# On the Fly BI

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# On the Fly BI:
# Reaching and Teaching
# from the Reference Desk

Susan E. Beck
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**SUMMARY.** Today's reference librarians are constantly faced with the challenge of orienting users to the complex, ever changing world of the electronic library. A well-structured library instruction program is one important approach to the overall goal of educating users. But library instruction sessions cannot and do not reach all students. Studies indicate that students are most receptive to learning research techniques at the point of need, which most often occurs at the reference desk. Although many reference librarians are committed to ''teaching students to fish,'' they are frequently faced with students whose research needs require in-depth lessons that exceed the time available for most reference desk transactions. This paper offers a way to close the gap by providing a set of techniques and strategies, utilizing behaviors and props, which can be used in those short, one-on-one instruction-based situations. *[Article copies available for a fee from The Haworth Document Delivery Service: 1-800-342-9678. E-mail address: <getinfo@haworthpressinc.com> Website: <http://www.HaworthPress.com> © 2001 by The Haworth Press, Inc. All rights reserved.]*

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Just as college and university faculty are rethinking their roles in the classroom, moving from the traditional teacher-centered, lecture-driven classroom to the student-centered activity-based session, so should reference librarians reinvent themselves. Academic reference librarians need to take heed of this paradigm shift in higher education by seeing themselves not as mere answer machines but as learning facilitators. The typical reference desk scenario of the librarian charging off to the shelves, selecting, finding and then delivering the answer to the often confused but very grateful student is no longer the only viable model of providing reference service. Why? Because our users require instruction in how to choose and use our new electronic resources. They need navigational strategies that go beyond identifying one or two keywords for searching. In the process of conducting reference, we also want to be coaching students in applying problem-solving methods of library research. We need to help students cultivate an awareness of how information of all types is structured and retrieved. As reference librarians begin their role change to teacher/learning facilitator, however, their actions, behaviors and methods must change as well.

Reference librarians do not immediately become teachers just because their tools, audience, and workload demand new focus. This change in methods and behaviors has been a gradual evolution, and one that not all of us have embraced. What are the actions, methods and behaviors of the teaching librarian? What behaviors allow students to learn general rules of research from the particular questions at hand? Can we fit teachable moments into the flow of the reference interaction?

## *QUESTIONING BEHAVIOR*

The reference interaction begins when students first approach the reference desk. As librarian/teachers, we can use our own questions to begin getting students to think through their problem solving. Classroom teachers have long recognized the role of questions in helping students to think critically (Wolf, 1987; Savage, 1998). These techniques can be used at the reference desk as well if we ask questions that encourage students to verbalize their thought processes and thus reveal their problem-solving strategies. Examples of questions that elicit these processes are:

What were you thinking about?
How were you going to go about solving the problem?
Tell me where you've looked already.
What is it you are looking for, exactly?
Can you describe the search strategy you have used so far?

By framing our questions in terms of problem solving, students can begin to think of their own library research as a strategic process. These questions require that students recognize what they already know. They also force students to explain the basis on which they are making their problem-solving decisions. Asking hard questions of students challenges them to clarify their information need before they begin their research process. The reference interview can include other verbal behaviors of the teaching librarian as well. For example, the use of open, neutral questions during the reference interview (Dervin, 1986) encourages students in the verbalization of their information need.

Analogies should also be used as a method for getting students to hook new material onto information that they already know. A popular example of this technique, as reflected in a recent survey of analogy use in reference (Sutherland, 1999) is the telephone directory analogy suggested by Meg Singer. The yellow pages of the telephone book are a familiar example of the use of controlled vocabulary. Librarians can compare the directory headings to the Library of Congress system of subject headings. There are other analogies which can help students grasp unfamiliar library practice: the call number on a book is like a street address; a rental car can be compared to a new database; the turn signals may work differently from one car to another, but all cars have turn signals. So in a new database, the look is different, the location of buttons may be different, but the overall structure and searching functionality of one database is like others one has encountered before.

## MODELING PROBLEM-SOLVING BEHAVIOR

The prospect of getting started with research for a student new to an academic library can be daunting. When faced with a sea of computer terminals, how does one identify the library's catalog? The Library of Congress classification scheme, the variety of electronic resources, even the organization of the library, are likely to be unfamiliar. An

assignment, like the one described below, is typically given to a first-year college student.

Each semester students approach our reference desk in search of scholarly or professional journals in their academic major or area of career choice. This activity is assigned so students can become familiar with the rhetoric, writing style and issues facing their chosen profession or area of study. Similar to many other university libraries, our periodical collection is cataloged. We also maintain a Current Periodicals reading room where users can browse the most recent issues.

Locating a journal at the library requires a great deal of "procedural knowledge" on the part of the student. This includes informational knowledge and "how-to knowledge" (or skills). How can the librarian/teacher use the reference interview as an opportunity to model a few of these behaviors? First, the steps need to be made explicit.

The basic questions students need to address in order to carry out this assignment are:

1. What types of materials can I access through the online catalog?
2. How do I access the catalog?
3. Is the catalog searchable by title?
4. How do I search the catalog by title?
5. What do I look for in the catalog display? What does it tell me?
6. What information should be evaluated and possibly, recorded from the catalog?
7. Where are the periodicals located in the library?
8. How does the call number relate to the arrangement of periodicals on the shelves?

Thinking about the required knowledge and steps involved for even a simple problem-solving task can help us in making our behaviors explicit, and teaching those behaviors by thinking them aloud. There are several practical ways of doing this. For instance, Ross and Dewdney (1989) describe "inclusion" as the process of explaining to the patron one's actions and thoughts during the activity.

> *I'm checking the library's catalog for this journal by typing "t" for title. I need to find the call number for this journal, so I am going to look at the item record here in the catalog.*

It is important to model our thoughts and decision-making pro-
cesses for users during the reference interaction primarily for the
reason that we cannot assume that our users will make connections
between their stated information need and our actions. By explicitly
showing the user how we do it, we provide them with a model they
can use in future, similar situations.

> *Well, if I were looking for journal articles in a particular field, I
> would want to find out what the Library of Congress classifica-
> tion letter for that subject was‑all the books and journals in that
> subject field should be shelved under that letter. Let's see now, in
> journalism, the call number will start with PN . . . Okay.*

Another problem-solving strategy which we may take for granted is
the method by which we process information on the computer screen,
particularly when using an electronic database. In the context of teach-
ing the reading of books with children, Davey (1963) discusses how
the cognitive process of reading can be modeled by teachers. We can
apply this modeling behavior to the process of reading a computer
screen with a student new to using electronic databases.

What are the clues that we use to de-code information presented on
the screen? Our experience has taught us to look at colors, type size,
and in specific areas of the screen to find important information. We
make decisions about what to pay attention to on that screen. By
pointing out the significant text and buttons on the screen as we talk
through the screen-reading process, we can help students learn to
focus their eyes on the most essential components.

Although librarians are familiar with the format of a bibliographic
citation, students may require assistance in making predictions, envi-
sioning the information beyond a citation, verbalizing a confusing
point and demonstrating fix-up strategies. All of these are processes
that we use when navigating an electronic database. When we make
our process explicit by verbalizing our strategy, we can turn the pro-
cess into a teaching situation.

### *SELF-VERBALIZATION:*
### *THINKING ALOUD*

Educators recognize that putting thoughts into words helps students
to organize and store information in memory. Kuhlthau (1994) and

Fister (1992) suggest that verbalizing helps students to clarify and focus a search strategy. Self-verbalization is also discussed by Nahl-Jakobovits and Jakobovits (1988) as a useful strategy in library instruction. The example used is one in which call numbers are spoken aloud as the searcher looks for a title on the shelf.

> *Okay, now we have a call number for this journal on communication research. Let's walk over to the current periodicals section and browse those shelves, since you need an article for 1999. Here is the row for P. Let's look down here. Okay, we're at the P's. Now what is the second part of the call number? Hum, no, we've gone too far. Let's see. Ah-here it is, P91 C56.*

## *PHYSICAL BEHAVIORS:*
## *WHY WE NEED TO LEAVE THE REFERENCE DESK*

The verbal behaviors of questioning, modeling, thinking aloud and the use of analogies are some teaching techniques that librarians can employ at the reference desk. However, librarians can also use physical behaviors which encourage more active learning on the part of students. First, we need to move out from behind the reference desk and accompany students, whenever possible, to the stacks or to the computer workstation. Helping students *in situ,* in the location they are working, is necessary for modeling many of the behaviors we have discussed. We are accessible and approachable when the barrier of the desk is removed, and we may find that helping one student encourages questions from other students working nearby.

It is important that we keep our hands off the keyboard, although this may increase the time necessary to get a student going. Hands-off coaching forces students to ''take the reins'' and fosters an independence and responsibility for their work. Students are far more likely to remember how to do something which they have physically done before, than a procedure they have passively watched someone else do. It also teaches the essential lesson that accuracy and spelling are important when searching an electronic database!

By roving through a bank of workstations, librarians can more easily provide assistance at critical points of need (Kuhlthau, 1993). Roving opens up the teaching space, and allows other students in the vicinity the opportunity of listening in on a ''lesson.'' Peer-coaching

between students can be engendered in this way as well, with the suitable arrangement of workstations in the reference area.

Question style, verbal modeling, and physical behaviors discussed so far are some of the ways in which librarians can make reference interactions more useful as contexts for teaching library skills. Handouts and other physical materials used during the reference interaction can carry the lesson even further, providing a concrete tool for students to consult and take away with them.

## *MATERIALS*

When teaching a skill or a concept in a short time period, librarians should use materials at hand to their best advantage in communicating the teaching point. Many of these materials can be created ahead of time, designed specifically for a frequently encountered problem, or skill set. However, not every research problem can be managed with a handout. This is especially true in reference desk transactions where all too often a very short, mini-lesson is needed. In these cases the less obvious tools, ranging from well-designed web pages to signage and the physical characteristics of the building, can be presented as teaching materials. Nevertheless, in every reference transaction requiring some type of instruction, reference librarians should always focus on finding the best and most efficient materials to convey the teaching point. Before creating materials for these brief instructional encounters, it is best to examine how to use different teaching aids and what purposes these materials should serve.

### *Purpose and Use*

The first step in designing teaching materials for mini-lessons at the reference desk is to think like a teacher. When developing pathfinders to orient users to library resources on a given topic, librarians often devote more time to including all the pertinent resources available than to thinking about the ways their users might best benefit and make use of the document. By the same token, when creating user guides for specific tools, be they print or electronic, librarians often neglect to highlight the most often used and asked about functions. Stuck in a ''just-in-case'' mindset, librarians often point out every

feature and function found in the database. This barrage of information obscures the initial goal of helping users help themselves. What is often missing in the original design of library guides and pathfinders is the human element. They need not be thought of as a replacement for reference service, but should be considered an equal partner in teaching library use. In other words, when creating learning materials, librarians also need to focus on how they will use the materials to teach the skills and concepts the document addressed. When undertaking material development, Kemp, Morrison and Ross (1998) suggest addressing specific questions, such as the following:

1. What prior knowledge must users have to complete the task?
2. What skills and concepts do students need to acquire to complete specific tasks?
3. When completing the task, what should students be able to do and what must they know?
4. How will librarians use the materials to teach these skills and concepts?

For starters, it is best to choose the one or two most important learning concepts, then design the teaching materials around these. In the previous scenario, where students need to find a professional or scholarly journal in their subject area, the materials created can be a simple Library of Congress Class Outline that both helps students focus rather broadly on their topic (i.e., Nursing instead of Gerontological Nursing) and provides them with the organizational structure for how materials are stored in the library. The main teaching point is to understand that materials are organized generally by subject area within a given system (Library of Congress Classification or Dewey). Other objectives comprise the following:

1. Matching general subject area to the LC class section
2. Locating the selected LC subject area on the shelves
3. Browsing a section by call number to grasp the breadth and depth of the publications available within a discipline.

In this situation, the mini-lesson consists of a quick question-and-answer exchange between reference librarian and student with a one page LC Class Outline serving as the primary teaching material. An important aspect of the lesson is that the librarian guides the student's

eye to the important areas by using both questions and gestures. Here, as in all other teaching encounters at the desk, the librarian needs to show restraint by not providing the answer. In this instance the teaching materials are both supplementary and complementary. One of the primary goals is that students recognize that the LC chart is a document to consult in the future when needing to browse the collection by subject. Another important goal is their understanding that information is organized in a coherent fashion and is easily found once they know how the system works.

Topics for teaching materials are usually those that address the myriad of subjects library users find confusing or difficult to grasp. Often engendered by poor signage, inadequacies in library catalogs or regularly given assignments, most teaching topics are comparable in academic libraries. Typical teaching topics could be: differentiating between different types of serial publications, exploring the different facets of a topic as a way to focus one's research, searching for materials by subject compared with searching by keyword. All of these are topics universally taught both in the BI classroom and, we hope, at the reference desk.

### Design and Layout

With material design it is important to include commonly recognized signals that define the structure of the text. These graphic or textual signals aid comprehension by providing learners with a known model to incorporate new material. Chambliss and Calfee (1989) found three important design components for printed materials.

1. Structure Signals. Consisting of pointer words or phrases (e.g., first, second, third; step one, step two, step three), these explicitly alert the reader to the overall structure of the material. Typography and printing conventions are other examples of structure signals. For example, using different font sizes or faces as well as making use of paragraph headings, and using bold or italics to emphasize important material are other typically used practices.
2. Text/Content Signals. These are easily recognized and familiar vocabulary and phrases that help to both organize the information and make it easier to recall.

3. Matching Content Delivery to Knowledge Base. Include words, phrases and sentence structures the intended audience will instantly recognize.

Other frequently used text structures that signal important text are bulleted or numbered lists, comparison and contrast structures, temporal sequences (e.g., first, second, third), and definition lists (Armbruster, 1986).

As noted above, it is essential to write in a style that learners recognize and will embrace. Time after time we are told to write in the active voice. Go one step further and use phrases that include learners and that appeal to their needs. Instead of naming your handout something thoroughly descriptive but rather dull such as ''Research Methods for Undergraduates: Periodical Indexes,'' why not use wording that will grab your audience by calling it ''Finding Articles on Your Topic: A How-to Guide.''
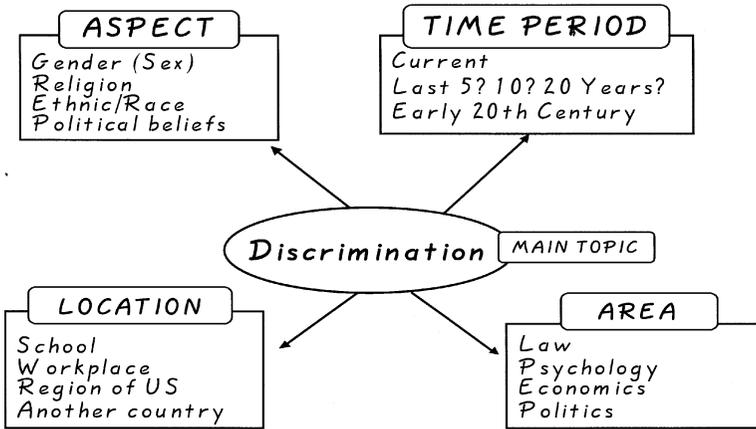
Consider also the impact of illustrations, charts or graphics. It is often said that a picture is worth a thousand words. Vygotsky (1962) called these graphic representations semantic mediators because they help us interpret new material. Not only are pictures and other illustrations easier to remember than lengthy text but they also serve as a mental tool to help the learner focus.

### *Material Types*

Handouts and pathfinders are not the only teaching materials available at the reference desk. In giving a mini-lesson, use any and all materials that will best convey the teaching point. These can range from computer screens, to drawings and flow charts created on the spot, to graphs, signs and charts.

Figure 1 shows a graphic organizer quickly created at the reference desk to help students explore all the different facets of a too-broad topic. In this mini-lesson, the librarian creates the initial drawing by charting out the circles and boxes for main and subtopic and labeling each of the subtopics, but does not fill in all the details. Together the librarian/teacher and student brainstorm examples of possible subtopics, with the librarian/teacher writing these ideas on the chart. As the student becomes more of an equal partner in the brainstorming session, the librarian/teacher can then hand over the pencil or pen, saying ''OK, now you take over,'' but continues to assist with brainstorming

FIGURE 1

**ASPECT**
Gender (Sex)
Religion
Ethnic/Race
Political beliefs

**TIME PERIOD**
Current
Last 5? 10? 20 Years?
Early 20th Century

*Discrimination* MAIN TOPIC

**LOCATION**
School
Workplace
Region of US
Another country

**AREA**
Law
Psychology
Economics
Politics

topic ideas. This signals a change in the mini-lesson, where the student is now an active participant in the learning process–a major objective in any library instruction session.

Graphic organizers can be used in other situations as well. The librarian/teacher can quickly map out the steps or procedures students need to follow in finding materials in the library. This type of graphic organizer is a basic, step-by-step guide and can be drawn very quickly. While creating the graphic, the librarian/teacher could elicit the steps from the student, encouraging participation and assessing knowledge at the same time. In fact, creating mental maps or visualizing the problem on paper is a method used by expert problem solvers (Whimbey and Lockhead, 1980). By modeling the process or by getting the student to use this process, librarians are helping to extend students' repertoire of problem-solving methods.

Materials can also be prepared in advance and not rely on the spur-of-the moment creation. Figure 2 shows a worksheet used in formal library instruction sessions that does double duty at the reference desk. This type of worksheet is aimed to get students focused on their topic but is structured in such a way that students are required to take responsibility for most of the decision making about their topic. Unlike the graphic organizer in Figure 1, which was created on the fly

FIGURE 2

## Electronic Research Worksheet

**TOPIC** (describe in a phrase or in a sentence or two)

| Terms/Synonyms | AND/OR/NOT | AND/OR/NOT |
|---|---|---|
|  |  |  |

### ELECTRONIC TOOLS TO SEARCH

1. Library Catalog

2. ProQuest

3. WilsonSelect

4. World Wide Web

by the librarian/teacher, the Electronic Research Worksheet is designed so that students use it both as a problem-solving tool and as a research log. On the worksheet students can keep track of their search terms, the databases they have searched, their search methods (Boolean commands, string searches, truncation and wild card searches) and note results. It asks many of the basic questions posed in the graphic organizer but does so in a less dynamic fashion.

## *CONCLUSION: BEHAVIORS AND METHODS WITHIN THE RESEARCH PROCESS FRAMEWORK*

Important models of library research as an active information seeking process have been developed by Kuhlthau (1993), Loomis and Frank (1993) and described by Jacobson and Mark (1995). An example is Kuhlthau's six-step model, which outlines task initiation, topic selection, pre-focus exploration, formulation, information collection, and search closure or presentation. These models help us as librarians and teachers to recognize the complexity of information seeking behavior--as both cognitive and affective processes. In the context of a necessarily brief reference interaction these multi-step models become less helpful. When doing reference in the real world, mini-lessons need to suffice for extended ones. The behaviors and materials presented here are best viewed as techniques that dovetail with these broader schemes. Although our lessons cannot substitute for a thorough bibliographic instruction session, we can reach more students more effectively by applying instructional techniques to behaviors we know to work at the reference desk.

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