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Assessing Student Learning Outcomes from

Reference Desk Interactions in an Academic Library:

An Exploratory Study

Patrick McCarthy

Rapid technological innovations are resulting in ever more frequent changes in the way libraries deliver resources and services to their campus communities. Recently, the provision of reference service has been re-examined in the profession (Chu, 1997; Cotrell & Eisenberg, 2001; Salonen, 2003; Schader & Somerville, 2005). The American Library Association defines reference service to include, "the use, recommendation, interpretation, or instruction in the use of one or more information sources, or knowledge of such sources, by a member of the reference or information staff" (RUSA, 1984). Within academic libraries, there have been many models for providing reference services to patrons (Flanagan & Horowitz, 2000; McKinstry & McCracken, 2002; Naismith, 2004; Radcliff, 1998; Reih, 1999). Often these models fall into either the single or multiple service point framework. In the single service point model, librarians take turns staffing a single reference desk designed to receive inquires from across all disciplines. In the multiple service point model, there are several service points and each specializes in receiving a unique set of inquires. For example, a library may operate one reference desk for science questions, another for social science, and a third for humanities. Libraries have also experimented with separate desks for basic informational questions, including such things as service hours and building navigation, and another for research assistance. What is common in all these models is that they provide a service point in which patrons can interact directly with a librarian at one or more reference desks without having to make an appointment. This aspect of the service models is now being examined.

The issue in question is whether staffing a reference desk with professional librarians is the best use of their time and how removing them from the desk will affect service quality. In the proposed models, the reference desk or desks are staffed by students or other non-librarians. These information desks provide very basic information and research assistance. Patrons in need of more advanced assistance with their research are referred to a specific subject librarian with expertise in the area of inquiry. Often this will require that the patron contact the librarian and make an appointment for a research consultation. Advocates of this model claim that it frees librarians from working at a desk so they can devote time to other initiatives within the organization. Those opposed to this model maintain that removing librarians from the reference desk will significantly lower the quality of assistance patrons receive (Dilevko, 2001; Reih, 1999). Undergraduates in particular are unlikely to make appointments due to their frequent, immediate need for help. To fully evaluate the impact of removing librarians from service at the reference desk, an analysis of the outcomes of interactions between librarians and students is essential. This study explores a new method of evaluating reference desk interactions to include student learning outcomes from contact with librarians.

Reference Service Evaluation

The assessment of reference services in libraries extends almost as far back as the delivery of the service itself. Although the volume of publications is vast, substantial difficulties exist. This is due in large part to the complexity of the reference process. Each reference transaction results in a myriad of inputs, processes, and outcomes. The communication process between the librarian and patron is extremely difficult because

the patron is asking for assistance with something he or she knows little about. As many as 66 factors have been identified as potentially affecting the reference process (Neill, 1985). This degree of complexity has resulted in the development of numerous methodologies for assessing reference desk interactions which do not take the important factor of learning outcomes into account. The majority of reference assessment studies can be divided into one of two categories; patron satisfaction or unobtrusive observation.

Patron satisfaction studies have been around the longest and are among the most widely used. Their popularity is due, in part, from the receipt of highly satisfactory ratings from patrons. One frequently used evaluation, LibQUAL+, assesses patron satisfaction with a wide range of resources and services. In this evaluation, patrons use a Likert scale to assess the caring and readiness of librarians to assist patrons (ARL, 2003). LibQUAL+ enables libraries to compare their ratings against national averages. Other studies, such as those conducted by Joan Durrance, put greater focus on interpersonal communication and focus on the patron's willingness to return to the library and request assistance in the future (Durrance, 1995).

Critics of user satisfaction studies point out that they do not assess the quality or accuracy of the information provided to the patron. Murfin and Gugelchuk, in their review of reference service research, identified several studies that demonstrated that satisfaction with the librarian's communication will influence patron perceptions of service even when the accuracy of the information is poor. In studies where satisfaction with the information is assessed separately from satisfaction with assistance, substantial variation existed between the two measures (Murfin & Gugelchuk, 1987).

This research supports the claim that high ratings usually seen in satisfaction studies are due in part to measurement instruments that did not adequately account for the complexity of reference transactions. In addition, it is not clear how usage of the reference desk service might impact users' expectations and, correspondingly, their satisfaction scores on assessments. To account for this influence, previous experiences with the reference desk would need to be assessed.

The second evaluation category is the unobtrusive observation approach. In this approach, individuals posing as library patrons ask questions either in person, by telephone, or increasingly through electronic media. The responses are then judged by the percentage correct, which usually averages around 55 percent (Hernan & McClure, 1986). Hernan and McClure's unobtrusive observation methodology assumes that reference service is a process of providing right and wrong answers to factual questions. Although providing accurate answers is a high priority of delivering reference service, it does not take into account the full range of assistance requested by patrons. In fact, patrons do not often ask questions that have discrete right or wrong answers.

Because of the limitations of broad user satisfaction surveys and unobtrusive observation methods, Charles Bunge and Marjorie Murfin developed the Wisconsin-Ohio Reference Evaluation Program. This combined approach attempts to assess the cause and effect relationship between accuracy and process. They wanted to better understand what in the process caused the answer to be incorrect or the search to fail. As a result they developed a complex evaluation form for reference transactions. One part of the form is completed by the patron and the other by the librarian. One purpose is to include as many input factors as possible to ascertain causal factors. Factors

include such things as availability of resources, training of librarians, time constraints for the librarian or patron, subject of inquiry, and extent of information needed (Bunge, 1990). The instrument has been used by more than 100 libraries and allows individual institutions to compare their performance to aggregated data. It is by far the most complex method available to assess reference service satisfaction and the multiple factors that impact satisfaction.

Although the above methods provide insight into reference service success as measured by patron satisfaction and accuracy of answers, few provide evidence of patron learning. Because libraries are increasingly asked to educate students in the selection and use of appropriate resources, evaluation methods should place a greater emphasis on measuring learning outcomes. In 2000, Denise Green and Janis Peach developed a methodology to assess the teaching and learning aspects of reference instruction. They sought to devise an assessment instrument that would demonstrate teaching effectiveness at the reference desk in the same way that classroom faculty demonstrate teaching effectiveness through valid and reliable student course surveys. As academic faculty, Green and Peach were required to demonstrate teaching effectiveness as part of the promotion and tenure process. They believed that their most effective teaching efforts, providing reference service, were not included in their evaluation process because they had no method to demonstrate that teaching and learning took place. They developed a Likert scale questionnaire based on the Wisconsin-Ohio form and the university's classroom teaching evaluation form. Their instrument was completed by undergraduate, graduate, and community patrons immediately after receiving reference desk assistance. The results indicated that 92

percent of respondents learned something new about how to do library research. Moreover, 95 percent stated that they learned more about using library resources and 85 percent indicated that their research skills increased as a result of the reference transaction (Green & Peach, 2003).

Although the Green and Peach assessment focuses specifically on the teaching and learning aspects of reference service, it has limitations. The methodology uses student self-reported data of a general nature. For example, the question "I learned more about how to use the information resources from working with the librarian" does not provide the detail necessary to identify learning outcomes. For example, what specifically did the student learn? Can the student apply what was learned in another context? Also, the methodology does not allow the evaluator to ascertain which processes or teaching activities led to the learning. The Green and Peach evaluation methodology corresponds to student course/instructor evaluations. It does not, however, equate to the learning outcomes assessments conducted in classroom settings. To determine the extent of student learning resulting from reference transactions, a more authentic methodology should be used.

Assessing student learning outcomes from library instruction is not new for libraries. In January 2000, the Association of College and Research Libraries adopted the Information Literacy Competency Standards for Higher Education (ACRL, 2000). The policy consists of five standards, 22 performance indicators, and over 80 outcome measures. Since the adoption of this policy, academic librarians have used the standards to develop curriculum and assess learning outcomes. One of the most widely used methods utilizes pre and post assessments given to students receiving library

instruction. These assessments have been limited to formal classroom instructional activities. This type of instruction takes place when academic faculty bring their students into the library for instruction in the use of specific resources relevant to particular topics or courses. Increasingly this instruction focuses on the use of computer based information databases. Students are issued an assessment instrument prior to receiving the library instruction and again immediately after the instruction intervention. A before and after comparison is then made to identify the specific knowledge and skills gained by the student as a result of the instruction. However, this type of assessment emphasizes the student's immediate recall. It does not demonstrate the student's ability to apply this knowledge and skill later or in a new environment.

Although this method can be partially effective in the classroom setting, it is not feasible for assessing learning outcomes of reference instruction which is usually spontaneous, random, and a one to one interaction. Development of curriculum and pre assessment would be difficult. As a result, alternative methodologies must be employed to understand the learning outcomes from reference instruction.

Research Questions

The evaluation design will be guided by four specific questions related to learning outcomes from reference desk instruction. The first question that will be addressed is the identification of specific learning outcomes from reference desk transactions. The evaluation should help to identify knowledge and skills students receive from interacting with reference desk staff. Second, the study attempts to identify the reference desk behaviors and instructional methods that lead to student learning. It is essential to

identify the most effective methods so they can be expanded or replicated and thus improve the learning outcomes of the program. Third, the evaluation should help to identify how students implement or use the knowledge or skills they have obtained. If the purpose of instruction is to increase students' self-sufficiency in using a research library, true learning effectiveness should result in students who can apply what they have learned to new information needs. Fourth, the evaluation hopes to provide evidence to compare student learning outcomes with selected ACRL Information Literacy Competency Standards for Higher Education (ACRL, 2000). The standards are designed to guide instruction in the areas most critical for academic success and lifelong learning. The evaluation will indicate whether or not the learning outcomes match the national standards.

Method

Data for this assessment was collected in two steps. First, a questionnaire was given to students after receiving assistance at the reference desk. The reference desk is located in the one main library on campus. The survey asked students to describe the assistance they requested and if they felt they learned something from the interaction. Basic demographic information was also collected. For example, students were asked to identify their student status, the course connected with the request for assistance, and gender. In addition, students were asked to indicate if they would be willing to be contacted for an interview about the assistance they received. Those willing to participate in an interview were asked to provide their name and contact information on a separate form. This allowed all students to submit the survey anonymously.

Generally, questions at the reference desk can be divided into two categories -- reference and directional. Although students often learn important aspects of navigating a library from asking directional questions, they are not the focus of this study. Pointing students to the location of restrooms, elevators, and telephones is outside the learning outcomes addressed in this evaluation. Therefore, only students requesting assistance with a research need were asked to complete the survey. This should not be a difficult distinction to make for those handing out the survey as the library routinely collects utilization data about reference and directional questions. The survey was distributed during all hours of reference desk operation during a two week period, in the middle of a 16 week semester, to obtain results from a representative sample of students, information needs, and staff assistance.

After collecting the submitted surveys, a random sample of students were selected for interviews. The main purpose of the interviews was to obtain specific details about the learning outcomes as a result of the reference assistance. Interviewees were contacted by telephone for approximately 10 to 15 minutes two to three days after completion of the survey. The interviews included both directed and open ended questions. Interviewees were asked to relate their understanding of the information conveyed to them during the reference interaction. In addition, they were asked to identify how they have or might apply this knowledge to other information needs. These interviews provided rich insights into the patron's perception of the reference transaction, as well as evidence of specific learning outcomes.

Notes from the interviews were taken, no recordings were made. The notes were then analyzed for application to the four key evaluation questions and responses

were examined for accuracy. Because students were asked to describe what they learned from the reference transaction, an accuracy analysis can be conducted. If the interviewee's description of his or her new knowledge was factually inaccurate, he or she did not learn the material conveyed and a learning outcome was not achieved. Moreover, if the interviewee was unable to provide a detailed description of what was learned, he or she does not possess a mastery of the material and a transfer of knowledge did not take place. Because the primary focus of the evaluation was to assess learning outcomes, it was critical that students provide evidence of learning. If the student provides this evidence, a learning outcome may be claimed. Moreover, because the learning took place in relation to an actual information need, evidence of that learning should be considered authentic assessment.

Findings

A total of 137 questionnaires were given to students receiving assistance at the reference desk. Students returned 52 questionnaires and of those five contained missing or incomplete parts. This constitutes a 38 percent response rate. Returned questionnaires were not evenly spread over the days of the week. One third of the returned questionnaires were from students receiving assistance on Wednesdays. The lowest return came on Sunday, with 2 questionnaires returned. Over half, 59.6 percent, of returned questionnaires came from assistance received between noon and 4 pm. Most, 71 percent, of respondents were undergraduates, while19 percent were graduate students. Female respondents exceeded males at the rate of 63 to 36 percent. Respondents' requests represented a diverse range of course assignments. A total of 18 separate courses were reported. Only one course, College Composition, was

indicated by more than two students. The number of respondents indicating that they had received prior assistance at the reference desk was 53 percent, compared to 46 percent who indicated they had not requested assistance from the reference desk before.

Most respondents, 63 percent, indicated they requested help in locating articles or books for a class assignment and they were shown how to use an online database to look up materials. Another 23 percent requested help in locating a specific article for which they had the citation. Of these, over half were shown how to make article requests through interlibrary loan.

Respondents were asked to rate their level of agreement on a four point scale for seven statements about what they learned from the assistance they received. Findings are shown in Table 1. Respondents consistently reported that they learned something new as a result of the assistance received and believed they could apply what was learned to succeed in the future. The item with the highest level of agreement as well as the lowest standard deviation indicated that help at the reference desk is closely linked to course assignments. Another interesting finding is the responses to items dealing with the students' ability to evaluate the quality and usefulness of information they received. These items had lower means and greater standard deviations than the other questions. Although students felt that they learned something about searching and retrieving information, they were less certain that they increased their ability to evaluate the information retrieved. These patterns held consistently across all subgroups.

Undergraduates rated higher that they learned something new about information sources and doing research; 3.86 and 3.92 for undergraduates and 3.80 for each item for graduate students. However, undergraduates scored lower, 3.36 and 3.45, on items dealing with judging the quality and usefulness of information sources than did graduate students, 3.63 and 3.75, indicating that graduate students were more likely to gain skills in making judgments about the quality and usefulness of information sources. Analysis of the variance, however, did not indicate that these differences were statistically significant.

Table 1 Questionnaire Results

Items	Min	Max	Mean	Std. Deviation
My interaction with the librarian will help me succeed with my assignment.	3	4	3.96	0.204
I will be able to apply what I learned today to other courses and information needs from now on.	3	4	3.89	0.312
I learned how to use information resources by working with the librarian.	3	4	3.87	0.345
I learned something new about how to do research by working with the librarian today.	3	4	3.83	0.382
My interaction with the librarian increased my skills in research.	3	4	3.77	0.428
My interaction with the librarian increased my ability to make judgments about the usefulness of information resources.	2	4	3.52	0.547
My interaction with the librarian increased my ability to make judgments about the quality of information resources.	2	4	3.41	0.541

A similar difference was evident in comparing students' prior experience with the reference desk. Those who had not received prior assistance at the desk reported higher means for items dealing with learning something new about doing research and using information sources than those who had. Conversely, they had lower means for questions dealing with evaluating the quality and usefulness of information than those who had received prior assistance. However, an analysis of the variance did not yield statistical significance for these differences. This may be due to the small sample of the subgroups in the comparisons. For example, 10 graduate students completed the survey, and an analysis of the relationship between student status and prior assistance did not indicate that undergraduates were less likely than graduates to have received prior assistance.

The pattern of results for questions one and two and questions six and seven suggest the potential for a strong correlation between the first two questions as well as the last two. An inter-item correlation analysis confirmed this relationship. Questions one and two had an inter-item correlation of .859 and questions six and seven had a correlation of .833.

One interesting comparison that did show statistical significance was the relationship between the type of question asked and the mean scores for items dealing with learning something new about doing research and using information sources. Table 2 shows that students requesting help retrieving an article for which they had a citation and students requesting help with a subject search reported higher means than those requesting help with other types of research questions. The F statistic for these items was 26.369 and 56.741 respectively. This indicates a strong relationship between

the type of question asked and the likelihood of student learning. No significant

relationship occurred between the student's college or course level associated with the

questions that were asked.

Table 2 Type of question

Type of question		I learned something new about how to do research by working with the librarian today		I learned how to use information resources by working with the librarian.	
	n	Mean	Standard Deviation	Mean	Standard Deviation
Subject Search	33	3.91	.292	3.97	.174
Retrieving Article	12	4.00	.00	4.00	.00
Other	7	3.14	.378	3.14	.378

Discussion

The findings of this survey and interviews indicate that some learning does take

place as a result of reference desk interactions. The primary learning outcomes include

an increased awareness of library resources, an expanded ability to search online

databases, and a greater understanding of how to locate and obtain articles from print

and online collections and services.

The largest percentage of students requesting research help were those

searching for materials on a particular topic. All of these respondents indicated that

they learned something about using library resources. All but one of the 11

interviewees indicated that a librarian helped them modify their information needs.

Three students indicated that the librarian helped them to distinguish between books

and articles and then select the format most appropriate for the information need. For

example, one student stated that "I asked her to help me find books on my topic

[electronic voting machine issues] but she explained that articles would be better because it was such a new topic." None of the interviewees stated that the librarian helped them modify the scope of their topic. They indicated that they were satisfied with their topic or that the topic scope was determined by the course assignment.

Four of the interviewees indicated the librarian helped them identify terms for searching an online database. One student stated that she asked for information on "book banning," and the librarian "showed her how to use words from a list in the database." As a result, she found information using the terms "censorship" and "prohibited books."

All of the interviewees indicated that they learned how to use at least one new source, with many indicating that they were shown several. The most frequently identified resource shown to students was Academic Search Premier. Other frequently mentioned sources included the online catalog, citation linker system, and interlibrary loan request program. Students who were shown Academic Search Premier or other online periodical databases reported they learned it contained periodical articles rather than Web sites and that a variety of terms and synonyms may be necessary to search effectively. Several students mentioned the most important thing learned from the interaction was that they could "narrow" or "refine" their search by entering additional search terms which described their topic.

Two of the interviewees indicated receipt of help in obtaining articles for which they possessed a citation from a previous search. They were, however, unable to identify how to obtain the actual article. One of these students was shown how to set up an account in the patron driven interlibrary loan system and how to enter required

information for the article desired. He indicated that he learned that the article would come from another library and would arrive in his email account.

A second aim of this study was to identify those instructional methods that lead to student learning. The most common method used by librarians was demonstration. Only one of the interviewees stated that the librarian had her enter information at the computer. All of the students, however, stated that the method used by the librarian helped them learn how to use the library for information needs.   Two students said that it was helpful to watch the screen while the librarian helped them find information. It is not clear from this study if having a student watch the librarian do the search or having the student conduct the search as instructed by the librarian differs in effectiveness at achieving student learning outcomes.   A larger sample and greater emphasis on this aspect of the study would be necessary to draw conclusions.

A third aim of the study was to determine if students could apply what they had learned to a subsequent information need. The interviewees were asked to describe the steps they would take to locate information on a topic provided by the interviewer. Only one of the students identified using a database other than the one demonstrated by the librarian. The others stated that they would use the same database that was demonstrated during their interaction at the reference desk. Although in each instance the database indicated would have been acceptable for the topic, other databases would have been useful, and in three cases significantly more effective. For example, a student who was shown how to use Academic Search Premier was asked to describe how she would locate information on doing business in China. Although Academic

Search Premier would be useful to some extent, the student did not indicate that she could look in a business database.

Many of the respondents did well at identifying search terms for the given topic. One student, who was asked how to go about locating information on global warming, indicated that she would search using the terms "greenhouse gases" and "climate change." She also indicated that she would look for both books and articles using the database available in the library. This student had not used library resources prior to her assistance at the reference desk. Six of the interviewees stated that, as part of their search procedures, they would seek assistance from the reference desk if they had trouble locating useful information.

Finally, this study sought to identify the information literacy standards most likely to be learned from reference desk interactions. The learning outcomes from reference desk assistance are most closely aligned with ACRL standard two; "the information literate student accesses needed information effectively and efficiently" (ACRL, 2000). In both the questionnaires and the interviews, students indicated learning about the availability of information sources previously not known to them. The students repeatedly indicated that the identification of appropriate terminology, with the assistance of the librarian was an essential benefit of seeking help from the reference desk (standard 2.2). Students felt they were better prepared after the assistance to develop alternative terminology for future searches. Moreover, several students demonstrated this ability when asked to describe a possible search topic on a given subject (standard 2.4).

Several students stated they increased their understanding of the steps involved in retrieving information (standard 2.3). Five students reported that they learned how to retrieve online articles and actually left the reference desk with a printed copy of the desired article in hand.

Although several students indicated that they believed they had increased their ability to judge the quality and usefulness of information sources (standard 3.2), this appeared to be limited to the source from which the information was obtained. Students felt the quality was better and that it exemplified what was required for the assignment because it came from a library database rather than a Web site. However, no interviewees were able to offer any specifics about the quality of individual resources obtained from the assistance they received. In addition, none of the students related any details about the assistance they received that would guide them in evaluating information. This does not necessarily mean that they did not receive instruction in this area, but if they had, they did not gain enough information to make use of the knowledge.

Conclusion

Providing reference assistance will continue to be a complex service for libraries. Assessing the service is equally complex. Assessing accuracy of the assistance provided and the satisfaction of the users with the service are useful tools for examining quality of reference assistance. However, these methods do not provide sufficient information for determining if the service should be provided in the first place. An analysis of the learning outcomes from this service is essential to answering this question. A comprehensive understanding of reference desk assistance on students'

ability to succeed with course requirements must be systematically documented. This exploratory study documents one potential method of assessing learning outcomes that result from interactions at a reference desk. Students frequently develop better understanding of resources available as well as search strategies to help them succeed with online searching. Expanded study in this area could provide a more detailed analysis of student learning. Also, the reference desk provides an opportunity for librarians to expand their range of assistance to include increased emphasis on other information literacy standards. Helping students achieve on a wider range of information literacy standards at the reference desk may make this service point more important to student achievement and lifelong learning than ever before.

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