

Taking notes at the reference desk: Assessing and improving student learning

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Abstract

Purpose

We assessed student perceptions of their learning during reference transactions and evaluated a note-taking strategy developed to improve the quality of learning during reference encounters.

Design/methodology/approach

Students were surveyed following a reference interaction and asked, "What did you learn today?" Based on our results, librarians developed a Reference Notes form encouraging librarians and students to take notes during reference transactions, highlighting terms, concepts, and strategies. The forms were assessed with a modified version of the initial student survey to determine their effectiveness. Student survey results were analyzed, and librarians also provided feedback via surveys and discussions.

Findings

Initial results indicated that students retained concrete concepts like the names of previously unknown databases. With the implementation of Reference Notes, students were more likely to report learning broad-based concepts like narrowing a search, brainstorming keywords, and search mechanics. Librarians and students felt the form was an effective reference tool.

Research limitations/implications

This is an indirect method of assessing student learning, relying on students' self-reports. Without the opportunity to pre-define learning objectives for a reference transaction, we were unable to assess student learning directly.

Practical implications

Many librarians write down some information during reference transactions. A more systematic approach to taking notes may improve the learning potential of the reference encounter.

Originality/value

This project demonstrates that student learning assessment is an important tool for evaluating reference services. Through student learning assessment, librarians can develop strategies, such as our Reference Notes forms, to increase the quality of learning during reference transactions.

Keywords

Assessment; Reference Services; learning; Information literacy; undergraduates; academic libraries; Note-taking;

Introduction and Literature Review

Librarian: *Hi. What can I help you with today?*

Student: *I've been assigned a research project where I need to find scholarly articles on a topic of my choice. I have no idea where to begin.*

It's a familiar start to a conversation that happens daily, if not hourly, at an academic library's reference desk. Dave Harmeyer (2010, pp. 359–360) describes what happens next:

I reached out and took one 3 x 5 card left behind from the library's bygone wooden card catalog days from a small, plastic desktop bin . . . If nothing else these information-finding tools from another era of librarianship come in handy as scrap paper. I began the session.

*I wrote out the word **keyword** . . . and **subject heading** . . . and explained, 'I'd like to recommend we start with one or more keywords on your topic, but we will eventually determine what the subject headings are for your terms. Using subject headings gets at better articles for your topic' . . . And with that, I put a line with an arrow going up to the right of the word **recall**.*

At most academic libraries, the typical one-on-one reference desk interaction has transformed from a seek-retrieve-provide service to one that is more instructional in nature (Desai and Graves, 2008; Elmborg, 2002). Harmeyer's eloquent depiction of the research conversation that evolves between student and librarian reminds us of key factors that will help students retain the skills shared. The librarian defines key

concepts, takes notes to help students follow the same research path when left to their own devices, asks prompting questions to discover information from the student perspective, and helps students see the connection between the immediate research question to another one in the future. Harmeyer (2010, p. 362) concludes:

Remember, this process can be used for just about any topic. Go into a database, first type in your term as a keyword, find out what subject headings might be used for the topic, and, if not, try something else like . . . And please let me know if there is anything else I can help you with. Here's my business card.

A seemingly successful interaction at the reference desk concludes with one remaining question: How does this librarian know that the mini, spur-of-the-moment teaching session has had any impact on the student's learning and retention of the material just shared? What did this student learn? At SUNY Geneseo's Milne Library, members of the Instruction & Reference Services unit sought to answer this question.

The first step in answering a question like this depends on the Library's understanding of, and value placed on, reference services as an integral part of their overall instruction program. One aspect of reference services, scheduled consultations, is becoming an important part of the instruction program (Yi, 2003), but reference desk questions are often considered separately.

Like other libraries, librarians at SUNY Geneseo had been diligently tracking our reference questions by quantitative measures like location of question asked, mode of delivery (e.g., phone, e-mail, in person), type of information need (e.g., directional, research-based, referral), and duration of transaction. At the same time, we were making progress toward systematic assessment of student learning in formal classroom sessions. But why separate the two if, at the core of each service, we were teaching students information literacy skills in an effort to complete research assignments successfully? The reality is that librarians approach each service differently.

Green and Peach described this distinction. "The context of reference transactions usually differs from classroom library or bibliographic instruction (BI). In BI there is a planned instructional workshop or guest lecture with a specific time and often a specific outcome, usually an assignment or term paper. Reference service is more random, with a user choosing when to approach a librarian who has not had time to prepare specific information on the students' course or research assignment" (2003, p. 256). With an increase in reference services that require students to schedule appointments, the random and on-the-spot nature of reference becomes less of a concern (Magi and Mardeusz, 2013). Librarians could develop measures to assess student learning during reference transactions, much like they do in the midst of, or at the end of, a formally taught information literacy (IL) session. McLaughlin's overview of the literature on

reference assessment indicates that there have been few studies assessing student learning outcomes in references services (2011). Our search of the library literature suggested that little has changed since McLaughlin's review, although there is a small but growing body of literature about the assessment of student learning during individual research consultations (Gale and Evans, 2007; Reinsfelder, 2012).

Green and Peach (2003) found that assessment of reference services focuses on three main themes:

- Patron satisfaction (e.g. Bunge, 1994; Miller, 2008; Murfin, 1995; Stalker and Murfin, 1996)
- Communication between patrons and librarians (e.g. Durrance, 1989, 1995; Jardine, 1995)
- Accuracy of librarian answers to students' questions (e.g. Goetsch, 1995; Hernon and McClure, 1986, 1987; Richardson, 2002; Roy, 1995; Saxton and Richardson, 2002)

The focus of reference assessment studies has shifted slightly over time. Articles discussing the assessment of new reference formats such as online chat, learning management systems, or digital tutorials have been published in recent years (Holliday et al., 2006; Oakleaf and VanScoy, 2010). The integration of reference services within a Learning Commons environment has also been studied (Steiner and Holley, 2009; Wolfe et al., 2010). However, authors continued to focus on the traditional factors identified by Green and Peach (2003): satisfaction, communication, and accuracy.

These traditional measures of reference desk services capture a snapshot of what makes the interactions effective but fail to connect library services with larger institutional values such as student learning, retention, and success as emphasized in Megan Oakleaf's *Value of Academic Libraries* (2010). Qualitative assessment of student learning at the reference desk is one valuable tool that can help make these connections (Adams, 2012).

Student learning has occasionally been assessed using a simple question, "Did you learn anything?" Gale and Evans found that 76% of students reported having learned something during a reference consultation that could be used again later, but did not investigate the content students learned (2007).

In one case, librarians were able to directly assess the impact of research consultations by evaluating student papers and bibliographies. Reinsfelder (2012) and colleagues were able to examine students' first drafts prior to a research consultation. They were then able to assess the students' final drafts to determine if the research consultation made a difference in the quality of their bibliographies, in comparison to a control group.

Reinsfelder (2012) determined that the consultations had a positive impact on the overall quality of sources used.

Indirect methods of assessing student learning are more common, and involve asking students to report what they learned. Using patron surveys, Jacoby and O'Brian (2003) briefly asked students about the library resources they learned. Although they received responses related to databases and library services, their study concentrated on librarian friendliness and student confidence rather than student learning. A 2007 study by Gremmels and Lehmann indirectly assessed student learning during reference transactions.

In particular, the Gremmels and Lehmann study sought to connect reference interactions to previous information literacy classroom instruction and the basic teaching intentions of the librarian (i.e., did the student learn what the librarian had hoped he/she would learn?). In their study, Gremmels and Lehmann (2007) found that 94-98% of students indicated learning something from the reference transaction, but had difficulty articulating what they learned. Students were most likely to report on the tools discussed, and their reported learning matched the librarians teaching intentions only part of the time.

At Milne Library, we were also interested in knowing what a student learned from a librarian when working together at the reference desk. After the analysis of an initial assessment, we followed up on Gremmels and Lehmanns' suggestion that "additional ways to help cement student learning might include graphic organizers and other written takeaway cues" (Gremmels and Lehmann, 2007, p. 495). As such, we devised a system of writing down notes and search tips/strategies during our research transactions to see if this would help increase a student's level of learning. We conducted a second round of assessment using the same techniques to determine if our strategy was effective. This paper outlines the methods and results used from two rounds of assessment, as well as our efforts to "close the loop" at each stage.

Setting

SUNY Geneseo is a public liberal arts college in upstate New York serving approximately 5200 mostly undergraduate students. Milne Library has a robust instruction program, reaching students in most disciplines at some point during their college careers. Librarians taught a combined average of 344 instruction sessions in each of the last five years (2009-2013). The library employs six reference and instruction librarians, and six additional librarians who provide reference services.

Changes to our instruction and reference services prompted us to carefully examine the return on investment of our time and effort. In 2010 we implemented a single service

point model (see McClure and Bravender, 2013), in which questions of all types were asked at the circulation desk. Staff were trained to answer basic questions and referred more complex questions to a reference librarian. We relocated the reference desk to a location behind the circulation desk to encourage communication between circulation staff and librarians and to ensure reference transactions were less likely to be interrupted. These changes resulted in a 73% decline in the number of 0-5 minute reference questions in the two years following this change (from 2,701 per year in 2009-2010 to 733 per year in 2011-2012). We also saw an 86% increase in the number of questions over 15 minutes (234 in 2009-2010 to 437 in 2011-2012). The library also has a robust research consultation service available for all students and faculty, averaging 270 scheduled research appointments per year over the past 4 years.

Initial Assessment of Reference Services

Methods

In the fall 2011 semester, librarians set out to indirectly assess student learning at the reference desk using the one-minute paper model often used in library instruction sessions (Choinski and Emanuel, 2006). We designed a simple survey with five questions (see figure 1):

- Walk-in or scheduled consultation?
- Today's date?
- Your major?
- Course?
- What did you learn today in your meeting with the librarian?

Check one: Walk-in Scheduled Appointment Date: _____

What did you learn today in your meeting with the librarian?

Your Major: _____ Course: _____

Thanks! Simply return this form to the Service Desk.

Figure 1: The initial assessment survey

Our primary question, “What did you learn today?” assumes that students learned at least something from the reference transaction, and is not a direct measure of student learning. This question primarily assesses what students thought they learned during the transaction.

Librarians handed the form to students after each transaction at the reference desk or during one-on-one appointments for a four-week period in the middle portion of the semester. Librarians were more likely to remember to hand out the survey during scheduled consultations, perhaps because they lasted longer and librarians felt a greater connection with the student. As a result, just over two-thirds of our responses came from scheduled consultations. We directed students to return completed forms to our service desk, although some students chose to fill the form out at the desk and return it directly to the librarian.

Data from the paper forms was entered into a spreadsheet for analysis and is available online at <http://www.figshare.com> (Swoger & Davies Hoffman, 2014). Using an elementary form of content analysis, each student answer was assigned to content categories (Hsieh and Shannon, 2005). Most survey responses included between one and four major concepts related to student learning, although some responses were too general to be useful:

I learned how to use more library resources for my term paper. It was very helpful!

Content categories were developed by analyzing survey responses and by talking with librarians about topics often covered during library instruction sessions and reference transactions. In order to improve consistency, two librarians assigned categories to a portion of the responses independently and compared their results. Categories were further defined, and the rest of the responses were categorized.

Results

We collected 48 survey responses during the fall 2011 semester. Students were most likely to ask reference questions related to classes in their major (60%), and courses in the humanities and social sciences dominated the responses.

A few responses focused on the helpfulness of the librarian which was nice to hear, but did not help us evaluate what students thought they learned:

Today I worked with a very patient librarian who appears to be very professional and well-experienced at what she does, which is helping me do research for one of my group projects.

From the responses that included some detail, students reported learning a variety of skills and concepts (see table 1). Students were most likely to write down that they learned about a previously unknown database, repeating the findings of Gremmels and Lehmann (2007). Students often named the database on the survey (see table 1):

Worldcat. JSTOR. Lexis-Nexis. 'AND' and 'OR' operators to expand or focus search. 'NOT' operator.

Table 1: Students reported learning a wide variety of skills in our survey.

Skills	Percentage of Fall 2011 responses
Searching a specific database	22.92%
Choosing appropriate databases	20.83%
Mechanics of searching (general)	18.75%
Boolean and truncation	12.50%
Using ILL	12.50%
Citation tracking	10.42%
Synonyms (brainstorming)	8.33%
Limiting results (i.e. date-sensitive, in a foreign language)	8.33%
Evaluating sources	6.25%
Narrower and broader search	4.17%
Citation Style	4.17%
Finding a particular item	4.17%
Choosing/narrowing a research topic	2.08%
Subject heading vs. keywords	0.00%

Students were also likely to mention the type of information source they needed help finding (see figure 2):

Helped me find primary documents for my paper. Helped a lot.

While 21% of students mentioned learning about a particular database, less than half that number reported learning about more complex skills such as narrowing or broadening a search, selecting keywords, or distinguishing between subject terms and keywords. Learning about Boolean and truncation strategies were reported by 12% of students, but few students reported learning about citation styles or evaluating sources.

The small number of survey responses prevented us from extrapolating these results to the entire student population, but gave us some interesting insights into our reference services.

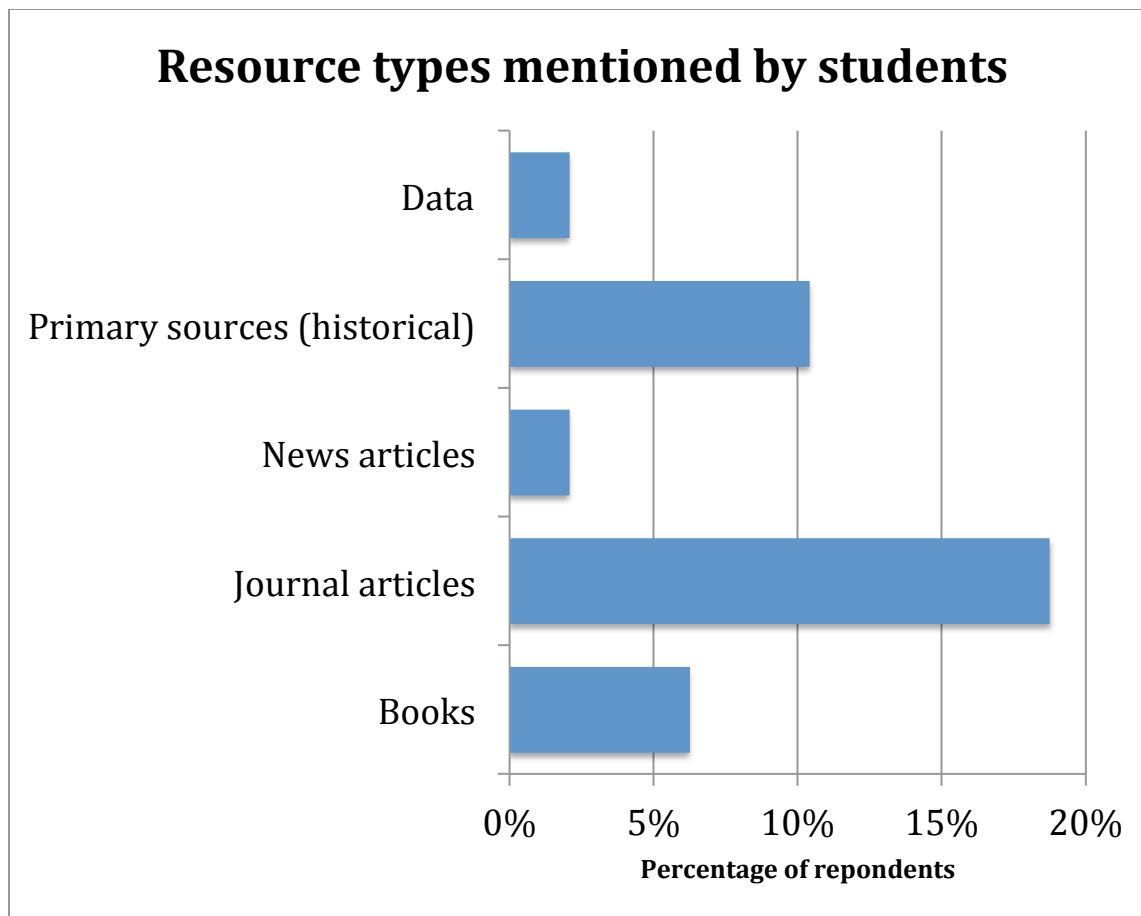


Figure 2: Resource types mentioned by students.

Closing the Loop: Part 1

An important part of every assessment project is the final stage of using the information collected to make improvements or changes to services, often called “closing the loop,” as emphasized by Oakleaf (2009). After analyzing the data, reference librarians met to discuss the results during a staff meeting and to determine how this information would affect reference services. Although we were pleased to see students mentioning specific databases and resource types (Gremmels and Lehmann, 2007), we were disappointed that few students mentioned more complex concepts. Librarians felt that much of the time during the reference transaction was spent on evaluating sources, finding appropriate search terms, narrowing or broadening the search, filtering, etc.

This led to a discussion about how individual librarians conduct a typical reference transaction. We found that several staff members would jot down rough notes during the reference interview. These notes, typically taken on scrap paper, were often thrown away after the transaction.

In an effort to improve student retention of the concepts discussed in the reference transaction, librarians agreed to develop a form for taking notes that could be handed to the students at the end of a transaction and referred to later. We hoped that providing students with a sheet of notes with important concepts, search terms, and strategies would reinforce his/her learning of complex information literacy concepts. These Reference Notes would serve the same purpose as class handouts, notes or worksheets, but customized for each transaction.

We searched the library literature and posted messages on several listservs seeking examples of forms used during reference transactions by either the librarian or the student. Most of the available examples were quite structured: listing databases to be searched or resource types to be found (e.g. Beck and Turner, 2001; Gremmels and Lehmann, 2007). We could not identify any literature that evaluated (directly or indirectly) the usefulness or the impact on student learning of such forms.

Librarians at SUNY Geneseo sought to develop a form that built upon their natural inclinations for taking notes (i.e., make this as natural as writing on an empty piece of scrap paper) and that could accommodate a wide variety of subjects and note-taking strategies (lists, concept maps, diagrams, etc.).

As a result, the form that SUNY Geneseo librarians developed provided just a few prompts:

- Project due date
- Research question
- Keywords/subject headings
- Databases/resources
- Other information (subject guides, strategies, types of sources, questions for professor, etc.)

The single-page sheet left extensive space for information, notes, and diagrams (see figure 3). The form also provided basic information to the students about library hours, and contact information for the librarian who helped them (or a subject specialist with whom they could later confer). The Reference Notes forms were piloted at the end of the fall 2012 semester. After making some minor tweaks, reference librarians agreed to use the forms during appropriate reference transactions in the spring 2013 semester.

Since the use of these new Reference Notes forms was a major part of our “closing the loop” strategy for our assessment of student learning at the reference desk, we needed to continue our assessment in order to determine if the new strategy had any effect.

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Research Question:

Due date:

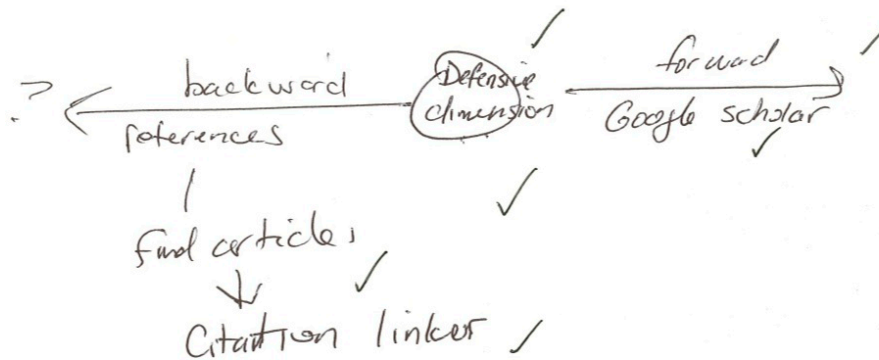
Keywords/Subject headings: /

AND Israel* (SU) ✓
AND "Counter terror*" or counter-terror* (AB) ✓
effect* or effect* ✓

Databases/Resources: ✓

Poli Sci library guide ✓
Proquest ✓
WV Pol. Abst ✓
PAIS ✓
Proquest News (search by under popular resources)
Israel* AND terror* ✓

Other information (subject guides, strategies, types of sources, questions for prof, etc.):



For more help, request a research consultation online or contact a librarian:

Librarian: [redacted]

Librarian's email: [redacted]@geneseo.edu

Milne Reference Desk: S 3-9pm, M-R 10am - 1am, F 10am - 9pm, S 12-5pm

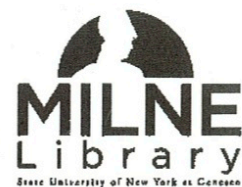


Figure 3: A filled-out Reference Notes form demonstrating the opportunity for librarians to record pertinent terms, useful resources, and relevant search strategies.

Assessing the New Reference Strategy

Methods

After developing and testing the Reference Notes form and strategy during the fall 2012 semester, we needed to determine if this had an impact on student perceptions of their learning. We continued our previous survey (“What did you learn today in your meeting with the librarian?”) while using the Reference Notes form. We added one question about the Reference Notes forms, “If the librarian handed you a sheet of notes, how useful will it be later?” Students answered using a likert scale from 1 (not at all useful) to 5. Due to a low survey response rate in Spring 2013, we continued handing out surveys into the fall 2013 semester (Swoger & Davies Hoffman, 2014).

The Reference Notes forms were printed as 8.5” x 11” carbonless duplicates, with pre-printed sequential numbers. Copies were placed at the reference desk and at the desks of librarians who met with students for scheduled consultations. Librarians entered the Reference Notes number in a field on the “What did you learn today?” survey as they handed it to students for later comparisons with student survey responses. Librarians handed one copy of the Reference Notes form to the student at the end of the transaction, and kept the other for possible later analysis.

In addition to the student survey and the Reference Notes forms, we also surveyed librarians to learn about how they were using the Reference Notes forms and to get their reflections on the experience. Their written answers were supplemented by a group discussion during a staff meeting about the usefulness of the Reference Notes strategy and its impact on reference service.

Results: Student Survey

We collected 60 survey responses in the spring and fall 2013 semesters. Librarians used the Reference Notes form with 83% of the survey respondents.

Student survey responses were categorized as “With Notes” or “Without Notes” depending on student responses (see table 2). Scheduled consultations made up 74.2% of the group without Reference Notes and 64% of the group with Reference Notes. The disciplinary breakdown of courses related to the reference transaction was similar for both groups (see figure 4).

Table 2: Student survey responses associated with our Reference Notes forms and those without.

	Fall 2011	Spring and Fall 2013	Total
With Notes	0	50	50
Without Notes	48	10	58

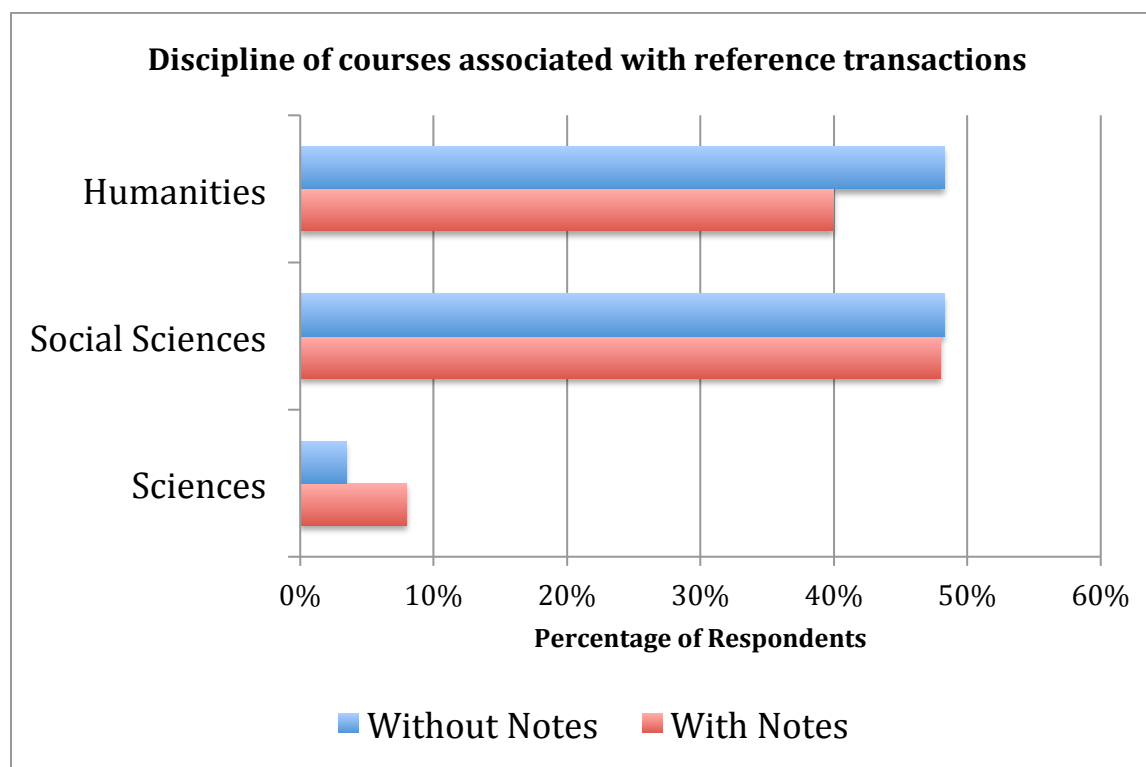


Figure 4: Student survey responses by discipline. The disciplinary breakdown of the “With Notes” and “Without Notes” are similar, but there was a decrease in the number of humanities students who responded.

Students universally felt that the Reference Notes forms would be useful to them (average of 4.7 on the 5 point scale), and anecdotal feedback from librarians suggested that students appreciated the forms. On several occasions, students who returned for help pulled out the original notes sheet as a starting point, and one student returned for a copy of her sheet after misplacing the original.

Student survey responses suggested that the Reference Notes form may change student perceptions of their learning, although our results were mixed (see figure 5).

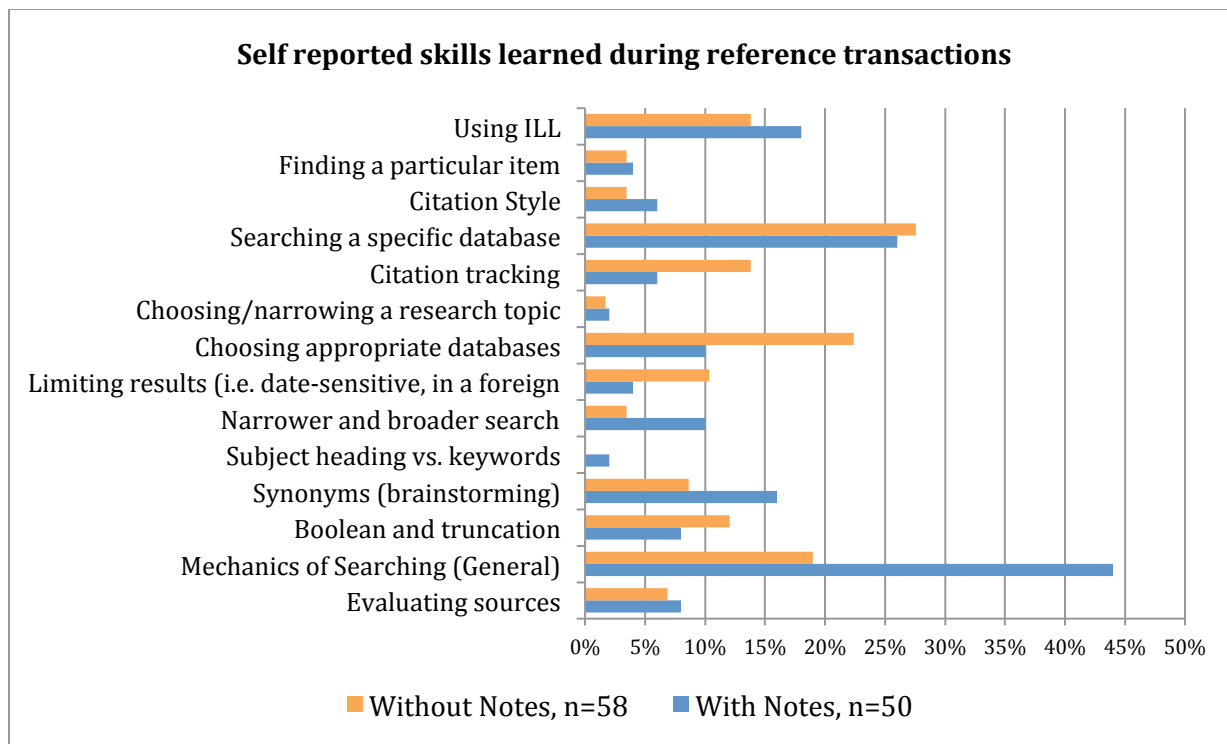


Figure 5: We saw increases in the number of students reporting that they learned about many concepts, although results were mixed.

Although we saw increases in reported student learning in some of the categories we hoped to improve, the differences are not statistically significant due to our small sample size. Librarians found student comments useful in suggesting what students were thinking about various concepts. Students were twice as likely to report learning about narrowing or broadening their search or learning to select appropriate keywords.

How to make searches super-specific and find the keywords that will make found [sic] articles most relevant to my topic. Also learned to use articles' references as new places to start and expand my research from.

I learned how to narrow down a topic, and find more information. This was extremely helpful and helped relieve my stress a bit. I learned how to better my search terms. Thank you!

We saw modest differences in other categories such as using interlibrary loan, citation styles, and evaluating sources.

Using the citation tracker on google scholar as well as better indicators of a peer reviewed vs popular article

We also saw a large increase in the number of students who indicated (generally) that they learned something about *how* to search for information.

Conversely, we saw decreases in some categories. Fewer students reported learning about Boolean or truncation, and fewer students indicated that they learned something about selecting an appropriate database. While fewer students indicated they learned about filtering results, this is largely accounted for by a 50% decrease in the number of research consultations we conducted related to foreign language classes (French and Spanish) in which students were looking for foreign language materials.

Results: Librarian Survey and Discussion

Twelve librarians filled out a survey about the Reference Notes forms during the summer of 2013. We then held a staff meeting to discuss the use of the Reference Notes forms and the librarian survey. Although reference librarians were aware of the initial assessment results, data from the follow-up survey (with the Reference Notes forms) had not yet been analyzed.

Like the students, librarians were asked to rank the usefulness of the Reference Notes forms. Librarians' responses averaged 4.3 out of 5 (n=12), slightly less than the student average of 4.7.

Librarians were enthusiastic about the use of the form, for several reasons. From the beginning, the process of developing the form forced librarians to think critically about their interactions at the reference desk. We were able to discuss *how* we do reference, a conversation that was rarely held amid the business of the working day. As a result, we learned new tips and strategies from each other and shared information, leading to a "tightened system" (see Green and Swanson, 2011).

Once we started using the Reference Notes form, librarians noticed several things about how it impacted their practice. For some, the form encouraged pre-planning for scheduled reference consultations, helping librarians remember important resources and concepts. For others, the form provided a guide to review a reference transaction at the end of the session:

I reviewed things better at the end of the SRC [scheduled research consultation] because of the form; I reviewed what terms we searched, what databases, and suggested a plan of action for the student's next phase of research, especially what questions or clarifications they need to discuss with the professor before they proceed too much further.

Several librarians mentioned that the form helped them organize their thoughts, and sparked discussion about additional resources they may have forgotten.

Although the response from librarians was generally positive, they did note a few negative impacts. Some librarians suggested that stopping to write things down interrupted the “flow” of the session and affected how they made eye contact and communicated with the student.

At our meeting, librarians also discussed the value of a student or librarian note-taker. Students would sometimes prefer to take notes in their own notebooks, or they wanted to use the sheet. One librarian suggested that finding ways to encourage students to take notes using our form might be a better strategy and would avoid “spoon feeding” information to the students. Others argued that students may not record some of the important details that a librarian would.

Closing the loop: Part 2

After analyzing the results of our second survey, librarians met again to develop strategies to close the loop. We were pleased with the effectiveness of the Reference Notes forms, and agreed to keep using them (without keeping the carbon duplicates). As new librarians were hired, we worked with them to explain the Reference Notes forms, the strategy behind its use and encouraged them to adopt the practice of taking notes at the reference desk.

Based on results from the two rounds of assessment, we could also see the value that students placed on discovering particular resources. In response, we have been working with the Milne Library web team to provide more direct access to subject-specific “best bet” databases via the library homepage.

Discussion

Very few published studies have assessed student learning during reference transactions and we could not identify any studies that examined changes in student learning through the use of particular reference strategies. Although Gremmels and Lehmann (2007) suggested that written or visual aids may help students learn during the reference transaction, they did not assess the usefulness of such tools. Our project suggests that written notes may be an effective strategy for making the reference transaction a more effective learning opportunity.

For decades, educational researchers have suggested that students learn best when presented with information in multiple formats. At the core of this research, Dale’s Cone of Experience suggests that when students use more than one modality (e.g. seeing, hearing, discussing, doing) they are more likely to retain the information presented

(1969). Recent research into multimodal learning updates these concepts for the digital age, suggesting that students may pay more attention when information is presented in a variety of formats (Sankey et al., 2010). It would seem then that the more methods librarians use to convey concepts and strategies at the reference desk (e.g. seeing and hearing), the more students will learn and retain.

The Reference Notes forms may be particularly useful in emphasizing to students that effective research is more than just knowing which database to use. Selecting the best terms and developing effective strategies are an important part of the research process that the Reference Notes forms highlight.

We draw a parallel between our Reference Notes system and the strategy of instructors providing lecture notes compared to a student taking their own notes. Several studies have shown that student recall of lecture material improves when they are provided with lecture notes by the instructor, rather than simply taking notes on their own (Barnett, 2003; Larson, 2009; Raver and Maydosz, 2010). Kiewra (1985) argues that “teachers should be aware of students’ relatively incomplete note-taking behaviors, and therefore, encouraged to provide learners with adequate notes for review.” Like a professor using a whiteboard to highlight structure and convey important material, a librarian can provide essential guidance in modeling effective search strategies and making connections (visually) between ideas. These may be concepts that a student might miss or deem as non-essential if they were taking their own notes.

There are some limitations to this work. Any assessment of student learning at the reference desk begins at a tenuous position: since the reference interview defines the learning objectives for the session, it is rarely possible to design an assessment that measures how well students meet those objectives. In this project, we were not able to directly assess the knowledge students gained or the skills they learned. Instead, we relied on self-reported learning.

We were unable to extend our assessment and Reference Notes system into the virtual reference environment for this round of assessment. Chat reference interactions are increasing in number at Milne Library and we hope to investigate our options for extending this assessment and the Reference Notes system into the virtual realm in the future.

When evaluating our original assessment results, librarians struggled to understand why students were writing down basic concepts like database names, when librarians felt that they spent most of their time on concepts such as filtering or brainstorming keywords. One possibility is that students reported learning novel skills or new

resources, rather than reporting an increased level of skill (such as better keyword searching). Students may be able to more easily recall and write down concrete concepts (such as the name of a database) over more conceptual ideas (such as Boolean searches or narrowing down a topic).

As a result, our student surveys did not accurately report everything students learned during a session. While we acknowledge the limitations of self-reported learning gains (Porter, 2012), the combination of student surveys, student rankings of the usefulness of the Reference Notes form, and librarian reactions to using the form suggest that this strategy is worthwhile.

Conclusion

The most recent ITHAKA survey of library directors suggests that information literacy will play an increasing role in many academic libraries (Long and Schonfeld, 2014). Treating reference consultations as a form of information literacy instruction is one more tool to help students understand our information-rich environment. As libraries place greater emphasis on their value to their parent institutions, connecting reference services to student learning becomes more important (Oakleaf, 2010).

Our project showed that the one-minute paper tool (Choinski and Emanuel, 2006) can be an effective tool for assessing reference transactions and can help librarians make the connection between student learning and reference services. Additional assessments may help define which aspects of our note-taking process were most helpful to students. Was the opportunity to review concepts and strategies at the end of the session an important factor in learning at the reference desk? Were important concepts such as keywords, databases, and search strategies emphasized when librarians paused to write them down? Further assessment of reference services could help librarians understand specific aspects of the reference interview, aided by note-taking, that improve student learning.

Our assessment process also allowed reference librarians to be introspective about reference services, a practice encouraged by many, including Green and Swanson (2011). Librarians should think critically about *how* they help students learn during the reference encounter, not just when and where these services are offered.

References

- Adams, P. (2012), "So much more than what's on the surface : Assessing reference services at academic libraries", *Georgia Library Quarterly*, Vol. 49 No. 4, pp. 11–13, available at: <http://digitalcommons.kennesaw.edu/glq/vol49/iss4/8/>.
- Barnett, J.E. (2003), "Do Instructor-Provided On-Line Notes Facilitate Student Learning", *Annual Meeting of the American Educational Research Association*, Chicago, IL.
- Beck, S.E. and Turner, N.B. (2001), "On the fly BI: Reaching and teaching from the reference desk", *The Reference Librarian*, Vol. 34 No. 72, pp. 83–96, available at: http://dx.doi.org/10.1300/J120v34n72_08.
- Bunge, C.A. (1994), "Evaluating reference services and reference personnel: Questions and answers from the literature", *The Reference Librarian*, Vol. 20 No. 43, pp. 195–207, available at: http://dx.doi.org/10.1300/J120v20n43_16.
- Choinski, E. and Emanuel, M. (2006), "The one-minute paper and the one-hour class: Outcomes assessment for one-shot library instruction", *Reference Services Review*, Vol. 34 No. 1, pp. 148–155, available at: <http://dx.doi.org/10.1108/00907320610648824>.
- Dale, E. (1969), *Audiovisual methods in teaching*, Dryden Press, New York, NY.
- Desai, C.M. and Graves, S.J. (2008), "Cyberspace or face-to-face: The teachable moment and changing reference mediums", *Reference & User Services Quarterly*, Vol. 47 No. 3, pp. 242–255, available at: http://opensiuc.lib.siu.edu/morris_articles/18/.
- Durrance, J.C. (1989), "Reference success: Does the 55 percent rule tell the whole story?", *Library Journal*, Vol. 114 No. 7, pp. 31–36.
- Durrance, J.C. (1995), "Factors that influence reference success: What makes questioners willing to return?", *The Reference Librarian*, Vol. 23 No. 49-50, pp. 243–265, available at: http://dx.doi.org/10.1300/J120v23n49_18.
- Elmborg, J.K. (2002), "Teaching at the desk: Toward a reference pedagogy", *portal: Libraries and the Academy*, Vol. 2 No. 3, pp. 455–464, available at: <http://dx.doi.org/10.1353/pla.2002.0050>.
- Gale, C.D. and Evans, B.S. (2007), "Face-to-face: The implementation and analysis of a research consultation service", *College & Undergraduate Libraries*, Vol. 14 No. 3, pp. 85–101, available at: http://dx.doi.org/10.1300/J106v14n03_06.

- Goetsch, L. (1995), "Reference service is more than a desk", *The Journal of Academic Librarianship*, Vol. 21 No. 1, pp. 15–16, available at: [http://dx.doi.org/10.1016/0099-1333\(95\)90148-5](http://dx.doi.org/10.1016/0099-1333(95)90148-5).
- Green, D.D. and Peach, J.K. (2003), "Assessment of reference instruction as a teaching and learning activity: An experiment at the University of Illinois-Springfield", *College & Research Libraries News*, Vol. 64 No. 4, pp. 256–258.
- Green, J. and Swanson, T. (2011), "Tightening the system: Reference as a loosely coupled system", *Journal of Library Administration*, Vol. 51 No. 4, pp. 375–388, available at: <http://dx.doi.org/10.1080/01930826.2011.556960>.
- Gremmels, G.S. and Lehmann, K.S. (2007), "Assessment of student learning from reference service", *College & Research Libraries*, Vol. 68 No. 6, pp. 488–502, available at: <http://crl.acrl.org/content/68/6/488.abstract>.
- Harmeyer, D. (2010), "Hybrid reference: Blending the reference interview and information literacy", *The Reference Librarian*, Vol. 51 No. 4, pp. 358–362, available at: <http://dx.doi.org/10.1080/02763877.2010.503316>.
- Hernon, P. and McClure, C.R. (1986), "Unobtrusive reference testing: The 55 percent rule", *Library Journal*, Vol. 111 No. 7, pp. 37–41.
- Hernon, P. and McClure, C.R. (1987), "Library reference service: An unrecognized crisis - A symposium", *The Journal of Academic Librarianship*, Vol. 13 No. 2, pp. 69–80.
- Holliday, W., Ericksen, S., Fagerheim, B., Morrison, R. and Shrode, F. (2006), "Instruction in a virtual environment: Assessing the needs for an online tutorial", *The Reference Librarian*, Vol. 46 No. 95-96, pp. 187–211, available at: http://dx.doi.org/10.1300/J120v46n95_12.
- Hsieh, H.-F. and Shannon, S.E. (2005), "Three approaches to qualitative content analysis", *Qualitative Health Research*, Vol. 15 No. 9, pp. 1277–88, available at: <http://dx.doi.org/10.1177/1049732305276687>.
- Jacoby, J. and O'Brien, N.P. (2003), "Assessing the impact of reference services provided to undergraduate students", *College & Research Libraries*, Vol. 66 No. 4, pp. 324–340, available at: <http://crl.acrl.org/content/66/4/324.abstract>.
- Jardine, C.W. (1995), "Maybe the 55 percent rule doesn't tell the whole story: A user-satisfaction survey", *College & Research Libraries*, Vol. 56, pp. 477–485, available at: <http://crl.acrl.org/content/56/6/477.full.pdf+html>.
- Kiewra, K.A. (1985), "Learning from a lecture: An investigation of notetaking, review and attendance at a lecture", *Human Learning*, Vol. 4, pp. 73–77.

- Larson, R.B. (2009), "Enhancing the recall of presented material", *Computers and Education*, Elsevier Ltd, Vol. 53 No. 4, pp. 1278–1284, available at: <http://dx.doi.org/10.1016/j.compedu.2009.06.010>.
- Long, M.P. and Schonfeld, R.C. (2014), *Ithaka S+R US Library Survey 2013*, available at: <http://www.sr.ithaka.org/research-publications/ithaka-sr-us-library-survey-2013>.
- Magi, T.J. and Mardeusz, P.E. (2013), "Why some students continue to value individual, face-to-face research consultations in a rechnology-rich world", *College & Research Libraries*, Vol. 74 No. 6, pp. 605–619, available at: <http://crl.acrl.org/content/74/6/605.abstract>.
- McClure, H. and Bravender, P. (2013), "Regarding reference in an academic library: Does the desk make a difference", *Reference & User Services Quarterly*, Vol. 52 No. 4, pp. 302–308, available at: <http://dx.doi.org/10.5860/rusq.52n4.302>.
- McLaughlin, J.E. (2011), "Reference transaction assessment: Survey of a multiple perspectives approach, 2001 to 2010", *Reference Services Review*, Vol. 39 No. 4, pp. 536–550, available at: <http://dx.doi.org/10.1108/00907321111186631>.
- Miller, J. (2008), "Quick and easy reference evaluation: Gathering users' and providers' perspectives", *Reference & User Services Quarterly*, Vol. 47 No. 3, pp. 218–222, available at: <http://www.rusq.org/2010/01/03/quick-and-easy-reference-evaluation-gathering-users-and-providers-perspectives/>.
- Murfin, M.E. (1995), "Evaluation of reference service by user report of success", *The Reference Librarian*, Vol. 23 No. 49-50, pp. 229–241, available at: http://dx.doi.org/10.1300/J120v23n49_17.
- Oakleaf, M. (2009), "The information literacy instruction assessment cycle: A guide for increasing student learning and improving librarian instructional skills", *Journal of Documentation*, Vol. 65 No. 4, pp. 539–560, available at: <http://dx.doi.org/10.1108/00220410910970249>.
- Oakleaf, M. (2010), *The Value of Academic Libraries*, Association of College and Research Libraries, Chicago, IL, p. 172, available at: <http://www.acrl.ala.org/value>.
- Oakleaf, M. and VanScoy, A. (2010), "Instructional strategies for digital reference: Methods to facilitate student learning", *Reference & User Services Quarterly*, Vol. 49 No. 4, pp. 380–390, available at: <http://meganoakleaf.info/instructstratdigref.pdf>.
- Porter, S.R. (2012), "Self-reported learning gains: A theory and test of college student survey response", *Research in Higher Education*, Vol. 54 No. 2, pp. 201–226, available at: <http://dx.doi.org/10.1007/s11162-012-9277-0>.

- Raver, S.A. and Maydosz, A.S. (2010), "Impact of the provision and timing of instructor-provided notes on university students' learning", *Active Learning in Higher Education*, Vol. 11 No. 3, pp. 189–200, available at: <http://dx.doi.org/10.1177/1469787410379682>.
- Reinsfelder, T.L. (2012), "Citation analysis as a tool to measure the impact of individual research consultations", *College & Research Libraries*, Vol. 73 No. 3, pp. 263–278, available at: <http://crl.acrl.org/content/73/3/263.abstract>.
- Richardson, J.V.J. (2002), "Reference is better than we thought", *Library Journal*, Vol. 127 No. 7, pp. 41–42.
- Roy, L. (1995), "Reference accuracy", *The Reference Librarian*, Vol. 23 No. 49-50, pp. 217–227, available at: http://dx.doi.org/10.1300/J120v23n49_16.
- Sankey, M., Birch, D. and Gardiner, M. (2010), "Engaging students through multimodal learning environments: The journey continues", *Proceedings ascilite 2010*, Sydney, Australia, pp. 852–863, available at: <http://ascilite.org.au/conferences/sydney10/procs/Sankey-full.pdf>.
- Saxton, M.L. and Richardson, J.V.J. (2002), *Understanding reference transactions: Transforming an art into a science*, Emerald Group Publishing Limited, Bingley, UK.
- Stalker, J.C. and Murfin, M.E. (1996), "Quality reference service: A preliminary case study", *The Journal of Academic Librarianship*, Vol. 22 No. 6, pp. 423–429, available at: [http://dx.doi.org/10.1016/S0099-1333\(96\)90002-6](http://dx.doi.org/10.1016/S0099-1333(96)90002-6).
- Steiner, H.M. and Holley, R.P. (2009), "The past, present, and possibilities of commons in the academic library", *The Reference Librarian*, Vol. 50 No. 4, pp. 309–332, available at: <http://dx.doi.org/10.1080/02763870903103645>.
- Swoger, B.J.M. and Davies Hoffman, K. (2014), "Taking Notes at the reference desk: Assessing and improving student learning - Raw Data", *figshare*, available at: <http://dx.doi.org/10.6084/m9.figshare.1038811>.
- Wolfe, J.A., Naylor, T. and Drueke, J. (2010), "The role of the academic reference librarian in the learning commons", *Reference & User Services Quarterly*, Vol. 50 No. 2, pp. 108–113, available at: <http://digitalcommons.unl.edu/libraryscience/221/>.
- Yi, H. (2003), "Individual research consultation service: An important part of an information literacy program", *Reference Services Review*, Vol. 31 No. 4, pp. 342–350, available at: <http://dx.doi.org/10.1108/00907320310505636>.