New Directions in Library Instruction: Keywords, Visual Literary, and Critical Thinking

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Abstract:

Library instruction labors under a hidden problem. In the hand-off that takes place between faculty and librarians in one-shot library session, students are not receiving sufficient instruction in translating their subject knowledge into search statements. Studies of online searching behavior suggest that the conventions that serve students well with commercial internet search engines do not translate smoothly to scholarly research. This paper investigates the emerging field of visual literacy to identify tools and teaching techniques for one-shot library sessions, to assist students in the difficult initial step of conceptualizing a topic and transforming abstract ideas into meaningful input for academic search tools.

Introduction

The Problem

Students are not being given adequate instruction in converting their subject knowledge to meaningful keywords and search statements. While information literacy instruction has emerged as a key service, in many institutions, the bulk of instruction remains "one-shot" sessions for introductory writing classes. The session is envisioned as a "hand-off" from instructor to librarian whereby students apply their subject knowledge from classes to library resources. However, this transition frequently does not entirely succeed. Matt Conner has taught writing, both at the University of Illinois at Urbana-Champaign and the University of Minnesota, Morris, for over 20 years, and in his experience of interacting with fellow-instructors and reviewing the literature on composition studies, he can attest that writing instructors devote very little attention to the content of library instructions sessions.

Library instructors, on the other hand, tend to focus on the mechanics of research: how to select databases, where to input keywords, how to use search limiters, and how to retrieve items. There is little emphasis on teaching students how to think systematically about their topics and express them in the best search statements. Students, therefore, tend to fall into a gap between the subject instruction of their classes and the mechanics of search tools without explicit guidance. As illustrated by the adage "Garbage in garbage out," databases and other information resources are only as good as the search statements that are entered. In the absence of intelligent and systematic search strategies, there is every reason to suppose that their potential is not used to the fullest.

Literature Review

Identifying appropriate terminology is an integral step in finding relevant information. The ACRL Information Literacy Competency Standards for Higher Education emphasize the importance of this step, especially in the early stages of the research process (Association of College & Research Libraries, 2000).

Numerous studies have sought to describe the impact of the internet on the information seeking strategies of college students. Most students begin their research on the internet and are confident in their search skills (Sewell & Davis, 2008, p. 6). They tend to rely on single word searches, or enter long strings of terms or phrases (Williams & Rowlands, 20007, pp. 9-10). It is not surprising that students struggle when attempting to retrieve content from academic databases or library catalogs that that rely on Boolean searches and controlled vocabulary. In fact, one recent study found that 50% of catalog subject searches fail (Antell & Jie, 2008, p. 71).

Although there is evidence that suggests students may actually be reading more, not less, than they were 30 years ago, the tendency to skim text in a non-linear way, rather than read thoroughly has been amplified and reinforced by a hyperlinked web and scan-able web design elements (Marcum, 2002, p. 194; Oblinger & Oblinger, 2005; Weiler, 2005, p. 49; Williams & Rowlands, 2007, pp. 13-14). Many students, if given the choice, also prefer graphic or visual representations of information over text (Oblinger & Oblinger, 2005, p. 2.15; Weiler, 2005, p. 49). As a result, students often assume no information is available on their topic if their initial skimming is unsuccessful; they may also overlook relevant results.

The library field has engaged with the issues surrounding search behaviors for some time. One researcher describes a "war," going back a century at least, over alternative ways for users to access information (Rowley, 1994, p. 110). The elements in this conflict are the use of keyword retrieval as opposed to the use of subject headings. In essence, the question is whether information should be organized from the user's side with reference to intuitive "natural" language or from the library's side with a "controlled vocabulary" of subject headings.

Figure 1. Author Catalog Card. The author and title, as obvious descriptors of a work, corresponded to "natural language" while the subject words as abstract categories constituted the controlled vocabulary.

The conflict engages with deep issues of freedom vs. control. One can see it played out in the catalog card of previous times (Figure 1). The struggle continues today. Librarians we polled

indicated they prefer to have students use subject headings to navigate databases, yet they admit that teaching this material in the time available is not easy. An exception was a biology librarian, who explained the layout of Pubmed's MeSH headings has proven to be very useful and well received by her students. The MeSH heading display reveals significant differences from the old card catalog (Figure 2) and suggests that presentation of the subject headings can be key to teaching them. The librarians we spoke with agreed that an ideal would be to use both keywords and subject headings in a complementary way. In any case, the struggle between keywords and subject headings continues as a basis for organizing and accessing collections (Eckel, 2006, p. 36; Williams & Rowlands, 2007, pp. 9-10).

Figure 2. PubMed's Medical Subject Headings. The reader sees a highly visual display with the headings arranged in hierarchical order and linked to generate new searches.

Current Methods for Teaching Search Statements

A body of techniques exists for creating search statements. However, the majority of these focus on the mechanics of search statements, rather than the conceptual and orderly search for knowledge about a topic.

i. Boolean operators
This is a long-standing technique. Examples abound, such as having students in class stand up based on how they are dressed (e.g. red shirts, dark socks) to teach them the relationship between logical operators. Such exercises often produce giggles and generally correct answers. However, it is questionable whether students apply these underlying concepts of set theory to their searches. Similarly, Matt witnessed a presentation on how students were taught advanced features of Boolean searching including nested statements, wildcards, and proximity operators. While the products produced by this lesson plan were technically impressive, it is implausible that these details were retained and used.

ii. Broadening/Narrowing Synonyms

This is another traditional technique that would seem to be useful in helping students generate multiple entry points for their searches. However, in practice, the danger is to focus on terms for their own sake and generate an essentially random list of words that does little to improve the understanding of the students.

iii. Brainstorming

The comments for the synonyms technique apply here as well. With a focus on generating terms without any structure, it is fair to assume that students will not leave this exercise with an increased understanding or organization of their subject knowledge.

iv. Concept Mapping

The authors have found that it is difficult to teach the full complexities of this method within the scope of a typical instruction session (Hilbert & Renkl, 2008, p. 55). The method derives from cognitive psychology and offers a format for describing hierarchies of importance in concepts—exactly what is needed by end-users of databases. However, in practice, concept-mapping often amounts to generation of bubbles and lines on a page—another instance of engagement for engagement's sake.

New Directions: Visual Literacy

The emerging field of visual literacy suggests new approaches for converting subject knowledge into search statements.

Definitions

Notwithstanding its wide use, "visual literacy" is not well-defined. This paper will use convergent concepts from the fields of philosophy and biology to formulate a definition. Philosophy describes vision as unique among the five senses in being a "co-temporaneous manifold" (Jonas & Jonas, 2001, p. 136). In other words, it offers a perceptual field that allows the simultaneous comprehension of data that, for the other senses, is limited to a time sequence. Music, for example, is comprehended one note at a time through the sense of hearing. A blind person, reliant on the sense of touch, can make sense of his environment by tapping repeatedly with a cane. Vision allows a more inclusive comprehension of one's environment than the other senses.

Biology describes vision as a non-linear dynamic process that is not fully understood. Experiments suggest that seeing is inextricably bound up with the process of cognition, not prior to it. The conclusion, which harmonizes with philosophy is that to see is to think.

Principles

Among the overwhelming data presented to vision, the mind focuses on prominent shapes and connects them to cultural associations. The result is a radical and transforming simplification of reality. Common examples of visual symbols like the Nazi swastika, the hammer and sickle of the Soviet Union, and the cross of the Knights Templar, all inspired enormous geopolitical movements often at odds with the literal sense of these symbols, which illustrate the potential of vision to simplify and distort reality.

Cartoon caricatures are another example of this transformative process. Cartoons of immigrant Irish in the nineteenth century distorted faces in simian fashion so that the result, according to one contemporary commentator, resembled a combination of a prize-fighter and an orangutan (chnm.gmu.edu/courses/omalley/120/alien/four.html). Vision was used to alter reality in the service of racism.

Another example of the same process can be found in the development of newspapers. A representative front page from 1930 shows a wall of text (http://depts.washington.edu/labhist/laborpress/Vanguard.htm). The front page of a *USA Today* issue from 2007 is filled with pictures and headings in various font sizes (http://mediamatters.org/research/200702020004). What is demonstrated in the contrast is the trend towards "scan-ability" whereby newspapers offer a more exciting visual presentation that allows readers to rapidly grasp a point rather than reading at length. The same principles of simplification in the service of an increasingly visual culture appear again.

A more detailed set of techniques for the practice of visual literacy consists of recognizing axial presentation, both vertical and horizontal. The vertical has cultural associations of high and low; the horizontal of left and right. The Latin dexter (right) and sinister (left) leave little doubt about the values attached. Also common is the center/margin organization. These organizing schemes can be used to represent values of the real vs. the ideal, general vs. the specific, and given vs. new.

Implications

The stakes of visual literacy are three-fold. Ignoring the visual dimension of a presentation admits noise that can only degrade the students' attention. Secondly, with the complex interconnection of vision and reality, it is not at all difficult for the arbitrary and subjective to be masked as real. This development, understood in terms of coercive and repressive social networks is the departure point for Cultural Studies, which is probably the premier driving force behind the writing courses that request one-shot library instruction sessions. The pervasiveness of prejudice and discrimination in media representations is the object of critical thinking in Cultural Studies; libraries can make a similar use of visual literacy to advance critical thinking as a goal of information literacy instruction. Finally, visual literacy provides a tool for reinforcing the message of a presentation in combination with all of the learning styles in play.

Applications

Visual literacy as described can illuminate the success of one exercise in helping students develop search strategies. The exercise is introduced with the question of what input students provide databases in research. It is suggested that rather than moving haphazardly between terms when a search fails, students learn to back up the generality of their search terms until they get results, then narrow the search among the items that turn up. The result is a dialectic between the general and the specific that exemplifies the analytical process at work in many fields. To demonstrate this technique, the instructor identifies a topic, then asks students to fill in a matrix with two topics each that are more general and more specific (table 3).

Table 3. Broadening/Narrowing Matrix.		
~~General:~~	Politics Governor	Acting Foreigner
Topic: Arnold Schwarzenegger	California Budget Crisis	
~~Specific:~~	Terminator	Body building star
Note: The instructor provides a term, e.g. Arnold Schwarzenegger, and asks the students to fill out the matrix with topics that are more general and specific than the initial term. "California Budget Crisis" is placed in the middle and students are asked, as the last step in the exercise, whether to place it in the "General" or "Specific" row and why.		

The exercise is based on the traditional technique of broadening/narrowing terms. However, it appears to bring something else with it that can be described well in terms of visual literacy. The axial organization of the diagram from left to right demonstrates the pattern of Given vs. New. And the vertical axis reinforces the hierarchy of general and specific. Capturing these concepts in visual terms allows them to be generalized to habits of critical thinking relevant to the rest of their studies. The exercise has almost never failed to draw an enthusiastic response from students.

One of the most rewarding results of the exercise and evidence of its effectiveness is the way that instructors respond to it. In one class, the librarian asked the students to define "analysis." There was a long silence followed by loud laughter. Afterwards, the instructor explained, incredulously, that he had been talking about the concept of analysis all quarter and could not believe that his students did not answer. Clearly a visual display of the concept could only have helped. This same instructor, after making several references to the exercise, began using the board for his own visual representations. His example—1 in 10 vs. 10 in 1—though clearly visual with its symmetry was not immediately clear. After explanation, it emerged that his notation was a device to analyze the ratio of generalizations to specific examples. The idea was consistent with the exercise matrix but would have benefited from a better visual presentation. The exercise as a whole suggests that visual literacy can be used not only to teach library concepts but to engage with notions of critical thinking and therefore complement class material that lies outside the traditional scope of library instruction.

The number of free and subscription-based online search tools using principles of visual literacy is proliferating. These tools allow librarians to build on students' familiarity with the internet to help them conceptualize their topics and generate keywords.

i. KwMap.net (http://www.kwmap.net)

This tool generates a "navigator panel," a visual display of terms and phrases related to the one input by the user; an alphabetical listing of keywords; and a list of websites. The sources KwMap draws its results from are unknown and its commercial website results are suspect. (Figure 3). It is not clear why the left and right branches of the navigator panel are made to intersect, nor it is clear why the bottom half of the display is faded out compared to the top.
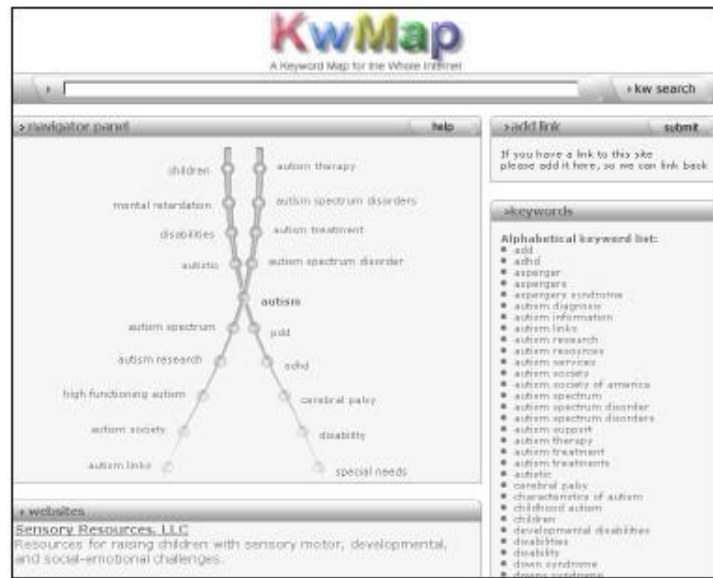

Figure 3. KwMap.net. The visual display clearly makes an effort to use horizontal and vertical axes.

ii. Google Wonder Wheel (http://www.google.com/)
  This feature of the Google interface was launched in Spring 2009. Users enter a search word or phrase, and navigate to the Wonder Wheel via the "Show Options" link. The visual display is suggestive of a concept map and has been well-received by students (Figure 4). However, given that the essence of concept mapping is a subtle representation of hierarchies and relationships, it is clear that this aspect is lost in an extensive search where the user browses many terms but only sees two bubbles at a time.

Figure 4. Google's Wonder Wheel. While its form clearly borrows from concept mapping, only two bubbles are displayed at one time with one larger and one smaller.

iii. EBSCO's Academic Search Complete Visual Search

This tool is significant in belonging to one of the most popular databases for undergraduates. Among the online search tools, it makes the heaviest use of visual devices (Figure 5). But while the commitment to visual literacy is clear enough, the scheme unravels somewhat upon closer inspection. The terms in the columns overlap making their relative specificity unclear. It is also difficult to distinguish which terms apply to which results.

Figure 5. EBSCO's Visual Search. There is a clear horizontal axis going from left to right; highlighting a term in one column generates a column to the right of more specific terms. There is also a vertical axis. Below each column are lists of specific results.

While online tools have clearly acknowledged the importance of visual literacy and show promise for use in one-shot library instructions, none of the examples provide a comprehensive

solution to the dilemma of helping students transform their topic ideas into search statements for scholarly research.

Conclusion

Our review of current theories of visual literacy, and our exploration of related tools in the classroom has led us to propose two hypotheses. First, visual literacy can inspire the creation of tools that can help students convert their knowledge into search terms. The basic premise is that to see is to think. By arranging words in relation to each other on the page, students can refine their understanding of the subject and produce better input for their searches. A variety of formats exist that include hierarchical, axial patterns and the techniques of concept mapping. The value of a visual orientation is evident in a trend among commercial products which displays information in a way to suggest relationships between ideas. Instructors can make up their own exercises with technology as simple as a whiteboard to help students to think systematically about searching. Visual literacy offers a way to approach instruction that goes beyond specific tools. Our second proposal, growing out from the first, is that by addressing the analytical process in this way, instruction on the visually-based construction of search statements breathes new life into the notion of "critical thinking" and a new way to cooperate with instructors in developing this important skill.

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