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Abstract

As "teaching libraries," many academic libraries are committed to teaching not only in classrooms but also at the reference desk. As reference has expanded to include digital modes of e-mail and chat, reference librarians are prompted to consider approaches to teaching in these new reference venues in ways that are meaningful to the user. A promising approach to teaching through digital reference is the application of the ACRL Information Literacy Competency Standards. This paper presents some challenges and benefits of teaching via digital reference. Practical methods for promoting self-directed learning by examining online instruction, and suggestions for effectively advancing a pedagogy based on the ACRL Information Literacy Competency Standards, are offered.

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Introduction

According to the Association of College and Research Libraries (ACRL), an information literate user is someone who can recognize when information is needed and

has the ability to locate, evaluate, and use effectively the needed information. (2001) For users to become proficient in information competency, academic librarians must consider teaching venues outside the classroom, like at the reference desk. The existence of digital reference in academic libraries over the last several years has prompted librarians to move beyond experimenting with the possibilities for mediation using chat and e-mail reference, now to figuring out how to incorporate teaching by encouraging information competency abilities in users. This paper seeks to highlight the expansion of traditional reference to digital modes of communication and new perspectives on mediation in digital reference, including its receptiveness to increase self-directed learning in library users through the teaching and promotion of information competency. I will discuss important pedagogical considerations and teaching practices to bear in mind that enable users to develop, if not hone information competency abilities. Some key issues that will be addressed are what can be learned from digital reference engagements that may inform us about how to teach effectively and how research in online instruction and distance education may reveal effective methods for teaching in digital reference.

It is hoped that this paper could serve as a practical guide to teaching and learning through digital reference. It is realistic that we acknowledge that reference, in all its existing forms, is a dynamic mode of communication that defies predictability, thus the promotion of a formulaic approach. However, this should not prevent us from beginning to identify best practices for teaching through digital reference.

Linking Reference and Instruction

Teaching at the reference desk or in the reference area has become a widely accepted practice among academic libraries. Through the adoption of mission statements, academic libraries have asserted their role as "teaching libraries," working both inside and outside the classroom. For over fifty years, with the University of Illinois being one of the first institutions of higher education, academic librarians were assigned faculty status and thus by definition, assumed an educational role in the college or university system. (Cronin, 2001) Although academic librarians have had faculty status for some time, scholars of information science have acknowledged the relationship between reference and instruction as "intrinsically linked, complementary, and intertwined services." (Hinchliffe and Woodward, 2001) In addition, a recent article discussed the philosophical and practical connection between reference and instruction. The authors concluded that definitions in the library literature support linking these services. They further discovered by administering a survey that communication between the two services is important to the library's goals for teaching information literacy. (McCutcheon and Lambert, 2001) However, an admitted limitation of their work was in failing to note the overlap that exists between reference and instruction functions in academic libraries. In the last decade, there have been organizational changes within libraries that have merged instructional and reference functions. These changes coincided with the creation of a position/job title of reference and instruction librarian. While these late developments were a part of the growing movement that advocated for information competency, they were not achieved without some doubt and opposition that, in part, continues today.

Before this linked concept of reference and instruction was introduced, librarians and users alike raised doubt about the instructional purpose of reference. Holding to the belief that they are professionals skilled in the complexities of information production, access, and evaluation, librarians

incorrectly thought they would forsaken their professional expertise. This was coupled by the fact that some users were not receptive to learn how to resolve their information needs. These users did not feel compelled to learn, knowing there was little assurance that their research efforts, if prodigious, would result in high grades on their research assignments. In general, librarians did not believe they could have the same impact as course instructors who could develop graded assignments to motivate users. (Rader, 1980) Even some reference librarians were unsure about their effectiveness, as teachers given users may not be able to learn because of information anxiety or information overload. As one opposed to teaching in reference, Katz claimed it was impossible for reference librarians to teach in an environment where time did not permit the kind of in depth instruction that is often needed by some information seekers. (2002) Despite these reservations, many reference librarians have grown to accept and to embrace some degree of instruction in reference.

Adopting philosophies for teaching at the reference desk, academic librarians should also be prompted to extend teaching to digital reference. Although it seems reasonable that this would be a necessary approach in the development of digital reference services, this cannot readily occur without first demystifying digital reference in terms of its possibilities and limitations for communication.

The Expansion of Reference to Digital Modes of Communication

With the expansion of reference venues to digital modes of communication, namely e-mail (asynchronous) and chat (synchronous), there has been a delay in applying teaching to digital reference. To a large extent, this set back has been attributed to the need for librarians and users to become better acquainted with the quality and character of reference interaction in these new venues. Many academic libraries may have first offered e-mail reference where users could submit their questions via an e-mail address. In the last few years the adoption of web forms not only changed the

quality of the e-mail reference engagement for the better, but also challenged librarians to develop effective means for managing questions and responses. (Lagace and McClennen, 1998) With new developments in technology, chat reference service soon became available in academic libraries.

Regardless of whether e-mail and chat reference services were initiated jointly, many libraries did not launch these services as an extension of traditional modes of reference. Rather, digital reference services were considered unchartered territory for which the nature of reference remained to be tried and tested. As digital reference services (in particular, chat reference) have continued to grow exponentially since the year 2000, a great deal has been learned about the appeal and shortcomings of the service. (Francoeur, 2001) Digital reference librarians have freely exchanged stories and experiences within and among libraries in an attempt to demystify these new and in some cases, unfamiliar services.

Many reference librarians as well as users check and send e-mail daily or may have had occasion to interact via chat software on an infrequent basis. Yet the novelty of computer-mediated communication between reference librarian and user was borne of convenience to the user as much as out of necessity to the reference profession. Noting the importance of digital reference as a necessary outreach service, Anne Lipow aptly stated, "we have to become more convenient…rather than thinking of our users as remote, we should instead recognize that it is we who are remote from our users." (1999)

Service trends for the last decade from the Association of Research Libraries reveal a -12% change in reference transactions, the greatest percentage decline of any library service. This disturbing trend was followed by a -6% decline in circulation services. (Association of Research Libraries, 2000) These statistics raised some concern among library administrators about the fact that fewer users were coming into the library to make use of the collection and/or to consult with reference

librarians. Users were not only finding it convenient to seek online assistance from question and answer services like *ASKJeeves* but also they were increasingly relying upon the Internet to satisfy their information needs.

This notion of convenience, especially having access to reference services remotely, may appeal to users who are avid online users and technologically savvy. They may have a preference for using online resources wherever and whenever possible. Some of these users may even have the false impression that online resources are all that is required to satisfy their information needs, relying heavily upon the Internet. These users may have a tendency to use e-mail or chat as a mode of communication with their friends and know the slang terms used in these modes. For these users, digital reference may represent a kind of simplicity or facility directly associated with technology.

The idea of convenience may also be an attractive factor for users who simply cannot come to the library because of their busy schedules. They may be older or more mature students who may have had some exposure to distance education or online instruction. Their busy schedules may be a result of family and/or work obligations. For these users, digital reference is an attractive option for effective time management.

In contrast to convenience, the comfort of anonymity may be a key reason why some users prefer digital reference. (Koyama, 1998) Spared the anxiety of coming face-to-face with a librarian, many users may prefer digital reference services because of the level of comfort they are assured. They can remain faceless and anonymous information seekers who are less self-conscious about asking questions or seeking reference assistance. In many ways, these users may become less preoccupied with the fact that they are consulting with a librarian, as technology becomes pervasive. For all intents and purposes, differences between librarians and users become less apparent in these digital engagements. Digital reference interactions may be less encumbered by biases and stereotypes based on speech patterns

(accents) and physical appearances. It has been established through research that such biases have deleterious affect on the quality and level of reference service delivered. (Radford, 1999)

Among those users who may be anxious about face-to-face reference, there is a subgroup comprised of users with physical or developmental challenges as well as those for which English is a second language. Having the time to formulate questions or even possessing a better command of written as opposed to spoken English, these users find it advantageous to communicate via the written word using digital reference. For those users with physical and developmental challenges, their challenges are not apparent, thus they are assured impartial service through digital reference.

While understanding the appeal and possibilities of chat and e-mail reference may have been an initial part of becoming familiar with these new service venues, reference librarians must also recognize and accept the shortcomings of these services. For librarians accustomed to performing reference transactions face-to-face, e-mail and chat reference service represents a challenge to discover new ways for conducting effective reference mediation. In practice, e-mail does not allow librarians to adequately conduct a reference interview. In academic libraries, the e-mail reference form attempted to "ask" basic questions of the user such as the level of education, resources already consulted, and purpose of research. (Lagace and McClennen, 1998) However, just collecting information does not allow for clarification when the information need is not fully articulated or well defined by the user. Unlike synchronous modes of reference, e-mail lacks immediacy and is disjunctive, as interactions are often prolonged or occur over delayed exchanges. As Joseph Straw cautioned, "Despite the speed of electronic messages [or e-mail] over networks, it is a mistake for reference librarians to conclude that electronic encounters are inherently faster or more efficient." (2000) Further, it takes time for both users and librarians, to formulate and type questions and responses, respectively. With these perceived

limitations, e-mail reference librarians are prompted to develop new approaches to mediation where the time delay could be less of a hindrance than a help.

Similarly, chat reference was equally time-consuming since typing questions and responses could be laborious for those who lack proficiency for typing. Some of these problems have been offset by the incorporation of scripted messages that offer a "quick and accurate alternative to typing." (Viggiano and Ault, 2001) Yet because of the challenge of typing, the presumption of anonymity and the inclination for impatience, chat reference users could be characterized as lacking social courtesies. (Francoeur, 2001) Librarians have observed antisocial behavior in users such as reticence, curtness, abrupt terminations or disappearing altogether. Despite the immediacy of chat reference where users can seek assistance when needed, "[c]hatting to people on the Web is disembodied communication and you can never quite be sure of how what you are writing may be construed." (Hase and Ellis, 2001) Chat reference librarians have further recounted their frustration and discouragement with the service when reference exchanges are out of sync. For example, as librarians attempt to respond to one query, users may pose another question simultaneously or vice versa. This is usually attributed to a lack of visual cues or mechanical signals in chat software programs that would indicate when a participant is engaged in taking their turn. However, overlapping reference negotiations may even be a manifestation of the perceived equality of participants in digital reference interaction. In this situation, users may be less intimidated by librarians because they do not consciously perceive the reference relationship as one based on dependency upon authority. Even the lack of immediacy in e-mail reference, allows users to submit queries with relative confidence and low anxiety, despite a vague knowledge that they are communicating with an information professional. Librarians and users seem to have equal standing, interchanging between their roles as leaders and followers.

If reference librarians are intent on incorporating teaching in digital reference, how can they utilize some of the unique aspects of communication in digital reference to a pedagogical end? Accordingly, it would be useful to examine how the perceived equality of participants in digital reference may present opportunities for teaching and learning.

Leveling the Playing Field

As the playing field is leveled in digital reference, the antiquated roles of librarian as leader and user as follower are less defined, and hence easily interchanged. Wilson first noted a change in the reference librarian/user relationship due to an increase in end-user searching with the Internet. In this context, users viewed themselves as autonomous and felt capable of resolving their information needs. Wilson described how the relationship between librarian and user in face-to-face reference was hierarchical, with the reference librarian functioning as gatekeeper and the user serving as supplicant. Yet, in digital reference the librarian's role as gatekeeper lessens, in favor of an individualistic or egalitarian user. (Wilson, 2000)

Interestingly, the power dynamic in face-to-face reference where librarians may have the upper hand by being in control of the reference engagement, fails to consider the pedagogical goals of reference: to increase self-directed learning in library users through the teaching and promotion of information competency. Self-directed learning is a concept in which students/users are willing to assume responsibility for formulating an understanding through the knowledge or information they gained. Self-directed learning does require some degree of confidence or self-efficacy in users. Self-efficacy is defined as "beliefs in one's capability to organize and execute the courses of action required to manage prospective situations." (Bandura, 1997) These users are described as motivated, task-oriented, persistent and less anxious. A recent study on the correlation between self-efficacy and

computer use in Baruch College freshman, successfully demonstrated that "students who use the library's electronic resources from home [, as remote users,] have higher self-efficacy [than non-remote users]." (Waldman, 2003) These findings further support the belief that remote users, either via digital reference or via online instruction, have a high degree of self-efficacy, thus are receptive to learning what is necessary to resolve their information needs. However, as a belief system built on perceptions not demonstrated knowledge, self-efficacy may cause users to overrate their information abilities when self-reported. Neely summarized these findings based on her research on the sociological and psychological factors that affect information literacy skills. She noted, "[T]he self-reported comfort levels and attitudinal findings indicated a clear over-assumption of information literacy skills and abilities, especially evaluation…[I]t appears, students are unaware of the limited or lack of skills they possess and, also unaware of what they do not know." (Neely, 2002) Despite the lack of concordance between perceptions and abilities in information seeking behavior, it is important for users to be optimistic and hopeful throughout their engagement with information. In information seeking situations, users become self-directed learners through positive experiences in their pursuit of information that in turn, encourages their progression through the information seeking process.

For reference librarians to work toward achieving self-directed learning in users through information competency they must begin to think of themselves as "learning advisors" or even, "information facilitators," enabling rather than directing users to resolve their information needs. (Rader, 2000) While the emphasis in academic libraries is on an user-centered approach to all aspects of librarianship, it is ironic that some reference librarians still cling to their authoritative roles as information experts. One reason why some reference librarians have resisted assuming a less dominant role in reference interactions, is due to the belief that their professional roles would be diminished, making them expendable. However, for reference librarians, being less dominant does not mean

forsaken expertise. On the contrary, practice supports the increased need for reference librarians to assist users in ways that promote self-directed learning. Now more than ever, reference librarians can help users to this end as well as assist them in making sense of the ever-changing information landscape that is further confounded by such complexities as access, retrieval, and evaluation. At a time when the Internet has contributed to an overload of information available, it is imperative that users become self-directed learners proficient in information competency, so they can make appropriate and informed decisions about information.

By teaching in a manner that promotes information competency, reference librarians are encouraging, if not also supporting active participation by the user in learning how to resolve their information seeking needs. Being proactive, the user then assumes responsibility for both the course and outcome of the reference interaction. These users could be characterized as achieving client self-determination. Client self-determination is a concept used in social work practice that perceives the client/user as willing to help him/herself. The connection of client self-determination to reference interactions at academic libraries was first posited in the library literature by Howze and Unaeze. Drawing from Biestek, a leading thinker in social work practice, Howze and Unaeze outlined the positive professional practice objectives that are worth noting here:

1. helping the client to perceive problems clearly and perceptively;
2. helping the client to find and make use of pertinent resources that may be of potential benefit;
3. introducing stimuli that activate the client's own dormant resources; and
4. creating relationship in which the client can grow and work out problems

(Biestek, 1957 as referenced in Howze and Unaeze, 1997)

Accordingly, the reference librarian cannot be effective in their teaching role, unless they resist the urge to commandeer the reference engagement by making decisions or worse, providing answers, as is the case in ready reference questions. It is rather surprising how many digital reference services at academic libraries make known that ready reference questions are the ideal question-types to pose. This

seems antithetical to the teaching mission of many academic libraries. However, it has been assumed that digital reference services would be both ineffective and inefficient in tackling questions that may require lengthy interactions such as questions that may entail help narrowing a research topic. Elmborg summarized, "As librarians, whenever we answer a student's question without teaching the student how we answered it or why we answered it as we did, we are essentially taking the question away from the student, thereby creating a dependency in that student that undermines rather than strengthens the learning process." (2002) Overall, users may need to be educated about the goals and objectives of digital reference at a "teaching library." Posting guidelines or a FAQ page about the kind of reference service to expect, libraries can inform users about the teaching objectives of digital reference.

At the Newman Library of Baruch College where I work, the philosophy for teaching in reference was already an integral part of traditional reference practice. Quite naturally, teaching in digital reference was merely an extension of our existing reference practice. However, for academic libraries where this is not the case, it is fortunate that digital reference, by its very nature, has leveled the playing field among users and librarians. The digital reference engagement is more user-centered and conducive to teaching information competency for self-directed learning than traditional forms of reference. In order to formulate approaches to teaching information competency through digital reference, it would be useful to review some of the challenges to teaching in an online environment.

The Insights Gained from Online Instruction

There has been much written in the scholarly literature on education about how to facilitate profound and sustainable learning in online classrooms. Two principles of effective online instruction that have been established through strong empirical support are: (1) challenging students to be proactive learners who are motivated to construct knowledge; (2) learning through effective use of examples.

(Hacker and Niederhauser, 2000) It is particularly useful to understand how these principles impact learning in online instruction as well as how they are highly relevant to promoting learning in digital reference.

Challenging students to be proactive learners who are motivated to construct knowledge

Online education requires a high degree of motivation. From the start, distance education students are encouraged to be proactive, possessing a high level of self-efficacy. They assume such roles in order benefit from online education. In fact, many online students are characterized as older and/or mature students who are willing to assume responsibility for their learning. However, these independent-minded traits are not necessarily present in all students from the onset. In time, as confidence is reinforced through positive experiences, students become self-directed learners. Online instruction that allows students to learn through experience is highly effective, as new knowledge is incorporated into the student's existing knowledge base. (Alexander and Boud, 2001) The student could not excel in online learning situations if they did not actively try to make sense of new ideas and experiences in relation to the knowledge they already possess. As Hacker and Niederhauser noted, "asynchronous communication tools like [e-mail-based] listservs and newsgroups provide opportunities for students in online classrooms to engage in high-level discussions by framing and presenting ideas, formulating challenging questions for peers, and responding to those questions to clarify misconceptions that arise. Thus, students learn to develop reasoned responses that include explanations and justification." (2000)

By reaching out to users at their point of need, digital reference librarians are approaching users at a time when they may be receptive to learning (proactive learners) or becoming knowledgeable about

how to resolve the problem(s) hindering the information seeking process. (Beck and Turner, 2001) As a synchronous mode of communication, chat reference enables users to gain immediate assistance or when the hours of operation are ideal, at will. In contrast, e-mail reference requires planning on the part of the user and perhaps effective time management in contending with delays in response that can suspend the information seeking process. It is for these reasons that users may consider e-mail reference to be a secondary service to chat reference when selecting digital reference services.

The merits of point of need instruction may be dampened by the affective state of the user. For example, anxious users may not have the capacity to learn if they are preoccupied with end results of research than freely engaging in the information seeking process. In reference, anxiety caused by confusion is a major culprit for stunting the information seeking process. The affective state of the users may influence the level of intervention possible, as some degree of uncertainty and disorganization may hinder the problem-solving process. In this situation, librarians may have to resort to maximum intervention, doing more coaching along the sidelines and even "showing and telling" before users feel comfortable and capable of tackling an information problem. Unfortunately, anxiety-ridden users may require more "hand-holding" than desirable. However, digital reference librarians should dynamically engage users in ways that develop their cognitive abilities. This could even be seen as a diversion to a user's affective state that impedes the learning process.

Kuhlthau's model of the six-stages of the information search process (ISP) offers a multi-faceted picture of the affective, cognitive and physical realms experienced by students in information seeking situations. (1991) These six stages are: initiation, selection, exploration, formulation, collection and presentation. Conducting qualitative research, Kuhlthau reviewed user logs written during the course of the ISP and noted feelings, thoughts and actions that occurred at various stages. Charting the overall progression through the ISP, Kuhlthau's studies elucidate how users struggle to make sense of new

information by its integration into their existing knowledge base. (Dervin, 1983) Striving toward the goal of knowledge integration, a constructivist model to learning can be applied where the user not the subject matter, is placed at the center of the learning process. In this manner, "knowledge is 'constructed' by individuals rather than passed on fully-formed from teachers to students." (Elmborg, 2002)

How long are users willing to endure the discomfort and disorder of the early stages of the ISP and struggle to make sense of ideas and concepts in order to reach the pivotal formulation stage? To what extent could the affective state become all consuming and lead to inaction, impairing the user's cognitive abilities? As academic reference librarians, we may have encountered a number of users who do not follow Kuhlthau's ISP model in the logical order presented. Certainly it is possible that not every user experiences the six-stages of the ISP in the same order or distinctly without repeating any stage. There may be users who feel stymied by the challenge of defining or narrowing their research topic and may prefer to collect for exploration, not as a result of formulation given the facility for collection using online resources.

Regardless of the situation, users should follow a self-defined ISP course of their own construction, muddled as it may be initially. No matter how the ISP course is defined, users are still challenged to endure the uncertainties of the affective state in order to advance to the clarity of the cognitive state. Doubt and confusion are necessary parts of learning that advance the problem-solving process or ISP. In this way, reference librarians should be poised to participate in a manner that acknowledges the chaos of the research process. (Elmborg, 2002) While it is difficult to predict the information abilities of users we may encounter in digital reference or their level of motivation, we must be prepared to incorporate teachable moments that promote information competency when possible.

Learning through Effective Use of Examples

Researchers in online instruction have long recognized the need for examples to foster durable learning experience. Two psychological paradigms, behaviorism and cognitivism are important to understanding the purpose that examples serve in online instruction. (Hacker and Niederhauser, 2000) Despite differences in approach, these two paradigms both strive toward the objective of formulating generalizations or transferring concepts and abilities learned through examples to wholly new contexts. The behavioral approach tended to present positive and negative examples so students could learn to distinguish defining elements in each. However, the significant criticism to this approach was its failure to use examples that drew from real-world situations. These are the kinds of examples that were typically used in the cognitive approach.

Of the kinds of examples used, there is a preferential order where authenticity is preferred to tangibility, which in turn is more desired than abstraction. For example, determining how to spend no more than $40 a day during a two week vacation in Rome, Italy (authentic), is a preferred question to: deciding how many hours it would take to completely fill an Olympic-size swimming pool, if water is added at a rate of one cup per minute (tangible); or moreover, finding the value of x in the equation, $y=2xy+4$ (abstract). The transference of concepts or abilities can occur on varying levels of difficulty, from simple and common to complex and rare, depending on what is appropriate to the stated learning objectives.

In teaching environments transference occurs when examples facilitate the retention of concepts and abilities that when used over and over again, can have the affect of reinforcing such concepts and abilities. However, in online classrooms where interactions may be staggered using asynchronous technology or lead to miscommunication using synchronous technology, examples are also an affirmation of the principle aim: keeping students cognitively engaged in the learning process. In this

manner, real-world examples not only facilitate transference as bridges of understanding to learning objectives, but also concretize the online learning experience that is otherwise distant.

In digital reference, transmissions in the form of chat transcripts or e-mail messages fulfill the role examples play in online classrooms. These transmissions by themselves and in addition to imbedded URLs, slideshows or attached handouts, also may have a distinct cognitive function to improve or develop information competency abilities in users. Digital reference services of e-mail and chat are mediums capable of making extensive use of other materials for instruction, written and otherwise. Emphasizing the value of instructional materials (handouts, pathfinders, web pages, and even signage), Beck and Turner discussed how to effectively develop such materials. (2001) Although written or interactive materials take time to create, this seems a small concession given these materials have the potential to represent durable learning tools which may have wide-ranging impact when shared among users working collaboratively. Chat transcripts or well-crafted e-mail responses, with or without attachments, embedded URLs and scripted messages, represent uninterrupted missives between reference librarian and user. Such written communiqués may have a reinforcing affect on users for being potentially read and reread as needed. Accordingly, transmissions serve the purpose of prolonging the learning experience even after the engagement has ended.

The Internet has accelerated the information seeking process as users can access and retrieve information wherever and whenever they need. Even the idea of hyperlinks has allowed for cross-references and meaningful associations which would otherwise have to be sought manually and thus in a time-consuming manner. While technology has eased the information seeking process by reducing, if not eliminating the physical obstacles of access and retrieval, this benefit comes with mixed blessings as users often act before or without thinking.

Teaching information competency standards through digital reference represents a challenge to encourage reflection before reaction. In this era of point and click, we must consider ways to get users to slow down, think critically and explore the available options. Despite the delays of asynchronous communication, studies have shown that e-mail promotes learning whereby participants have "the opportunity to frame, reflect on, and revise questions and responses before sending them." (Harrington and Hathaway, 1994) Evidently, transmissions are one such tool for promoting thought before action, as these must be read before users can act upon them. Users become more thoughtful and consider the course of their information seeking process that may change in response to what information is found, which could in turn be used to construct new search statements. As a result, a user's information seeking actions are not routinely executed but instead are cognitively placed into meaningful perspectives.

Examining two principles of effective online instruction and considering their relevance to digital reference, digital reference librarians can begin to identify curricular objectives that aim to improve the information seeking abilities of users. While information competency as a curricular basis for teaching through digital reference is a challenging endeavor, it encompasses essential abilities needed by users to successfully engage in the information seeking process.

Establishing Curricular Objectives: Applying Information Competency to Digital Reference

Since digital reference mediums tend toward a more user-centered approach to learning, it is worthwhile to examine how the ACRL Information Literacy Competency Standards could serve as a curricular framework for teaching in digital reference. More formally, the ACRL Information Literacy Competency Standards for Higher Education set forth five standards that define an information literate user as someone able to:

1. Determine the nature and extent of information needed
2. Access the needed information effectively and efficiently
3. Evaluate information and its source critically and incorporate selected information into one's knowledge base
4. Use information effectively to accomplish a specific purpose
5. Understand many of the economic, legal and social issues surrounding the use of information and accesses and uses information ethically and legally

(Association of College and Research Libraries, 2000)

These five standards are further augmented into twenty-two performance indicators and outcomes that specify activities users must be able to do in order to demonstrate their mastery of each of the five standards.

As a developmental process, information competency requires practice and application to attain proficiency. It is attainable by users both capable and willing to engage in intellectual curiosity and scholarly inquiry, despite the degree of anxiety they may experience during the process. Evidently, the level of proficiency a user achieves in information competency has direct impact on their potential for academic success. Yet, there are wide-ranging benefits to information competency that extend beyond the realm of education to encourage career success, responsible citizenship and lifelong learning. In this manner, information competency is part of the continuum of learning.

The ACRL Information Literacy Competency Standards represent guidelines to assist librarians and other academic faculty with formulating objectives and assessment tools in their coursework. As a "teaching library," the Newman Library of Baruch College made a concerted effort to teach to information competency through digital reference services (chat and e-mail) since its inception in March 2001. Later that same year, a study was conducted to identify information competency efforts by careful review of 138 chat transcripts dating from March 1, 2001 through October 15, 2001. (Francoeur and Ellis, 2001)

A research methodology for analyzing the chat transcripts was developed based on a comparable study done by Cottrell & Eisenberg who used the application of the information problem-solving model to academic reference. (Cottrell and Eisenberg, 2001) A set of codes was established for each of the five ACRL standards to identify which standards were taught. Essentially, these codes are a list of the kinds of assistance offered to users that indicated whether one or more of the ACRL standards were absent, thus taught. **[See Table I]** Two coders reviewed the transcripts, first separately then together, so that a consensus was reached. Differences in coding were discussed and a final decision arrived at based on whether sufficient justification could be offered.

Take in Table I here

Analysis of the data, as presented in Figure 1, reveals that standard one (nature and extent of information need) and standard two (information access) were taught the most, representing 22% and 62% of the total chat transcripts, respectively. This is understandable given the ongoing difficulties users have with defining their information needs, especially with narrowing the focus of their research topics. Similarly, the changes wrought by the Internet have expanded the number of formats available for information, thus confounding access. Users have difficulty locating information when there are innumerable places where information could be found. It is also no surprise, standard four (effective use of information) was hardly taught or taught 1% of the time, since it is not the typical kind of assistance offered by librarians. Standard four is better addressed by faculty responsible for the research assignment or those skilled in advising users on writing. Furthermore, standard five (economic, social and legal implications of information use) was seldom taught, representing 3% of the total chat transcripts reviewed. In the few instances standard five was taught, users needed help with citation formats for online sources.

Take in Figure 1 here

The most revealing data of the study, the lack of any chat interactions that taught to standard three (evaluating sources), probably hints of the lengthy amount time required to teach information evaluation. Standard three also requires users to think critically about how information satisfies the criteria for selection and may even be dependent on their completion of the research project. Of the total number of transcripts reviewed, 35% or a little more than one-third of all chat transcripts reviewed demonstrated no ACRL information literacy competency standard. This was either because of early terminations or reference interactions were just pointed explanations of library services or policies.

Despite the importance of knowing the degree to which information competency was taught, there were unavoidable limitations to the study that made it less of an ideal model for gauging the possibilities for teaching information competency through digital reference. For example, the facility for teaching through chat reference varied from librarian to librarian. Although the Newman Library adopted a philosophy for teaching information competency through reference, there was no assessment tool in place to ensure that this was practiced frequently or consistently. Evidently reference experience coupled with some adeptness for using chat software, are just some of the factors influencing effective teaching through chat reference.

For any academic library intent on applying information competency to digital reference, having a copy of the ACRL information literacy competency standards on hand would assist librarians in determining what standards were deficient or missing and could then be taught. This enables librarians to be mindful of information competency standards to effectively engage in point of need instruction. Creating laminated cards with the ACRL information literacy competency standards to distribute among the reference staff to post or carry with them wherever they may be, represents one way to simplify the process of adopting a new practice to reference that would otherwise require memorization. Other factors influencing an instructional reference engagement may even be dependent upon the willingness

of users to learn and to be proactive information seekers. In addition to varying degrees of teaching and learning, another limitation of the study was the relative newness of the service. The study could be regarded as premature since there was still much to discover about and experiment with chat reference for both users and librarians, alike that may not have been accomplished in the first eight months of service. In the future, identifying approaches to teaching information competency standards through digital reference and encouraging librarians to make consistent use of these, would certainly be an improvement to the study.

Although this study was a preliminary attempt to understand the extent to which the ACRL information literacy competency standards could be taught in chat reference services, practical approaches to teaching information competency through digital reference need to be examined.

Teaching ACRL Information Competency Standards through Digital Reference

There has been limited discussion on how to apply information competency to traditional reference, and even less to digital reference. Beck and Turner offered some practical techniques for teaching effectively in reference when time is limited, and students are most receptive to learning at their point of need. Naming this approach, "On the Fly BI", Beck and Turner encouraged reference librarians to incorporate the following behaviors in their reference practice: "questioning behavior, modeling problem-solving behavior, self-verbalization or thinking aloud and physical behavior." (2001) While it is hoped that librarians would be mindful to incorporate these behaviors in reference, they should also be skilled in their use. Evidently, there is a great deal of pressure placed on the reference librarian due to the false impression that certain behaviors will cause predictable responses in users. It may not be possible to truly predict what users will do or even expect users to follow a logical course in the information seeking process.

For these reasons, it is important to develop learning objectives for teaching in reference that are user-centered. Teaching information competency standards represents both a practical and user-centered approach to reference, particularly to digital reference. Reference librarians can use different teaching techniques and behaviors to address those ACRL information literacy competency standards that may be deficient or lacking in users to resolve their information needs.

From Francoeur and Ellis' analysis of chat transcripts, standards one, two, three and five are capable of being taught, though some to a lesser degree than others. (2001) This study indicated that standards one and two were taught the most, whereas, standards three, four, and five were seldom taught or not taught at all. Since standard four entails the creation of an end product such as a research paper or report, it is reasonable that reference librarians should not handle such information problems. In the very least, digital reference librarians could suggest resources to assist with standard four such as writing guides. Standard five concerning "the economic, legal and social issues surrounding information," was only taught when users needed assistance with citations. However, some of the issues raised in standard five may require more time for explanation and discussion than reference engagements allow. Further, Francoeur and Ellis concluded standard three concerning information evaluation, was time consuming to teach. Standard three dealt with the complex concept of evaluation that could not be effectively taught in short-intervals of instruction without using supplemental materials such as handouts, interactive tutorials or information guides. Despite the fact that standard three is difficult to teach, digital reference librarians can still highlight the fundamental ideas of evaluation when they are teaching standards one or two. This is because students are beginning to evaluate information or construct criteria for information selection when they are thinking about what types of information are needed (relates to standard one) and where to reliably access this information (relates to standard two). I will further discuss approaches to teaching these first three standards in an upcoming section.

Each of the information competency standards presents a unique challenge for users to develop proficiency, and thus increase their ability for self-directed learning. While it may be orderly to consider approaches to teaching each of the ACRL information literacy competency standards individually, it is more practical to conceive of a more integrated approach to teaching them. I have found that users are often tackling information problems that relate to more than one standard or their information problems may be primarily about one standard yet confounded by their poor understanding of another. However, this does not prevent reference librarians from teaching one standard when such an opportunity presents itself. When reference librarians encounter teachable moments that require they address more than one standard, aside from teaching the standards, reference librarians are also teaching users about the interrelatedness of the standards that together form information competency. Therefore, it would be of great value to take into account approaches to teaching and promoting information competency that could be used to teach to more than one standard. Although at the Newman Library of Baruch College many integrated approaches to teaching and promoting the ACRL information literacy competency standards have been successfully used in the classroom and in face-to-face reference, they have been even more useful in digital reference.

Topic Development Exercise

Traditional reference permits librarians to conduct interviews to become familiar with a user's information problem. This knowledge is helpful to librarians not only to know what kind of assistance can be offered but also, to better understand what the user already knows about their research topic and what information they may still need in order to complete a specific purpose. While in traditional reference, the reference interview is an efficient and effective means for assessing a user's information problem, in digital reference, librarians are challenged in getting a user to articulate their information

problem. A detailed e-mail reference form or scripted messages in chat are certainly methods for attempting to recreate the traditional reference interview, but even these methods are sometimes hindered by communication difficulties and other behavioral tendencies.

One important tool used at the Newman Library to help users formulate thesis topics and consider the kinds of questions they may need to answer to fully comprehend their information problem, is known as the *topic development exercise* **(see Appendix I).** Essentially users are asked the five W's and one H (who, what, where, when, why and how) about their research topic to assess what may be missing from their knowledge base or the information they gathered.

Belkin first classified such knowledge chasms as anomalous states of knowledge (ASK) where users are compelled to seek reference assistance but are not clear about what information they need or how to articulate their information problem. (1980) For these users, the information seeking process is stunted and comes to a halt. In some situations users experiencing ASK, seek reference assistance in order to brainstorm on their research with an objective party or to assess their research progress. In this manner, the reference interview is not meant for assisting librarians in answering an information problem, so much as for helping users determine what knowledge is still needed as well as what information abilities should be employed.

The topic development exercise can be administered as an interview in chat reference or sent as an attachment to an e-mail response. The questions are meant to challenge users to think about their information topics and sort out what they already know, what they need to know, and what they may want to know. As Beck and Turner noted, "asking hard questions of students challenges them to clarify their information need before they begin their research process." (2001) In addition to using the topic development exercise to prompt users to think about their research topic, it is also effective in helping users to narrow and refine their research interests. For example, a user interested in writing a research

paper on abortion (itself a broad topic) can decide what aspect of this multi-faceted topic they want to examine through the topic development exercise. In this manner, the topic development exercise is instrumental for both topic discovery as well as topic clarification.

Teaching Demonstratively and Explicitly

It is essential for digital reference librarians to be demonstrative and explicit when interacting with users because of the high potential for miscommunication through digital mediums. Giving examples or analogies, digital reference librarians can actively engage users to transfer learned concepts to new situations. For example, one issue I have noted that entails standard one is when a user's information problem is not fully understood or is too general. In this instance, digital reference librarians may want to ask users follow-up questions that are specific in pointing out what may be lacking and how knowing certain information may be essential to the progression of the information seeking process. It is not enough to merely reply to a user that their information need, as stated, is not understood or too general, since this approach does not help a user to better express their information problem. Rather, digital reference librarians must ask questions that may aid the user to think critically about what is lacking or unclear and how they can improve upon their initial query.

Although this strategy may be easily implemented in chat reference, follow-up questions in e-mail reference often go unanswered. This may be attributed to the time added to the entire reference transaction by the exchange of e-mails. In these instances, it may be prudent to point out the inadequacies or shortcomings of how the information problem was posed and then offer general guidance to the user for resolution. Often, the e-mail reference form may provide clues or answers as to the actual information need. In some cases, if the user's information problem as stated is vague, e-mail reference librarians can mention what adjustments to the general research strategy could be made once

the topic is clarified. This approach enables the user to realize the problems of their initial query, yet still offers some means for resolution.

Another demonstrative approach to consider is showing a displayed index. In doing so, digital reference librarians can effectively teach aspects of both standards one and two. As a way to demonstrate the possibilities for narrowing a particular topic as part of teaching standard one, digital reference librarians can also show a displayed index in the subject section of a database that indicates the hierarchy of subject classifications such as related topics, narrow topics, and broad topics. This can be facilitated in chat by simply pushing the page or even co-browsing a database. In the instance of e-mail reference, librarians can direct users, step-by-step, to consult the displayed index of a database.

Many digital reference users I have worked with have found it extremely helpful to review a displayed index from a database, not only when they are having difficulty narrowing their research focus (standard one) but also to acquire controlled vocabulary that could assist them with formulating search statements (standard two). Evidently, standards one and two are connected through the notion that controlled vocabulary are related to a specific discipline or topic. It is not uncommon for online users to simply type the first few words that come to mind on their topic and spend little time consulting subject dictionaries or even brainstorming on the many kinds of words that could be used to formulate search statements. In fact, subject terminology or jargon is important to formulating search statements and could make the difference between obtaining relevant or off-target results. Using a displayed index, users can learn how to tackle some of the ideas covered under ACRL standards one and two, explicitly and demonstratively.

Information Producer Model

The information producer model is the only approach presented that can effectively teach to at least three of the ACRL information literacy competency standards. Created by Professor Kyzyl Fenno-Smith, currently at California State University at Hayward Library, the information producer model represents a cumulative approach to understanding the system of information production and the many factors affecting this system.

A crucial performance indicator for standard one involves "identify[ing] a variety of types and formats of potential sources for information." While users may learn this idea by their experience using various books, scholarly articles, and databases on a given topic, it can be taught well remotely through the *information producer model*. The information producer model requires users to answer a series of questions, each building on the next: (a) Who cares enough about your topic to write or express something about it? (b) What particular subject disciplines are associated with those parties interested in your topic? (c) What kind of information would these stakeholders produce? (d) Who is the potential audience for the information produced? (e) Where is the information produced and how is it disseminated? This model works by enabling users to learn the complexities of information production in gradual steps. Users are able to easily answer the questions by making connections without getting too overwhelmed. Perhaps what makes this approach so successful is how it prompts wide-ranging discovery, thus awareness on the part of the user to think of all the stakeholders for a topic and the information they produce, regardless of how obscure or little known they may be. In using the information producer model, I have found once the first question is answered, users can readily answer succeeding questions.

Questions (b) and (e) of the information producer model relate to concepts covered under standard two. For example, a user researching the new occupational roles assumed by women in this

country during World War II, would certainly name historians among the list of stakeholders on such a topic. Historians contribute to the humanities discipline of history and are writing, among many things, scholarly articles, biographies, non-fiction books, and even contributing to documentary films. If the user attempts to find biographies on the subject, they would first have to think about where such distinct sources are produced in order to access them. From a familiarity with this genre, most users think readily of books as the likely source of biographies. Remote users intent on locating materials online and brief in nature would perhaps, then think of finding biographical summaries on the Internet, and even subscription databases like, Gale Group's *Biography Resource Center*. Knowing the name of the group of women who fit the profile of the research assignment, the user would possess another key to access biographical information. (i.e., Rosie the Riveter) Without such information, users can still formulate search statements for appropriate databases using words or terms from their original thesis statement such as "women and world war II." Depending on the list of retrieved results, and reading the results closely, the user may modify this general search statement by adding a new word or another word from their thesis statement like "occupation" or synonyms as, "job" or "profession."

Questions (d) and (e) of the information producer model deal with ideas set forth in standard three. Evaluation is a process that entails formulating comparisons and ranking gathered sources in order of importance to the information need. These tasks are probably easily accomplished when users first establish criteria for selection. Mindful of the general criteria for evaluation as presented in tutorials and guides on evaluation (purpose, authority, currency, audience and accuracy), users may hesitate in applying these overarching concepts. At this point, a sub-exercise could be introduced that essentially puts theory into practice. Considering the user's frame of knowledge based on age and interests, digital reference librarians can engage users in posing a hypothetical question: "If you are thinking about buying a stereo system, what would you consider in your selection?" Users usually are

not the least bit reluctant to contribute to listing criteria. They learn to be just as particular about the sources they select for their research assignments as they are about the products they consume. However, knowing what you want from a source and knowing where to locate reliable sources, are two different things. If users identify the authority and audience of a source, they can assess reliability. Admonishing users against the use of the Internet as a source for information, is a futile task and further defeats the purpose of promoting self-directed learning. Instead digital reference librarians can work with instructors to teach users how to distinguish between reliable and dubious Internet sources.

The information producer model is ideal for users who do not realize that they already possess knowledge that can be wielded as a powerful tool for investigation. Users are rather surprised and amazed that they have some ability to think through a research problem to help him/herself. Digital reference librarians can assist students through the information producer model by "thinking aloud" and placing themselves in the shoes of the user. Not only is it troublesome that users do not realize they possess some skills required to work through many research problems from their life experiences with information, they are often not treated by their instructors as if they possess such skills and cognitive capabilities. The more digital reference librarians continue to "hold the hands" of users, the more they doubt them and perpetuate the false self-image of users as inept information seekers.

Transferable knowledge of databases

At a time when users must select from over one hundred subscription databases available at the Newman Library, it is not feasible for reference librarians to provide instruction in searching each and every database. This problem is further complicated by changes in the search interface of these subscription databases that may occur a few times over the course of a year and without advanced notice. How can digital reference librarians best teach users about standard two (information access)

when faced with a plethora of databases, each with its own interface that will undoubtedly change in time?

By teaching transferable knowledge of databases to users, digital reference librarians are emphasizing the commonalities of database systems. This approach helps to further minimize the unique design and look of each database that serves as a distraction from the general purpose and structure of databases. Digital reference librarians are also teaching users to adapt to unforeseen changes in database systems that could become an impediment to effectively and efficiently searching for information. For example using the transferable knowledge approach, digital librarians can present common types of database systems, as a frame of knowledge for what users can anticipate encountering. They can then present a typical database record where users are made aware of the possible fields to search such as title, author, abstract, or source. Lastly, they can give users an overview of ways to formulate searches, from using Boolean operators to more advanced search techniques, as proximity operators and truncation. They may even want to reinforce the importance of being proactive information seekers who do not become wedded to one search statement but are poised to consider new vocabulary that could lead to more information. This approach can effectively be taught in digital reference using an attached handout or an interactive tutorial.

Given the competitiveness among vendors of database systems today, it is interesting to note that these vendors are keen on designing databases that look alike and have few functional differences. This trend certainly works to the advantage of digital reference librarians who can more readily teach transferable knowledge of databases. It is also worthwhile to encourage users to consult the help guides available in databases, which are more user-friendly than they were years ago. As a means for increasing self-directed learning, transferable knowledge approach teaches users how they can tackle searching new and different databases systems on their own or with minimal help from librarians.

Conclusion

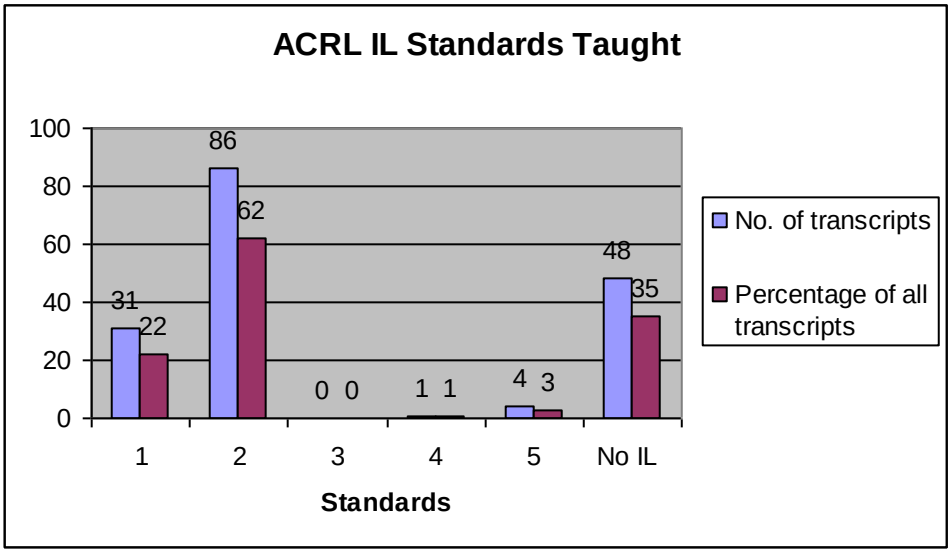
Over the years, academic libraries have worked diligently to realize their purpose as "teaching libraries". Whether teaching occurs formally in the classroom, at the reference desk or remotely using digital reference, academic librarians are overcoming all kinds of technological and pedagogical challenges to increase self-directed learning through the teaching and promotion of information competency. As users, more and more, are working in environments that necessitate remote access to library services, it is perhaps crucial for librarians staffing such services to consider how they can effectively teach using approaches that acknowledge the benefits and limitations of digital reference services of e-mail and chat. In these new digital environments, users and librarians have discovered new relational dynamics. The digital reference engagement has transformed users from being anxious, dependent, and disinterested in learning, to being self-efficacious, autonomous, and proactive learners.

Although a number of practical approaches to teaching information competency through digital reference have been presented here, this is only the beginning of a call for best practices for teaching through digital reference. Digital reference librarians should be committed to developing new and different approaches to teaching that acknowledge the collaborative efforts to promote information competency within an institution among all teaching faculty, administrators and other key staff. It is hoped that all students, no matter their level of education or ability, will be reached through such institutional collaborations. Nonetheless, it is hardly insignificant that digital reference librarians are working at a pivotal point where they can potentially reach users of all kinds, reinforcing information competency in ways that are developmental and integrated.

Table I – Coding List for ACRL ILC Objectives

ACRL ILC Objective	1	2	3	4	5
Abilities Defined	The information competent student determines the nature & extent of the information needed	The information competent student accesses needed information effectively & efficiently	The information competent student evaluates information & its sources critically & incorporates selected information into his or her knowledge base & value system.	The information competent student individually or as a member of a group, uses information effectively to accomplish a specific purpose.	The information competent student understands many of the economic, legal & social issues surrounding the use of information & accesses & uses information ethically & legally
Reference assistance offered that attempts to teach to ACRL ILC objectives	Need to conduct reference interview Topic development (broadening or narrowing topic as needed). General advice about books vs. magazines vs. journals vs. websites that relate to the student's topic. Discuss importance of doing background research.	How to access databases remotely. Recommendations of specific databases or other resources to use. Instructions on how to search for information or refine search. Instructions on how save print, or download. How to find text of articles listed in an index. How to use a call number to find a book in the library. How ILL works. Where to get info about admissions, registration, hours of facilities, phone numbers, etc. How to retrieve reserve materials.	Help evaluating the source on its own (i.e. look at biases, agendas, etc.)	Help with uploading coursework (such as essays) on Blackboard. How to copy and paste text from source material into student paper.	Help with citations.

Figure 1


ACRL IL Standards Taught
100
80
60
40
20
0
86
62
31
22
0 0
1 1
4 3
48
35
1
2
3
4
5
No IL
Standards
No. of transcripts
Percentage of all transcripts

Appendix I

Topic Development Exercise

By K. Fenno-Smith and J. Bornstein

This exercise will help you detail what you already know about your topic and perhaps highlight some of your assumptions or biases. Your answers to these questions along with other questions and thoughts that occur to you will be useful as you plan your research strategy and begin your project.

What?

FIRST

State your topic simply in one or two sentences.

WHY?

- Why did you select this topic?
- What interests you about it?
- Do you have an opinion on the issues involved?

HOW?

- How is your topic discussed?
- What language is associated with your topic?
- Do different groups use distinct terms to describe or discuss the issues?

WHERE?

- What places or areas will you include in your research?
- Are there specific regions, countries, states, or cities pertinent to your topic?
- Will you be comparing policy or legal practices in different places?
- Will you be examining religious or cultural values and practices concerning your topic?

WHEN?

- Are you interested in finding current day, recent past, or historical information?
- Are there specific dates or periods of time associated with your topic?
- Will you be comparing past practice with today's standards?

WHO?

- Who is affected by the issues related to your topic?
- Who might write or publish information on the topic?
- Are specific professions or occupations associated with the issues?
- Do certain academic disciplines study the issues?
- Are there individuals who might form organizations concerned with the issues?
- Are there well known persons associated with the topic?

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