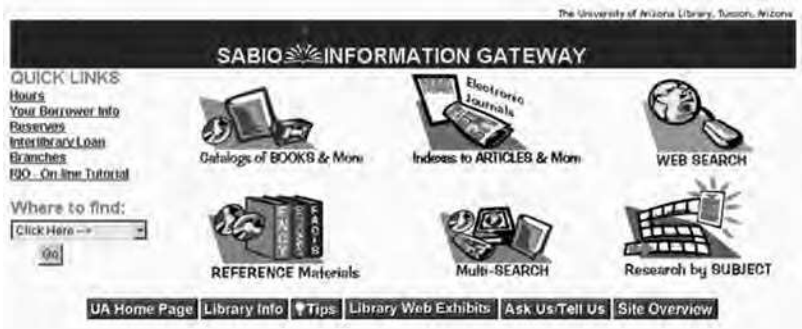
Illustration 3 . Catalog Safety Net



The University of Minnesota is experimenting with slightly more advanced components of a catalog LPSS that does not necessitate a change in users' search behavior. When a user types "The" at the beginning of a known title, for example, an invisible program strips the search inquiry of the "the" before the search is executed. The user does not know that the search was ever modified. Likewise, an author search is first executed in the order the user enters it, and then with these search terms reversed.

There are countless other instances of basic safety nets that can be pulled together to create small-scale LPS Systems. For example, during usability testing of the library's homepage at the University of Arizona more than a decade ago, we realized that students did not know what "reference sources" meant and why they would choose them. Likewise, they did not realize that the catalog listed videos and other materials, or that indexes included newspapers, despite the fact that this information was available on the Web site. To correct this disconnect we changed the text-based information to small graphics. Testing proved that these graphics were an excellent safety net for our primary audience of undergraduates.

Illustration 4 . User Interface Safety Net



Large-scale Library Performance Support Systems

Large-scale Library Performance Support Systems can be created to act like massive safety nets with smaller Performance Supports embedded within. The tax software discussed earlier is an example. Embedded in this software are features which serve as smaller safety nets (for example, a series of questions that pursue which donations you have made that might be tax deductible).

One example of a large-scale LPSS is the University of Minnesota Libraries' Full-Text Finder. The Full-Text Finder was developed as the result of a process level fail point in which users had difficulty determining if the Libraries had an article that they needed in full-text. The system addressed a mental model fail point at which users did not understand that journal articles can be included in multiple indexes, some with the full-text and some without. Reference and instruction librarians had long noted this fail point through their experiences with confused and frustrated students. We designed the Full-Text Finder to divert users from

taking a path where they might encounter multiple fail points. Instead, the FTF directs them towards a tool specifically developed to be a large scale safety net that saves them from a major research and mental model process level fail point.

Illustration 5 . Full Text Finder Initial Box on the University of Minnesota's Undergraduate Virtual Library

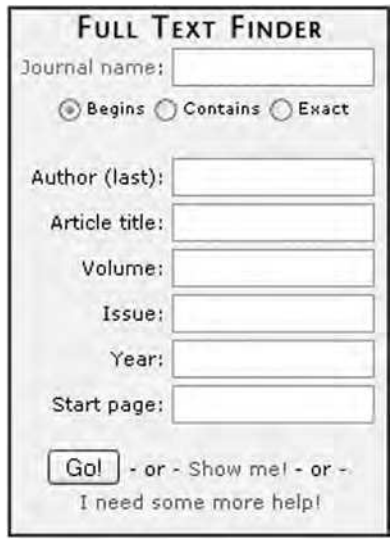
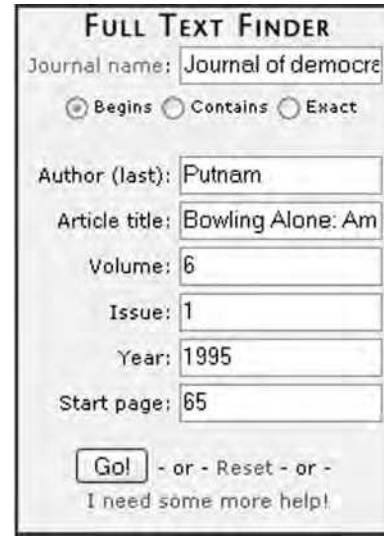


Illustration 6 . Full Text Finder—"Show Me" Interface

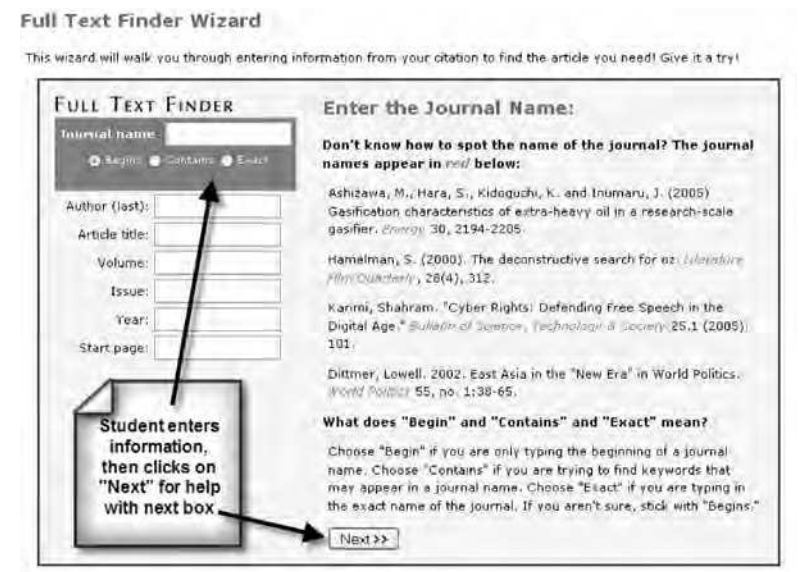


The Full-Text Finder is featured at the University of Minnesota's Undergraduate Virtual Library (http://www.lib.umn.edu/undergrad/) and appears like this:

An LPSS such as this, however, may also be rife with other potential fail points: Which part of the citation is the article title? What is the name of the journal? Where is the volume number? What if I do not have an issue number? Clearly, citation analysis is a potential fail point. We therefore built multiple safety nets into the Full-Text Finder. Have you hit a fail point because you do not know how to interpret your citation? Click on "Show me" to see an example of the form filled out. Are you still confused? Click on "I need some more help" to go through the process step-by-step (see next illustration). Likewise, if you fill out the form and hit a fail point, the Full-Text Finder sends you into the Full Text Wizard, a step-by-step tool that provides you with an opportunity to try again, this time with examples and point-of-need help.

The Full-Text Finder, therefore, becomes an opportunity to teach students aspects of a citation by giving them the feedback and instruction that they need to correct their own errors. They are motivated to learn because they really are looking for a specific full-text item—not because we have created an artificial learning experience for them (as library tutorials do).

Illustration 7 . Full Text Finder Wizard



There are many opportunities to wrap instruction around real tasks as the Full Text Finder does. The University of Minnesota's Assignment Calculator is a PSS that guides students step-by-step through their paper writing and research processes. Students enter the date that their papers are due, and the calculator returns specific steps that will help the student to successfully complete the paper on time. The student can receive timed reminders of each step via e-mail. She uses the tool to get just enough help while completing each step. (See illustration 8.) There is also a similar tool designed for the dissertation writing process: the Dissertation Calculator. The Assignment Calculator is accessible from http://www.lib.umn.edu/undergrad/ and the Dissertation Calculator is at http://www.lib.umn.edu/help/disscalc.

Workflow Performance Support Systems

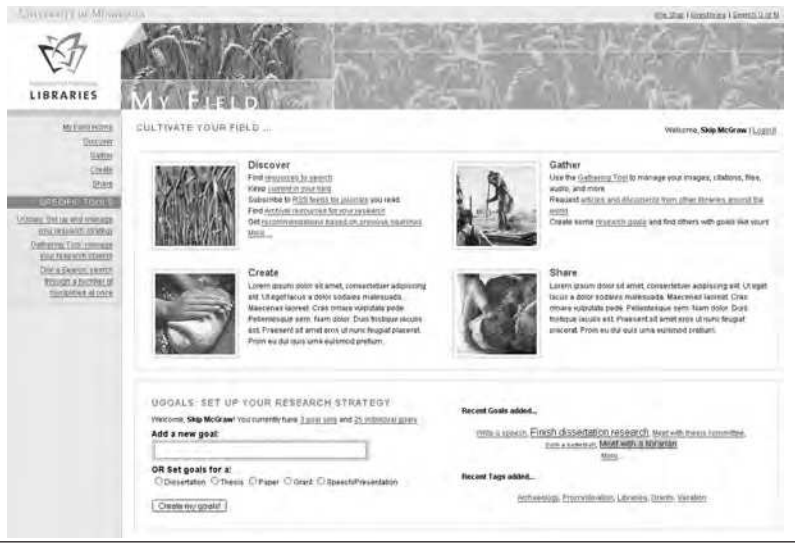
Although building small- and large-scale Library Performance Support Systems is an excellent investment, ultimately we need to find ways to reach our students and faculty where they are working and present Library Performance Support inside that workflow. Lorcan Dempsey, of OCLC, has spent a good deal of time defining this "in the flow" concept for libraries. Using his model, we adapt to users' current workflows and help them to do their work there, instead of forcing them to temporarily engage in library spaces disconnected from their workflows (Dempsey 2006). A student's natural workflow might be in their course site, the writing center's site, or in other systems that we build to help them get their work done. A library presence in student workflow reflects the ultimate Library Performance Support System.

Illustration 8. The Assignment Calculator

There are plenty of opportunities for LPSS that are "in the flow" of our users and can help them actually get their work done (just as the TaxAct program does for taxpayers). What if the Assignment Calculator, for example, was a full-service tool in which students wrote their papers and did their research? It could bring together word processing capabilities, citation software, and metasearch functionality. Help from instructors, librarians, writing consultants, or fellow students could be provided from within the Assignment Calculator at the point and level of need.

An example of this kind of LPSS that is waiting funding for further development is another Minnesota tool currently called "My Field." (See illustration 9.) My Field breaks down the researcher's process into four areas as illustrated in this screen shot. The LPSS then provides researchers with tools that support each of these areas; discovery research, gathering research, creating new

Illustration 9 . My Field



works, and sharing them with others. The Libraries will embed library help, instruction, and support through and around these areas and tools, creating various levels of safety nets throughout.

Leveraging Tutorial Content for Library Performance Support Systems

There is still an important educational role for formal e-learning tutorials in libraries despite the potency of LPS Systems to address fail points. A tutorial (or classroom situation), for example, is better suited to address deep-seated mental models of the research process, such as:

- The user who has a Mental Model of research as a quick process where *Google* may be used to find Web pages supporting his or her argument.
- The user who has a Mental Model of the library as a free bookstore similar to Borders or Barnes & Noble.

Libraries, however, should not have to fully staff and fund two separate efforts—one to build online tutorials and another to build Library Performance Support Systems. Instead, online tutorials should be built so that content can be repurposed into Library Performance Support Systems. In this way the time and resources invested in building both online tutorials and LPSS can be more wisely leveraged.

There are three basic building blocks for designing online tutorial content that can be repurposed into Library Performance Support Systems. The first building block concerns learning objects.

Learning Objects

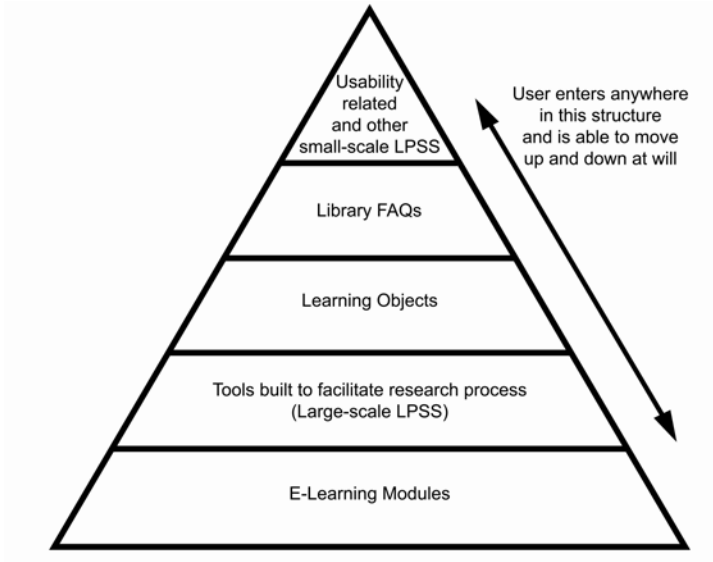
Learning objects are discrete learning tools that can be mixed-and-matched in

various learning venues and contribute to the development of Library Performance Support Systems. Examples include a streaming video that demonstrates a keyword search, or short exercises that provide users with feedback on their ability to identify the key words in a sample research topic. Learning objects can also be as low-tech as a handout with screen captures and instructions.

Learning objects can be repurposed and delivered to multiple targets within the library site as well as into external systems (such as course or department pages and writing center tools and support). Learning objects can also be grouped to provide traditional e-learning in the form of tutorials, but unbundle these learning objects and *voilá*, you have bite-sized content for embedding into both small- and large-scale LPSS.

Once engaged in a learning object, the user should be given the flexibility to complete his task (e.g. find a call number he actually needs) or to move into a tutorial module with more robust instruction. In order to accomplish this kind of mobility, the library's performance support needs to be scaffolded so that educational components become paths into more—or less—content.

Illustration 10. Library's Performance Support Pyramid



This may sound daunting. How can we really make it work? You can imagine multiple small-scale and large-scale performance support systems with pages and pages of supporting content. Every time the library changes (or eliminates) the OPAC or key databases, for example, we would have to modify multiple pages of help, instruction, and support that refer to the OPAC or database. What librarians need to successfully manage learning objects are special databases

that hold these learning objects. This leads to the second building block for creating online tutorials that also support LPSS—Learning Content Management Systems.

Learning Content Management Systems

Learning Content Management Systems are like storage systems for learning objects. Instead of having an interactive exercise on call number order located in various places and servers across the library system, one interactive product resides in the Learning Content Management System and is delivered to multiple online targets. Many libraries have similarly employed library content databases that drive link and descriptions to licensed databases to various library Web pages (see the LibData model at http://libdata.sourceforge.net/ for an example). A library tutorial would need a similar kind of content management system that would drive learning objects to various LPSS targets.

Authoring Tools

The third building block for creating online tutorials that support LPS Systems revolves around authoring tools that assist librarians in creating interactive learning objects. Full-scale authoring tools such as Trivantis' *Lectora* provide plug-and-play ability to create quizzes, mix-and-match interactives, and more. Other, more specific, authoring tools (such as *Camtasia* and *Captivate*) assist the developer in creating screencasts, building interactive exercises (as with *Flash*), creating quizzes (as with *Survey Monkey*), or designing games (as with *Game Show Presenter*) and graphics (as with *Adobe Illustrator*).

These three building blocks are key for repurposing tutorial content into LPS Systems. In addition to these building blocks there are several other layers of capability that could also be added:

- Capacity for integrating individual components (or "reusable learning objects") into other venues (such as *WebCT*, Assignment Calculators, e-portfolios, FAQs, and various Web sites including those outside the library). This would allow libraries to more easily provide instruction, support, and quick tips wherever users might need it.
- Capacity to track learners' use of learning objects wherever they encounter them and provide instructor/faculty reports.
- Capacity to use and integrate learning objects created from multiple authoring tools (e.g. *Camtasia*, *Illustrator*, and *Flash*).
- Capacity to customize authoring so that various librarians can create unique modules for plug-and-play use and integrate them into pathfinders, academic departmental Web sites, etc.

By incorporating these building blocks and some of the above capacities into new tutorial development, reference and instruction librarians can avoid the duplication and unwieldiness of having the same content replicated at numerous fail points. They can also create more robust LPS Systems that interrelate seamlessly with their online tutorials.

Conclusion

The effort to identify fail points and to design effective Library Performance Support Systems that address them can be a daunting enterprise. However, libraries should not continue to treat large-scale, glaring fail points with mere "band-aids." Library users rely more and more on the virtual library, reference desk traffic is slowing, and these trends may lead to a reduction in hiring. As the Web continues to develop, the future of the reference librarian may become even more marginal to the success of our current, and potential, library users.

If librarians want to continue to provide access to quality materials and to give a high-level of assistance at the reference desk, they also need to ensure that fail points are proactively identified and that problems are addressed as much as possible at their source. This proactive approach amounts to building a robust, effective, and far-reaching "virtual reference desk" made up of the kinds of safety nets and support structures discussed in this chapter. By expanding the role of the reference librarian in this way, we ensure both the survival of the position and its centrality to the future success of our users.

Sources for Additional Research

Brown, L. A. 1996. *Designing and developing electronic performance support systems.* Boston: Digital Press.

There are several books on building Performance Support Systems. This one discusses a commonly used model for instructional design that includes these steps: Define, Design, Develop, and Deliver.

Carliner, S. 2002. Considerations for designing electronic performance support systems. *Technical Communication* 49 (4): 411.

This article is written for practitioners in the technical communications field and is therefore very applicable to those developing Library Performance Support Systems. Carliner differentiates between high-level performance support design and what he calls detailed design, and offers practical advice at each design step.

Clark, R. C. 1998. Recycling knowledge with learning objects. *Training & Development* 52 (10): 60-63.

Clark clearly explains learning objects and the ways they can, and should, be repurposed. She also discusses the importance of organizing and tagging these objects.

Gery, G. 1991. *Electronic performance support systems: How and why to remake the workplace through the strategic application of technology.* Boston: Weingarten Publications.

This is the book that introduced the Performance Support System concept. The reality may not have matched up to this ideal, but Gery's book is still worth a read.

Maughan, G. R. 2005. Electronic performance support systems and technological literacy. *Journal of Technology Studies* 31 (1): 49-56.

This article is a compelling argument to use Performance Support Systems to facilitate use of challenging technologies. It includes a section on embedding performance support in the user's workflow.

Van Schaik, P., P. Barker, and O. Famakinwa. 2006. Potential roles for performance support tools within library systems. *Electronic Library* 24 (3): 347-365.

This article from the UK describes a stand-alone Performance Support System designed to help students use the library classification system in order to locate the books that they need. A study on its effectiveness concluded that the students found the system useful, but that changes and improvements were recommended.

Van Schaik, P., R. Pearson, and P. Barker. (2002). Designing electronic performance support systems to facilitate learning. *Innovations in Education & Teaching International* 39 (4): 289-306.

This article describes a stand-alone Performance Support System designed to help psychology students use SPSS, a statistical software program. The section on integrating help is of particular interest to librarians.

Works Cited

Dempsey, L. 2006. The (digital) library environment: Ten years after. *Ariadne* 46. http://www.ariadne.ac.uk/issue46/dempsey/.

Houlson, V., K. McCready, and C. Steinberg Pfahl. 2006. A Window into our patron's needs: Analyzing data from chat transcripts. *Internet Reference Services Quarterly* 11 (4): 19-39.

Kupersmith, J. Library terms that users understand. http://www.jkup.net/terms.html.