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An Exploratory Survey of Reference Source Instruction in LIS Courses

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A Survey of Reference Source Instruction in LIS Courses

Abstract

We surveyed 40 reference instructors at 28 North American ALA-accredited programs of library and information studies about instructional methods they used in teaching about reference sources in print and electronic formats. Results indicated that instructors spent more time teaching students about electronic than about print sources. General reference courses included a larger variety of instructional methods for teaching print sources than did subject-specific courses. Commonly-used instructional methods for print sources included instructor-led discussion of the sources and hands-on assignments completed outside of class time. For electronic reference sources, commonly-used instructional methods were instructor-led discussions and modeling searches. The study identified an apparent conflict between instructors' desires to develop a deeper knowledge of print and electronic sources, and their ability to ensure access to sources, work with technology, and manage changing interfaces. We conclude with three options that LIS practitioners and educators might take to address this conflict.

Introduction

In a review of papers presented at a Reference and User Services Forum in 2002, John V. Richardson, Jr. suggested that provision of reference services involves a confluence of three factors: information resources, information technology, and users.¹ This paper focuses on one of those factors, information resources (herein called reference sources) and the practice of teaching about those sources to future librarians in American Library Association (ALA) accredited

library and information science (LIS) programs in the North America (the United States and Canada).

Reference sources facilitate easy access to snippets of information. Effective reference practice requires a thorough knowledge of a variety of reference sources, thus making librarians' ability to use these sources an essential aspect of their professional practice. Reference courses provided in LIS programs teach library students to use various reference sources in order to become familiar with finding information and providing it in the right format for the information seeker. Recently, both LIS educators and librarians have voiced concerns about trends in reference source instruction. For example, at the Association for Library and Information Science Education (ALISE) conference in 2003, reference educators in the Teaching Methods Special Interest Group discussed the difficulty of balancing reference source and service instruction in one semester, the need to cover a vast number of reference sources in one course, and the difficulty of putting reference sources use in the appropriate context to facilitate student learning. Reference instructors also mentioned that students increasingly rely on Google to answer practice reference questions, rather than exploring print sources. However, even before Google, developments in information technologies and the growth of the Internet in the 1990s heralded a time of fundamental change for reference source instruction. Because many reference sources became available online, the coverage of reference instruction has expanded to include not only traditional paper formats but also multiple electronic formats such as CD-ROMs, proprietary databases, and the World Wide Web (Web). This expansion of format coverage has placed new demands on reference instruction.

Knowing how LIS reference educators manage reference source instruction in the changing environment is of interest to many categories of library professionals. It may assist

new educators in determining successful instructional strategies, allow experienced reference instructors to understand the shared concerns of reference instruction, or familiarize practicing professionals with some of the strengths and limitations of LIS reference education. However, there is limited information available about current practices in reference source instruction. We conducted an exploratory survey of reference instructors at American Library Association (ALA) accredited LIS programs to determine the teaching methods they use to present reference sources to their students. Two broad questions guided our research: (1) what instructional methods do instructors use in teaching reference sources, and (2) what are the most effective and most challenging aspects of presenting reference sources to students?

Literature Review

Samuel Rothstein's brief history of LIS reference education describes contentions regarding the appropriate role of source instruction.² The principal question for Rothstein was, what should reference instructors teach to their students? Should the instruction concentrate on memorization of specific sources; usage of various types of sources; or on communication and operational issues inherent in reference encounters? This question speaks to the larger issue of what role the reference librarian plays in the reference encounter.

Samuel Swett Green in 1876 portrayed the librarian as pleasant and helpful, though very much the social and intellectual superior of the reader being assisted.³ The role of the librarian in offering this "personalized assistance" was not to provide answers for the patron, but to teach the patron to be self-sufficient. However, this "conservative theory of reference work" was not universally accepted, as some librarians advocated and practiced more direct provision of

information. The debate about whether the reference librarian facilitates or furnishes access to information is ongoing, particularly in academic and school libraries.

Another concern was the educational background that would best serve the reference librarian. With the development of specialized reference departments in the 1910s, reference librarians were sought who had expertise in certain fields, and library schools developed specialized reference courses.⁴ The question the profession was dealing with was whether specialized reference training was necessary, or whether anyone could learn to negotiate unfamiliar reference territory through the use of “reference strategy.”⁵ Some academic libraries have traditionally sought candidates with advanced subject degrees to complement the ALA-accredited LIS degree.⁶ The idea of an intensive library fellowship as an alternate route into librarianship for humanities scholars has been developed and debated by librarians.⁷ Do librarians with advanced degrees have additional extra knowledge that librarians with only the MLS do not have?

Rothstein describes changes in reference education from the primarily source-based instruction of the first half of the 20th century to operationally-focused instruction dealing with reference interviews, patron interaction, and types of sources.⁸ Other evidence of this transition comes from Ronald R. Powell and Douglas Raber who in 1994 provided an extensive review of literature on reference instruction and concluded that there has been “a gradual shift ... from the consideration of titles and queries to the broader concerns of information service.”⁹ While in the 1970s and 1980s, reference courses emphasized the use of sources, by the 1990s the educational content of reference courses was expanded to include topics such as patron interaction and technological mastery. John V. Richardson, Jr. points out a 1930 reference textbook that delineates appropriate personality traits of the reference librarian, saying that “the [reference

instruction] paradigm has undergone a shift from formats to method and back again.”¹⁰ New technology, new sources, and new views of reference interactions have been added into an already-crowded reference curriculum.

Despite introduction of new curricular elements, knowing which reference sources to use and how to use them remains a fundamental component of reference service. Reference educators have historically maintained that some source knowledge is essential. The importance of source instruction has been supported in both research and practice-oriented literature of the pre-Web era. A survey of LIS schools published in 1989 revealed that all “types of sources” were taught in 100% of responding schools’ reference classes.¹¹ In another study, reference instructors ranked source instruction as being more important than instruction in reference services or reference philosophy.¹² An adjunct instructor of general reference presented a generalized reference syllabus in which twelve out of fourteen weeks were occupied with the review of some type of information source.¹³

LIS literature suggests that non-print reference sources have historically received less instructional coverage than print sources. Summarizing reference instruction up to 1990, Richardson noted that “formats such as microforms, and more recent technologies including online and CD-ROM resources, received almost no attention.”¹⁵ Despite the early lack of attention to non-print formats, electronic source instruction has become more prevalent in recent years. In 1993, Powell and Raber found that while 80% of instructors taught specific print sources, over 50% also taught electronic sources, such as online databases and CD-ROMs.¹⁶ Later work by Ingrid Hsieh-Yee found that the instruction of electronic sources was no longer performed exclusively in reference courses.¹⁷ Hsieh-Yee’s survey found that electronic sources were taught in 293 LIS classes, of which only 45% were traditional reference courses. As

electronic information sources become more ubiquitous and easier to use, LIS education has increasingly gravitated toward them.

LIS practitioners have supported the idea that the foundation for effective reference services is the ability to select, evaluate, and use information resources. The most recent summary of reference competencies compiled by the Reference and User Services Association (RUSA) indicated that librarians must be able to choose among multiple information sources to find the best one for a patron; be able to organize and present information sources so as to maximize patron access; and know how to use both print and electronic sources.¹⁴ These competencies represented the skills and abilities that practicing librarians believe reference librarians must possess. Accordingly, knowledge of sources is assumed to be an explicit characteristic of a truly competent professional.

Contemporary methods for teaching students about reference sources have not been well-documented; nevertheless, some historical information on this topic is available. For example, descriptions of instructional methods in the Williamson Report of 1923 include lectures about reference books, distribution of lists of reference questions, and in-class discussion of methods of finding answers to those questions.¹⁸ Furthermore, according to Rothstein, until the middle of the 20th century, guides to reference books dominated the curriculum.¹⁹ Richardson expands on the idea of a source-based reference curriculum by looking at historical reference textbooks published from 1890 to 1990 and the role of textbooks as signifiers of a reference instruction paradigm.²⁰ He also documented teaching methods used by reference instructors between 1890 and 1953, including discussion of specific reference sources, discussion augmented by “practical [reference] problems,” discussion of search techniques for general source types, and learning “by doing.”²¹

Richardson's technique of assessing source instruction by looking at reference textbooks can be used to assess the types of source instruction favored by current reference instructors. Two texts are primarily used for reference instruction, William A. Katz' *Introduction to Reference Work, Volume I* and Richard E. Bopp and Linda C. Smith's *Reference and Information Services: An Introduction*.²² Both of these volumes categorize reference sources by type, with examples of specific sources included within each type. Further, both texts have chapters devoted to electronic reference sources, but also include mixed coverage of print and electronic sources in the chapters dealing with various types of sources (e.g., dictionaries, encyclopedias, indexes). It might be assumed from this coverage that reference students are exposed to the names of reference sources and the types of information covered in those sources. However, this text-mediated approach decontextualizes the sources and does not permit visual, tactile experience of those sources that might be obtained in the classroom or through directed exploration of sources. LIS students have a variety of learning styles and while some will find a text-based presentation of reference sources adequate, others will "need the opportunity to work actively" with those sources in order to learn them.²³

In 1982, F. William Summers noted some of the teaching methods used by reference instructors at that time, including reference simulations and case studies.²⁴ Susan McEnally Jackson suggested comparison of print and electronic versions of the same source as a teaching method in 1989.²⁵ In 1994, Powell and Raber documented frequently used methods such as lecture, discussion, demonstration, online searching, self-guided study, and treasure hunts.²⁶ Hsieh-Yee found that preferred methods for teaching electronic sources included lecture, hands-on experience, and demonstration.²⁷ However, the above studies have mentioned reference source instruction in passing, not as a specific focus of the research. Furthermore, most of the

documentation of reference source instruction was conducted in the pre-Web era. A more formal study of current reference source instruction methods is needed, specifically examining methods used for both print and electronic sources.

Method

This exploratory study was designed to provide practical information about how future librarians are taught about using these sources in LIS education programs. To study the instructional methods used, we created a Web-based survey instrument (reproduced in Appendix A), searched LIS program Web sites to identify reference instructors, and invited those instructors to participate in a survey about their instructional methods. The survey consisted of six closed-ended questions about methods used in individual reference courses taught by the survey respondents. These closed-ended questions asked about percentage of time the respondents spent teaching print and electronic sources and the methods used to present print and electronic sources. In addition to the closed-ended questions, six open-ended questions asked reference instructors to report on what they perceive as their most effective teaching strategies and problem areas they encounter in teaching about reference sources in both print and electronic formats.

Pretest: A paper version of the instrument was pre-tested for content, clarity, and presentation by a group of reference instructors at the annual ALISE conference in January 2003. This pre-testing procedure also contributed to content validity of the study instrument. While the instruments were not separately tested for reliability, the nature of the majority of the questions (factual reporting of the participants' real experiences) increased the likelihood of high

reliability. We integrated pre-test feedback into the final version of the survey instrument and then converted the survey into an online format.

Population: The target population for this study was all instructors of reference courses at ALA-accredited LIS programs in North America. To identify members of this population, we visited the Web sites of all 56 LIS programs accredited by the ALA at the time of the study. We used course titles to identify reference-type courses taught within the previous three years, or if three years' of schedules were not provided, for as far back as course schedules were available. Some common terms used to identify these courses were: information sources, reference, library materials, and information access. The following are examples of typical course titles we identified:

- for *General Reference Courses*: Information Sources and Services; Reference and Information Services;
- for *Subject-Specific Courses*: Library Materials in Humanities; Social Sciences Reference; Business Information Sources; and
- for *Online Reference Courses*: Online Information Services; Digital Reference.

The complete list of courses included both introductory and advanced courses.

The instructors of reference courses identified on the Web sites were the accessible research population for this study. The process of population identification has some obvious limitations; for example, instructors may have been overlooked due to a lack of course schedules' availability on the Web or due to a misleading title for an otherwise reference-oriented course. However, we believe that this approach allowed us to identify a high percentage of practicing reference instructors while avoiding those who are not involved in reference instruction.

After identifying our study population, we acquired instructors' contact information from the schools' Web sites. E-mail invitations to participate in the study were sent to a total of 86 individuals from 48 institutions. Eight schools' Web sites did not provide sufficient information to identify reference instructors. The accessible population was narrowed to 78 participants because four e-mail addresses had permanent delivery errors and four individuals responded that they did not teach reference courses.

Return Rate: The first invitation for study participation produced 27 returned surveys, while a follow-up e-mailing garnered another 20, for a total of 47 surveys (60% response rate). Seven surveys were found to have technical errors and had to be excluded from the data set. As a result, the study data were provided from 40 reference instructors from 28 schools (50% of the 56 ALA-accredited LIS programs in North America). Respondents comprised 51% of the accessible survey population of 78, as identified through LIS programs' Web sites.

All respondents answered the six closed-ended questions for each of the reference courses they taught. (For the text of the questions, please see Appendix A.) For these questions, the unit of analysis was the individual course (n=61). We tabulated the data for each course and analyzed them using simple descriptive parameters (averages). The six open-ended questions were answered by 31 to 36 respondents each. We analyzed the content of the answers through several coding iterations, allowing for codes and broader coding categories to emerge from the data itself. The iterative coding procedure followed the format of "analytic induction" that is commonly used in qualitative research. This procedure is also shared by "grounded theory" methodology; however, in contrast to grounded theory, our study used analytic induction as a technique for data analysis and not as a tool for theory development.²⁸ Whenever possible, respondents' answers were assigned only one category. In a few situations (see Findings below)

when determination of a single code was not possible, we assigned multiple categories. Because we performed the data coding activities jointly, there was no need for separate intercoder reliability evaluation.

Findings

The 40 survey participants reported teaching a total of 61 unique reference courses. Based on course titles, 30 of those courses were general reference, 22 subject-specific, and 9 dealt exclusively with electronic reference sources. Of the 30 general courses, 28 focused on basic reference and 2 on advanced reference. Areas covered in the 22 subject-specific courses included humanities (5 courses), health sciences (4), business (4), social sciences (3), science (3), and government documents (3). Among the electronic reference courses, 7 were devoted to general electronic sources and 2 were subject-specific, covering business and health sciences. Table 1 provides a summary overview of the types of reference courses included in the study.

[Table 1 about Here]

Instructors spent more time teaching students about electronic than about print sources. As indicated in Table 2, across all 61 courses, 59% of instruction time was dedicated to electronic sources and 41% to print sources. Controlling for courses which dealt with electronic sources specifically, the gap between coverage of these two formats lessens. In general reference courses, average time was evenly split between print (50%) and electronic (50%) sources. In subject-specific reference courses, on average, more time was spent on electronic sources (57%) than on print sources (43%). Finally, while instructors of online reference courses spent a vast majority of time (94%) on electronic sources, some time was still devoted to print sources (6%).

[Table 2 about Here]

Methods of teaching about reference sources

We provided a list of alternative instructional methods that instructors might use to present print and electronic sources. Instructors ranked these methods on a scale of 1 to 5, with 1 being the method they perceived as being their least-used method and 5 being the method they used most often. Because course delivery formats and time periods are not standardized, we relied on respondents' subjective measures of frequency of use, rather than objective measures, (e.g., number of uses per week). An open-ended "Other" choice allowed participants to describe and rank additional methods of teaching print and electronic resources. Table 3 presents two measures of use for instructional methods. The "percent" column shows the percent of classes in which a method has been reported as used, regardless of the frequency with which the instructor used that method. The "average frequency" column was calculated by averaging the frequency rankings that instructors provided.

In both general and subject-specific reference courses, the most frequently used instructional method for print sources was in-class discussion of reference books led by the instructor (see Table 3, item 5). Overall, general reference courses included a larger variety of instructional methods for teaching print sources than did subject-specific courses. For example, the five methods included in the survey were used in 70% or more of the general reference courses. Although 86% of subject-specific reference courses used in-class discussion of sources, only about half used the alternate instructional methods identified. Not surprisingly, not many instructors used methods of print instruction in online reference courses, and if they did so, they felt they used these methods rather infrequently. Respondents who chose the "Other" category mentioned reproducing reference source pages for their students, issuing assignments involving

work with reference sources, creating workbooks or worksheets for student assignments, offering student-led bibliographic instruction sessions, and keeping source journals.

[Table 3 about Here]

The two most frequently used methods of presenting electronic sources were to model online searching in the classroom and to discuss searching electronic sources in general terms (Table 4, items 2 and 4). On average, live search modeling was reported as the most frequently used method in general reference (3.79) and subject-specific reference (3.93). Respondents reported that the most frequently used method for online courses was the discussion method (3.88), followed by live search modeling (3.63). In the “Other” category, two instructors noted that they demonstrated the search process, which students immediately replicated at their own workstations. Additional teaching methods included having students make class presentations of databases, creating scripts to walk students through searching, using workbooks for products such as DIALOG, and focusing on static database features such as “help,” “how to,” and “about” features.

[Table 4 about Here]

Two of the open-ended survey questions asked about methods used for comparing reference sources. The question about comparison of print resources was answered by 34 respondents. The two main categories, identified by 13 respondents, were:

- assigning students to complete exercises that require use of multiple sources (“A practice reference question will ask them [students] to find the answer to a question and compare either two sources given or one given and then to choose another on their own.”); and
- using the professionally established criteria for reference source evaluation as a base for comparison. (“I use standard evaluation criteria {scope, treatment, format, arrangement,

authority, cost, relation to similar works, special features} as a starting point.”)

In-class comparison of physical sources and use of source representations (slides, handouts, and transparencies) were reported by only two respondents each. Three respondents indicated that comparison of print sources is not what they typically focus on in their reference courses.

The open-ended question about methods used to compare electronic sources was answered by 36 respondents. For 15 respondents, methods for comparison of electronic and print sources were identical. Many instructors (13) also reported using specific evaluation criteria that are similar to criteria applied to print sources (e.g., access, content, cost, and organization). Some evaluation criteria were unique only to electronic sources, specifically, comparison of search processes, interface design, and usability issues; these criteria were mentioned by 11 respondents. Similar to comparison of print sources, nine respondents relied on students to perform exercises on their own and to give presentations. In-class demonstrations and class discussions, as a tool of comparison, were mentioned by six instructors. Two respondents made a specific point that they compare electronic sources with print sources. Finally, for four instructors, comparison of electronic sources was not an important instructional method.

Most effective and most challenging aspects about teaching reference sources.

Responding to an open-ended question, 35 instructors identified methods that they considered particularly effective for teaching about print sources. The majority of respondents (28) used hands-on assignments, often combining them with follow-up, in-class presentations by students. Here is an illustrative example:

“Teaching them in context. I make it a major function of the fieldwork. I don’t think it’s effective to hand books around to discuss reference “genres” like index, bibliography,

biography, etc. You need to really *use these sources* [emphasis added] to understand them. Handling the book isn't enough.”

In-class discussion of print sources was reported as the most effective method by six respondents and organized site visits to a library by only three.

For the majority of respondents to the open-ended questions (22), students' hands-on assignments and follow-up presentations were the most effective teaching methods for electronic reference sources. In-class search demonstrations performed by instructors or vendor representatives were a distant second (10). Seven respondents commented that the same methods that are effective for print sources also work well for electronic sources. Additional teaching methods, identified by only one or two instructors, included in-class guided exercises; integration of discussion on print and electronic sources, students' group work; and fieldwork with observation of librarians at work. Two respondents reported that they have not yet found an effective method for teaching electronic reference, as illustrated by the following answer:

“I consider this still to be an open issue for me and for my students. Electronic resource selection is an ongoing problem. This is an area in which I am always looking for new ways to facilitate learning.”

An additional two open-ended questions asked reference instructors to identify the main challenges they face about teaching reference sources in print and electronic formats. These were answered by 35 and 36 instructors respectively.

[Table 5 about Here]

For print resources, the complete list of categories and their frequency distribution in respondents' answers is provided in Table 5. Most respondents (13) reported challenges associated with some type of access to the sources themselves. As illustrated with the following

quotes, the most prominent problem was access to print sources in courses that are completely Web-based:

- “Getting student access. Web-based courses for DL students make it impossible to ensure they have access to print resources.”
- “Since my class is almost entirely online I hope all students have access to titles I refer to here in their home library. Access to standard titles is usually not a problem, but I cannot assume all students have seen a more unusual title.”

Another prevalent category (10) was related to the efforts instructors need to invest in making students realize the value of print sources. As one of the respondents explained it, “Nobody wants to deal with paper anymore.” Of the responses coded in this category, eight focused on the challenges that instructors face in convincing students that “paper-based reference sources are still valuable; that going to the Web may not be the best strategy.” For the remaining responses in this category, the key challenge was how to reach the students and keep their interest in developing deeper knowledge of the content, as illustrated by the following response:

“Deciding what analogies/examples to use to make the points I wish to make alive and stick in students’ minds. Knocking down superficial understanding and ‘layperson’ misperceptions to be able to tackle more sophisticated knowledge.”

Additional challenges included selection of which sources to cover in the class (4) and development of sample reference questions (2). Three reference instructors reported that there were no major unique challenges in teaching print sources.

The variety of responses called for a longer list of categories for challenges in teaching electronic sources than for print sources (see Table 6). Many instructors identified more than one key challenge in teaching about electronic sources. These answers have been coded with all

applicable categories.

[Table 6 about Here]

Three main categories of challenges for electronic source instruction were:

- development of a deeper knowledge of electronic reference sources, identified in eight responses (“Students tend to want to search as though using Web search tools such as Google. It can be a challenge to get them to embrace Dialog or other structured database resources.”);
- changes in the content and interfaces of the electronic sources, identified in seven responses (“...the vendors change the interfaces pretty frequently so it simply gets a little confusing, especially for the new students, remembering which sources work best for which type of search.”); and
- problems with accessibility due to cancellations and lack of availability of more expensive electronic sources, identified in seven responses (“...in my state there is such a huge discrepancy between the small rural libraries and the large public and college libraries in terms of what is available to use. Many small publics don’t have electronic resources at all. It’s an economic issue.”)

Additional challenges identified by more than one respondent were problems with technical support such as lab operations, proxy servers and passwords (5 responses); selection of sources for inclusion in the course content (5); students’ uneven preparation for online searching (4); lack of time for in-class demonstrations (3); and lack of search interface standardization (3). Three respondents stated that they do not face any major challenges because the representatives of online vendors are eager to help with in-class demonstrations. Finally, the issue of keeping the coverage of electronic sources interesting was mentioned in only two responses.

Discussion

Our study findings identified the instructional methods applied by LIS reference instructors in teaching about reference sources and also pointed out the most effective and most challenging aspects of reference source instruction. In simplified terms, there are two general types of source instruction for both print and electronic types of reference sources:

1. *Discussion about sources*, led by the instructor or students reporting on their assignments.

Frequently, discussion involves explanation of evaluative elements used for comparison of reference sources; and

2. *Use of reference sources*, primarily accomplished through students' hands-on exercises.

While exercises involving use of print sources happen primarily without instructor supervision and outside of class time, use of electronic sources is frequently demonstrated by the instructor during class time.

In general, students get little in-class experience in handling and using print sources. Instructors expect students to gain application skills outside of class, through exercises and assignments. Instructors also seem to believe that comparison of resources flows better in the context of practical experience of using the sources. This approach avoids the difficulty of in-class demonstrations involving print sources, such as moving books from the library to the classroom or creating representations of print sources in a form of slides, transparencies, or PDF documents.

Overall, the reference instructors in our study reported spending more time teaching about electronic sources than about print sources. They also devote more class time to demonstrating electronic sources than to print sources. One possible explanation for the

instructional emphasis on electronic sources is the overall increase in importance of electronic formats in provision of reference services due to proliferation in their production and accessibility. Furthermore, networked access to electronic reference sources eliminates the logistical difficulties for in-class demonstration that are typically associated with bulky print formats. The portability and accessibility of electronic sources makes it effortless to demonstrate their use in the classroom, with just a computer, projector, and Internet connection. While instruction for print source utilization is deemed intuitive, and students are presumed to understand basic skills (e.g., using page numbers, indices, and tables of contents), electronic source instruction tends to be process-oriented and focused more on the search process. Instructors therefore make great use of modeling and demonstrating searches.

Many other instructional challenges reported by the survey participants can be attributed to the changes in the format of LIS education from in-class, face-to-face instruction to various types of distance education and increased use of electronic reference sources. For example, in reference courses that are offered in completely online format, students are distributed in various geographical locations and do not have access to the same collection of reference sources. Online teaching requires adjustments in instructional approaches that count on students' hands-on exercises outside of the class time as a prominent method of resource instruction. Furthermore, instructors teach courses that increasingly deal with non-print materials, but have not developed unique teaching approaches to present those electronic sources. They use many of the same or similar approaches for comparing electronic sources as they have traditionally used for comparing print sources. Some report that they find these methods equally effective in teaching print and electronic sources; however, others say they have not found an effective way to present

electronic sources yet. Consistent with these results, our study identified many more challenges for the presentation of electronic sources than for the presentation of print sources.

Future research should address the impact of these other instructional challenges on the ability of LIS education to produce professionals with higher-level thinking skills. Action research in this area should engage students, practitioners, and instructors, by allowing all parties to identify challenges, reflect on those challenges, and produce solutions for the problems of source instruction across a professional career. Qualitative research comparing the substance and process of reference source instruction, including rules of use and evaluation, is another potential avenue for understanding how instructors teach and new librarians learn to use reference sources. As LIS courses move from a face-to-face environment to a distance education environment, future researchers might conduct a deeper analysis of effective instructional techniques for various teaching modes.

Finally, an additional promising approach to assessing reference source instruction is to place it within the context of Bloom's Taxonomy of Educational Objectives.²⁹ Bloom's Taxonomy has been used and tested extensively since its development in the early 1950s. The Taxonomy is a hierarchical presentation of learning objectives, going from simple to abstract concepts. The lowest level, *Knowledge*, might be demonstrated by students who can name a reference source. Students at the highest level, *Evaluation*, would be knowledgeable about several different sources, would be able to choose the best source to meet a specific information need, and would be capable of explaining their process to others. Reference source instruction, as it has been revealed through this survey, seems to cluster on the lower levels of the Taxonomy. Definition and description of sources builds students' *Knowledge*, while comparing sources and teaching evaluation criteria helps students develop *Comprehension* of how multiple sources fit

together. Students typically learn *Application* of sources outside of class, in hands-on assignments.

The remaining three stages of Bloom's Taxonomy (*Analysis, Synthesis and Evaluation*) are usually identified as higher-level educational objectives. They refer to students' capabilities to see patterns, make inferences, generalize, and explain the information in some domain of knowledge. On the highest level of mastering reference resources the students need to:

- recognize what types of questions can be answered with a specific type of source;
- determine which among competing sources will most likely answer the question;
- articulate the strengths and weaknesses of reference sources; and
- explain why they have chosen a particular source.

Instructors articulated many methods they use to acquaint students with these levels: comparison of specific elements between sources, preparation of information resources and resources, and extensive evaluation of sources. Despite instructional techniques indicated by some reference instructors, most instructors used lower-level instructional methods in their reference classes.

Our study suggests that deeper understanding of reference sources is a desired objective of instructors; however, the methods they use for instruction may not be the most appropriate for creating that level of understanding. Interviewing instructors and looking at their instructional materials – syllabi, tests, and assignments – will provide richer information than a survey questionnaire.

Conclusion

Our study provided an insight into methods of reference source instruction, which had heretofore been lacking in LIS literature, and identified a number of instructional approaches that

reference instructors perceive as successful. These included students' classroom presentation of sources, hands-on assignments and fieldwork that allow students to work with sources. The study also identified challenges facing reference instructors in the era of distance education and the growth of electronic reference sources. Instructors want their students to develop a deeper knowledge of print and electronic sources, but face difficulties ensuring access to sources, working with technology, and changing interfaces. These challenges may be diminishing the potential quality of education for current students and future practitioners.

How is the field going to address instructors' concerns with reference source education? One option may be the "wait and see" approach, by letting the natural processes of evolution in instructional practice follow their own course. This course of action would likely mean watching a decline in the quality and quantity of print source coverage in reference courses without intervening. The better option might be for reference instructors to initiate discussions about new strategies for reference source instruction in the context of the changing nature of LIS education. These discussions can help establish standards for the instruction of print and electronic sources, which may include a required list of print sources, skills for using electronic reference sources, or source evaluation criteria to be learned. Although RUSA's reference competencies approach this state, they are more concerned with behavior and less with specific reference source knowledge or skills. Further, the standards approach, identified by John Richardson as "structuralist," has historically been difficult to maintain due to continual growth of the body of essential sources.³⁰ Nonetheless, a general consensus among reference instructors as to what print sources students must know would be a useful starting point for planning future reference curricula.

An additional approach may be to take the initiative in developing an instructional tool to facilitate reference source instruction. Such a tool might be a shared application to provide access to, demonstration, and comparison of print sources through electronic representations of those sources. A prototype version of such a tool was designed by one of the authors for a subject-specific reference course. An expanded version could include a database with multimedia clips illustrating and comparing online search processes in various electronic sources. This tool could build on Richardson's typology of reference sources and their characteristics,³¹ but would be oriented toward teaching LIS students how to use these sources rather than assisting librarians in finding sources. To expand this instructional tool beyond source instruction and into generalized reference education, video clips of reference interviews and the question-answering process might be included, for instructors to present case studies for their classes. However, a shared option would require commitment and collaboration among reference instructors from LIS schools and practitioners in a variety of settings, as well as the cooperation of reference source publishers to allay copyright concerns. Pursuing any of these approaches will have repercussions for the reference education of the next generation of librarians.

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Table 1. Types of reference courses taught by 40 survey respondents.

General reference	30
Introductory	28
Advanced	2
Subject-specific reference	22
Humanities	5
Health sciences	4
Business	4
Social sciences	3
Science	3
Government documents	3
Online reference	9
General	7
Subject-specific	2

N = 61

Table 2. Percent of time spent teaching print and electronic sources, by course type.

Course type	Average percent of time spent on teaching	
	Print sources	Electronic sources
All reference courses (n=61)	41	59
General & subject-specific reference (n=52)	47	53
General reference (n=30)	50	50
Subject-specific reference (n=22)	43	57
Online reference (n=9)	6	94

Table 3. Methods for teaching about print sources.

	General reference n=30		Subject-specific r. n=22		Online reference n=9		Total n=61	
	%	Av. freq.	%	Av. freq.	%	Av. freq.	%	Av. freq.
1. The class meets in the library and compares sources directly	80	2.08	59	2.08	66	2.33	70	2.12
2. I bring several reference books to class and pass them around	83	2.64	50	2.45	56	1	67	2.39
3. I use an opaque projector or camera to present the reference books to the class	73	1.18	50	2.45	56	1	62	1.52
4. I make transparencies or slides of selected pages in the book	73	1.86	50	2.64	56	1	62	1.97
5. I discuss the reference books in general terms and assume students will peruse them on their own time	90	3.70	86	3.58	56	1.8	84	3.47
6. Other (e.g., student-led bibliographic instruction sessions, weekly homework assignments, source journals)	53	3.81	59	3.62	44	5	54	3.88

Note: 1 = low frequency; 5 = high frequency.

Table 4. Methods for teaching about electronic sources.

	General reference n=30		Subject-specific r. n=22		Online reference n=9		Total n=61	
	%	Av. freq.	%	Av. freq.	%	Av. freq.	%	Av. freq.
1. I teach in a computer lab and have students perform their own reference searches	63	3	55	2.5	89	3.25	64	2.89
2. I use a computer and projector to model searching in front of the class.	80	3.79	68	3.93	89	3.63	77	3.81
3. I use slides or screen shots to model stages in the searching process	67	2.2	59	2.69	78	2.57	66	2.43
4. I discuss searching in general terms and expect students to do searches on their own time	70	3.19	91	3.6	89	3.88	80	3.47
5. Other (e.g., immediate student replication of search, workbooks, search scripts)	50	3.33	18	3.5	11	5	33	3.45

Note: 1 = low frequency; 5 = high frequency.

Table 5. Challenges in presenting print sources.

Coding category	# of responses coded
Access to sources (in completely online courses, shared access by students)	13
Convincing students that understanding print sources is important and keeping students engaged	10
Selection of sources to cover	4
Promotion of students' deeper knowledge of the subject	3
No challenges	3
Development of sample reference questions	2
Subject specific problems	1
TOTAL	36

N=36

Table 6. Challenges in presenting electronic sources.

Coding category	# of responses coded
Developing deeper knowledge of content and search processes; looking past Google	8
Future changes in content and interface of el. source	7
Problem with access to el. sources (cancellations, no access, expensive)	7
Problems with technical support (labs, proxy servers, passwords)	5
Selection of el. sources for presentation, keeping up with new el. sources	5
Students' preparation and uneven search skills	4
No challenges (vendors help, easy access)	3
More time for explanation of demonstrations	3
Complexity of interfaces and lack of standardization	3
Keeping presentations interesting	2
Other	3
TOTAL	48

Appendix A. Reference Instructor Survey

The web-based format of the survey prevents full reproduction of the instrument. Content-related survey questions are listed below.

Course-specific questions:

These questions were repeated three times to allow instructors to describe multiple courses.

1. What is the title for this reference or information sources course?
2. Think about the total time you spend teaching about reference sources in this course. What percentage of your time is spent teaching print sources, and what percentage of your time is spent teaching electronic sources?
3. What instructional format do you use for this class?
 - Completely face-to-face, with regular class meetings
 - Face-to-face, with “lab” sessions in the library
 - Live televised broadcast classes at remote locations
 - Web-based, with some face-to-face meetings
 - Other (please explain)
4. Please rank the methods you use to present print sources to this class. Use 1 for the least frequently used method and 5 for the most frequently used method.
 - The class meets in the library and compares sources directly.
 - I bring several reference books to class and pass them around.
 - I use an opaque projector or camera to present the reference books to the class.
 - I make transparencies or slides of selected pages in the book.

- I discuss the reference books in general terms and assume students will peruse them on their own time.
- Other (please explain)

5. Please rank the methods you use to present electronic sources to this class. Use 1 for the least frequently used method and 5 for the most frequently used method.

- I teach in a computer lab and have students perform their own reference searches.
- I use a computer and projector to model searching in front of the class.
- I use slides or screen shots to model stages in the searching process.
- I discuss searching in general terms and expect students to do searches on their own time.
- Other (please explain)

General Questions:

1. In a sentence or two, please describe how you compare two or more print sources.
2. What do you find to be your biggest challenge in teaching about paper-based reference resources?
3. What teaching methods or strategies have you found to be particularly effective in teaching about paper-based reference resources?
4. In a sentence or two, please describe how you compare two or more electronic sources.
5. What do you find to be your biggest challenge in presenting electronic reference resources?
6. What teaching methods or strategies have you found to be particularly effective in teaching about electronic reference resources?