

User education in the electronic age

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Introduction

Hardly a newspaper is published or news report aired that does not proclaim the wonders of the electronic or information age. And even though we are in the midst of the information age, it did not arrive everywhere simultaneously. Some of us eased into it and some of us awoke, like Rip Van Winkle, to a new time that we were not totally prepared for.

It's hard to remember exactly when this new era started, but in some ways it has been like a long-planned holiday. First, like reading a guide book for an exotic trip, we began preparing for the journey by reading about this land of electronic information long before we ventured here. Actually we've been reading about it for nearly 30 years. When we finally entered the enchanted province we were simultaneously impressed and disappointed. Our guide books predicted many things, some of which have been fulfilled, some that have yet to be realized, and still others that were simply false prophesies. For example, the long-awaited "virtual library", a library without walls and without a circulating collection, is not yet here. We still use physical structures to house information and that information is both digital and non-digital. We now know any change that will replace libraries as we know them must be a gradual one.

The guiding concept of the electronic library has moved beyond library automation to encompass profound transformation in scholarly communication, publishing and research.¹ This transformation has also transformed the workflow, required new physical arrangements within the library and even altered the role of the instructional librarian.

BI History

A review of where we've been with user education, indicates that during the 1970's the focus of BI sessions was on teaching procedural skills: the use of the card catalog, how to use paper indexes such as Reader's Guide and Humanities Index, and how to operate a microform reader. In other words, user education focused on the use of tools. The 80's saw a shift that included conceptual skills in the instructional content. Librarians began to incorporate into the learning sessions such concepts as selecting and narrowing a topic, information structure, evaluating resources, reading for understanding, and critical thinking. We might differentiate between these two types of instruction by stating that concept-based training places an emphasis on "how" a

¹ Nancy Nelson, "Electronic Libraries: Vision and Implementation," in Reference and Information Services: A Reader for the Nineties CMetuchen NJ: Scarecrow Press, 1991), 152.

system works whereas procedural instruction emphasizes the steps to be followed when working with a system.²

As electronic resources became more common in the 80s, BI librarians began to rethink their instructional role. In a 1987 book, Bibliographic Instruction: the Second Generation, the role of BI in relation to academic settings both past and future was considered. The authors predicted that the future role of BI librarians would change radically because the libraries would be totally changed due to technological advances.³ Two years later, Lois Pausch and Mary Pagliero Popp asked 50 librarians to identify the key issues that will face librarians over the next decade. It is no surprise that technology was revealed as the major concern. They commented that technology adds to the mystery and complexities and so thus adding to library anxiety of the users. It also adds to already heavy work load of librarians by requiring them to understand and anticipate trends in technology, to know what is available and how to use it, and to be able to guide and instruct others.⁴

The technological revolution of the 90's definitely changed the way in which information is organized, stored and retrieved. But contrary to what the soothsayers have forecast, it has not been cost-effective nor has it has lightened the workload for the library staff. Actually there is evidence that online sources make for more questions from the user, more needed instruction from the librarian and a reference desk that is busier.⁵ It has changed the way in which a user goes about doing research. Because users do need to know what keys to press in order to enter a search or to print their findings, many believe that this means librarians must teach these skills. Cerise Oberman summarizes the dilemma this way "...how can we teach concepts when our students can't find the PF1 key? As gateways to information resources have become more sophisticated, librarians are focusing on teaching effective methods for using an interface. In a few short years, we have managed almost a full swing of the pendulum back to teaching tools—only now the tools are electronic ones, which ironically, change more quickly than print tools ever did. We risk losing sight of the concept of information access, retrieval and evaluation, that will serve our users long after a particular interface ceases to exist."⁶

Procedural vs concept learning

Librarians from the University of California, Santa Barbara, refer to procedural training as explaining how to get from point A to point B. They agree that the proliferation of full text scholarly resources on the Web and in other electronic forms

² Brian Nielson and Betsy Baker, "Educating the Online Catalog User: A Model Evaluation Study," Library Trends 35(1987):576.

³ Bibliographic Instruction: the Second Generation, (Littleton, CO: Libraries Unlimited, 1987)

⁴ Lois Pausch and Mary Pagliero Popp, "Bridges to the Future: A Changing Focus for Bibliographic Instruction and Information Literacy," in Building on the First Century: Proceedings of the Fifth National Conference of the Association of College and Research Libraries (Chicago: ACRL, 1989) 166.

⁵ Carol Tenopir, "The Impact of Electronic Reference on Reference Librarians," Online 16(May 1992):54-60.

⁶ Cerise Oberman, "Library Instruction: Concepts & Pedagogy in the Electronic Environment," RQ 35, (1996): 320.

is changing the way we and the teaching faculty conceive of library instruction. Teaching faculty (and occasionally students) have the subject knowledge, but often no real understanding of how full text databases are searchable. For librarians, knowing something of the subject matter is very important, but being able to use the machinery efficiently is also of the utmost importance.

Stephen Weiss offers another viewpoint. Like Oberman, he contends that librarians have always instructed patrons in the use of bibliographic tools. Only the format has changed: yesterday's tools were made of paper, today they are electronic. He writes: "Recent articles on bibliographic instruction... focus on training users on the techniques necessary to effectively search electronic databases, e.g. using Boolean operators, front-end software, keyword and subject searching, print commands, and even basic typing skills. While this focus on specific tasks is necessary, it fails to address the more fundamental research skills needed in today's evolving information environment."⁷ Regardless of format, he sees the literature search as being the four same steps:

1. state the information need
2. identify the terminology
3. identify alternate terminology
4. formulate the search question.⁸

Blandy and Libuth, in an article titled "Electronic Scholarship," elaborate more on the research process and list these four layers of learning in the electronic environment:

1. The first they call the inquiry layer. Here a student identifies the information need, conceptualizes questions, develops the vocabulary of the search, and individualizes the inquiry or re-articulates the inquiry based on the available information. In other words, this layer is Weiss's 4 step process to a literature search.
2. The second layer is the library layer. The student will describe the information need, recognize information classification and format distinctions, and navigate the environment from citation to access.
3. The third layer is the new layer created by electronic resources. The researcher must be able to translate the question into a search structure and apply the search structure to a particular database. To do this he must have multiple computer literacies, an understanding of the use of hardware and peripherals, and the ability to decode electronic text.
4. The final layer is the scholarly layer, where the process of transforming data into information occurs.

These layers of learning incorporate the procedural as well as the conceptual. However, just because technology has necessitated an additional layer in the learning process does not necessarily mean that more time will be allotted for instruction. We might ask, "if technology skills are taught, what is not taught?" Often the teaching of concepts suffers at the expense of this new dimension. Blandy & Libuth believe that

⁷ Stephen C. Weiss, "The Impact of Electronic Tools on the Four-Step Approach to Library Research,"

Research Strategies 12(1994): 243-244.

⁸ Weiss, 244.

librarians must out of necessity concentrate their limited class time on the 2 central layers, the library and the technology layer. However, they also state that it is within the first and last layers that students often have the most difficulty. We can only hope the class instructor will concentrate on these layers by teaching subject matter, building vocabulary, and guiding the student through the process of transforming the gathered data into a research product.

The need for BI in the electronic age

Librarians instinctively believe that providing user education is a good and noble goal. However, in 1990, Brian Kahin predicted that automation would lead to "an increase in the sophistication of library users as a direct result of their ability to download and manipulate data in the microcomputer environment"⁹ A product information sheet for Info Trac asks "Are you seeing undergraduates who aren't quite sure what or how to search? No problem. The intuitive Subject Guide in Easy Trac helps users mentally navigate through a search and quickly target relevant articles."

Librarians, from their own experience can dispute these claims and verify that the need for training in the use of electronic resources is a reality. Rhonda Hunter, by examining the OPACs transaction log, found that students had a staggering 54.2 failure rate with their searches. She determined their problems to be lack of skills in operating the system, incorrect subject headings when doing subject searches, typographical errors, and attempts to use a database that was not appropriate for the subject.¹⁰

Other studies have also shown that students lack the ability to match their information needs to the correct electronic database. In a study at the University of Illinois, only 22 percent of database searches conducted by undergraduates were deemed appropriately matched to the research topic. A study conducted on several of Kent's regional campuses, including the East Liverpool campus, corroborates this finding. Only 23.7 of the respondents identified Humanities Index or MLA International as the appropriate sources to find articles on the playwright Arthur Miller, 42 percent identified Reader's Guide as a source for scholarly articles, while another 30.6 percent identified the online catalog. This study also revealed the dismal abilities of students in using Boolean operators. 42.9 percent of those surveyed incorrectly answered that the use of "and" in a search on "love and death" directs the computer to look for the words "love and death" appearing together, side-by-side in a record.

It is reassuring to know that users do believe that instruction is beneficial. One survey showed that over 70 percent of the students surveyed thought that BI made using the library easier.¹¹ Another survey questioned the users of the electronic databases Eric and PyscLit. Here 99 trained users and 158 untrained users were asked their level of satisfaction with search results. 67.7 per cent of the users who had received formal

⁹Nelson, 153.

⁰ Rhonda Hunter, "Success and Failures of Patrons Searching the Online Catalog at a Large Academic Library: a Transaction Log Analysis" RO_ 30 (1991):401.

¹ Kim Cook, Lilith Kunkel, and Susan Weaver, "Cooperative Learning in Bibliographic Instruction," Research Strategies 13(1995):17-25.

instruction in the use of the databases reported that they were completely satisfied, in contrast to 47.4 per cent of untrained or self-taught users.¹²

Tips for teaching procedural concepts

Now that we have made a case for the need for user education and we have emphasized the importance of balancing conceptual and procedural skills, we can review methods that librarians have found to be effective means of teaching electronic resources. Here are a few tips that I have gleaned from the literature or have learned from my own experience:

- Hands-on training is the preferred method. Although not always practical, hands-on training has proven to be the most effective method for achieving student retention of skills. A second choice would be the live demonstration. In this scenario though, not only are students denied participation, but they do not even "see" the keystrokes that are being made. They are less likely to remember the basic tasks of a particular database.
- Use collaborative or cooperative learning techniques whenever appropriate. Research shows that cooperative learning is the preferred learning style of students. It also reduces the anxiety associated with the use of computers and with library use in general. In my training sessions, I have students work in teams of 2 or 3; one student might take notes or use the hand-out, while another student uses the keyboard. At some point, I ask them to switch roles. Here's an example of a learning exercise that has been used on several of Kent's Regional Campuses: The goal was to teach students how to locate literary criticism using the OP AC. Following a 10 minute lecture on the topic, students worked in groups of 3. Each group used the online catalog to locate criticism on 3 different authors. One student served as keyboard operator, the second recorded their findings, the third retrieved a work of literary criticism from the library shelves. Students changed roles for subsequent searches. The result was a list of literary critiques that were judged by the students to be useful. Although teaching the rudiments of OP AC searching, the procedure also incorporated concept learning. The exercise was based on the pedagogy of Johnson and Johnson who have published widely on the topic of cooperative learning as a teaching method.¹³
- Narrow the scope. Librarians at Rutgers University found that participants and presenters alike recommended that electronic resource training contain less information and focus on sources that would be relevant to the research.¹⁴ Other librarians corroborate their finding and favor a subject-specific, targeted, and focused approach¹⁵

¹² Grace Jackson-Brown and Gwen Pershing, "Comparisons of Graduate and undergraduate End-Users of ERIC and PsycLit on CD-ROM," in Conference Proceedings: ACRL, Sixth National Conference (Chicago: ACRL, 1992) 166-167.

¹³ Cook, 17-25.

¹⁴ Jackie Mardikian, "Targeted BI: Teaching Electronic Resources in the Biomedical Sciences," Research Strategies 14 (1996): 45.

¹⁵ Connie Ury, "A Tiered Approach to BI: The MEDAL Program," Research Strategies, 12(1994):

- Use handouts for re-enforcement. Whenever I am presenting a BI session, I ask "Are there any questions so far?" And it is the very rare instance when someone raises his or her hand. It is difficult for the student to anticipate problems they might have when they are searching for information in a less artificial setting. I always respond by telling them "Your questions will come when you begin your own research and you'll find many of the answers in the hand-out I am giving you." I also encourage them to go to the information desk for additional assistance. The hand-out will serve as a reminder of the key searching points which were covered in the presentation.
- The Electronic Hand-out. An interesting aspect of modern bibliographic instruction is the impact that automation has had on the media used by academic librarians to teach library skills.¹⁶ The electronic era has bombarded us with media choices: overhead projectors to enhance lectures, walk-mans for individual self-paced tours, video-tapes to illustrate library departments and services, and projection devices to project computer screens to the large screen. And now the Web has created yet another teaching aid, the course-integrated web page. Paper handouts are common. The web page is the "live" version of the handout. A paper list of useful resources can't compare with the onscreen list of clickable hypertext links to online resources. The hypertext page can take a great deal of information and organize it into an outline form that is manageable. However, there are several important issues which librarians who are developing course-integrated web pages need to consider. First, because of the relative novelty of the web, these projects are frequently requested by faculty with little advance notice. Also, the lack of time and staff may prove prohibitive for such a large undertaking. To create a web page requires a knowledge of the scholarly resources, programming ability, and physical and conceptual design expertise.

Have a back-up plan. The volatile and unstable nature of technology has a nasty habit of rearing its ugly head just as a class session begins. In any electronic presentation, there is the possibility that things won't work. Actually, I inform students at the beginning of all Internet sessions that things can and probably will go wrong while using the system. Although it is a time-consuming nuisance, it is wise to have the overhead transparencies or a PowerPoint presentation waiting in the wings.

Challenges in teaching electronic resources

The unique qualities of electronic resources have created unique challenges in technology instruction. Another 90s buzz phrase, information overload, is truly a reality. In the U.S., citizens are exposed to a mind smothering dust storm of sales messages, billboards, slogans, reminders, and sound bytes of news, estimated for New

¹⁶ Caroline Rowe "Modern Library Instruction: Levels, Media, Trends, and Problems," Research Strategies 12 (1994): 9.

Yorkers, for instance at 3,000 to a million per day.¹⁷ And that is before they enter the library.

Anyone who has ever used a Web search engine knows that the "every word of every page" method of indexing may result in literally thousands of hits per search. Relatively few of these will closely relate to the information need. The user begins to believe that any search word will do, that one no longer needs structured thinking, subject-specific vocabulary, synonyms, bibliographies, or even the experience of the librarian. Every search is successful at least in that it retrieves many choices. Librarians now have the added task of teaching users how to filter the information barrage and be selective in their acceptance of data. Experienced librarians know that without this persistent guidance, users will settle for what is there even if it is not precise, or up-to-date.

This raises what Oberman calls the "computer as goddess" syndrome. Research within the Kent's RC libraries has shown that students have a strong but inaccurate sense of what a database, especially the Internet, can offer. There is a tendency to believe "everything" is on the net and that most of it is good. Rather, it is the true, the false, the absurd, the opinionated, the scholarly and whimsical all in one, but to a many users, that's irrelevant. Perhaps the solution here is to harness the student's enthusiasm for electronic resources and teach them to use the resources well.

Evaluating electronic instruction through TLA

Every librarian who has watched the blank faces of students has questioned whether or not the instruction being provided will be useful. If need is a given, we must continually strive to improve our instruction by evaluating it's effectiveness.

The user survey is the most common method used to determine the effectiveness of BI. The literature is full of research on pre-tests, post-tests, and opinion surveys. Surveys are useful and informative tools, however the library electric has provided an additional method of observing user behavior. Transaction Logs are a special feature of electronic databases that we can analyze for our own professional understanding and development.

Transaction Log analysis can be narrowly defined as the study of electronically recorded interactions between the online information retrieval systems and the persons who search for the information found in those systems.¹⁸ In other words, information retrieval systems, such as our opacs, generally have the capability to create reports of the interaction between the computer and the human beings who are using it. These reports include such information as what database is chosen to be searched, the type of searched entered (author, title, subject, etc.), the time of the search and terminals at which these transactions occurred, and even the actual searches themselves.

¹⁷ Susan Griswold Blandy and Patricia O'Brian Libuth, "As the Cursor Blinks: Electronic Scholarship and Undergraduates in the Library," *Library Trends* 44(1995): 281.

¹⁸ Thomas A. Peters, Martin Kurth, Patricia Flaherty, Beth Sandore, and Neal K. Kaske, "Transaction Log Analysis," *Library Hi Tech* 42(1993):37.

These play-by-play accounts can be perused casually to determine user behavior or they can be studied and researched over time to establish patterns. Transaction Log Analysis (or TLA) thus becomes a useful vehicle for analyzing how users' needs and preferences can best be supported.

How might the bibliographic instruction librarian use TLA? One way would be to monitor students searching techniques following an instructional session. These observations could reveal the skills that student did not master or skills that should have been included but were not. For example, one searching technique that I seldom teach in my BI sessions, because of lack of time, is that of truncation. A student could learn to truncate by reading the information on each search screen. By reviewing the TL, I discovered that students generally do not incorporate techniques other than those specifically taught in the class. An examination of actual word searches in over 1,000 searches, did not reveal a single use of truncation.

At Kent we observed that the logs indicated a student preference for subject searching over word (or keyword) searching. Ballard and Smith also discovered through TLA that students seldom retried failed subject searches as keyword searches.¹⁹ A consensus among Kent librarians was that perhaps students perceived "SUBJECT" to be synonymous with "topic," as in the "topic of their paper." This conclusion prompted us to change the menu choices to read "SUBJECT (Library of Congress) rather than just "SUBJECT". Unfortunately we did not track the percentage of subject versus word searches prior to the change to determine if this change in wording will actually change student searching techniques.

However, a result of this discovery is that I restructured my classes to include an explanation of the 2 forms of searching. I now encourage students to begin with word searching. The Transaction Log does indicate a higher percentage of word searches in East Liverpool than in the other Kent libraries. TLA therefore can also serve as an indicator of students' mastery of skills.

Kurth states "Transaction log data effectively describe what searches patrons enter and when they enter them, but they don't reflect, except through inference, who enters the search, why they enter them, and how satisfied they are with their results."²⁰ For this reason many professionals suggest combining TLA with another type of analysis, for example the use questionnaire, to provide a more complete picture which can draw on the strengths of both types of studies²¹

¹⁹Terry Ballard and Jim Smith, "The Human Interface: An Ongoing Study of OP AC Usage at Adelphi University," in Advances in Online Public Access Catalogs. Volume 1, (Westport, CT: Meckler, 1992) 58-73.

²⁰ Martin Kurth, "The Limits and Limitations of Transaction Log Analysis," Library Hi Tech 11(1993), 98.

²¹ P.A. Cochrane and K. Markey, "Catalog Use Studies—Since the Introduction of Online Interactive Catalogs: Impact on Design for subject Access," Library & Information Science Research 5(1983):337-363

Most OPACS have a transaction log feature. "Total Recall" is a software package that may be used with databases on CD-ROM. And in 1995, "Clark" was developed as a transaction logging software for the WWW.²²

CONCLUSION

Electronic resources have changed nearly every aspect of our daily routines in libraries. Still, the research process remains the same. Librarians will continually strive to find effective methods to instruct users in the information age.

²² David S. Carter "Web Server Transaction Logs," <http://www.sils.umich.edu/~superman/AP/Report.html> (1995).