



Reference Transactions Analysis: The Cost-Effectiveness of Staffing a Traditional Academic Reference Desk

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This study categorizes 6959 reference desk transactions to determine how many of the queries require the attention of a librarian.

Results indicate that 89% could likely be answered by non-librarians. From the results of this and other studies, the author explores the cost-effectiveness of staffing a traditional reference desk with librarians.

INTRODUCTION

Librarians who worked in pre-Internet days remember a typical reference desk query: "I need ten scholarly articles for my paper due tomorrow." The long process of responding to the request began. First, an explanation was made that the proper print index for the request must be identified. With luck, the student had used the *Readers' Guide* in high school and had some idea of how to use a print index. For the uninitiated, a one-sided conversation began on subject terms, controlled vocabulary (found in a separate volume and different for different indexes), how to read a citation, where to find the actual names for the abbreviated journal titles contained within the citation, and how to tell (sort of) if the journal is scholarly (to know for sure, other sources had to be consulted). The student was reminded that the search strategy outlined above should be repeated in each annual volume of the index until ten articles had been found. If by chance an appropriate article was found, the student had to determine if the library actually owned the article (the odds were not good in most libraries) by consulting another print source. Then the format in which the journal was held had to be determined (microfiche? – that would require yet another lesson to use the microform reader printer, as well as a supply of change – dimes only, please – to print). With a little luck, ten articles might be procured in just a couple of hours. It was the rare student who could stumble through all of the necessary steps without the help of a librarian.

The same question asked today usually takes one database and about 30 s to suggest a search strategy. A controlled vocabulary search is rarely needed – in most cases students can enter a few keywords on their topic, check the "full-text" and "peer-reviewed" limiter boxes and get more articles than they can digest. Once shown a large aggregator database or multi-database federated search engine, students are ready to proceed and may not be back to the reference desk again during their college tenure. This is not to say that students never need reference librarians or never have information needs that require a little more than a quick Google or database search. But there is no doubt that online resources have caused dramatic changes not only in how questions are answered, but also in the questions themselves. Academic librarians have long discussed the changing nature of reference desk transactions, including how much time they spend on troubleshooting hardware, changing printer cartridges, and answering questions on how to use various software. This study analyzed 6959 reference

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transactions at an academic reference desk for 8 months over a four year period to determine the nature of those transactions and how many required a librarian to deal with them. The resulting data were used to hypothesize regarding the cost-effectiveness of staffing a reference desk with librarians.

STUDY QUESTIONS

The study looked at 6959 reference desk transactions to determine the following:

1. The types of questions asked at the reference desk.
2. How many of the questions are considered "reference" (as defined in the methodology).
3. How many of the questions are considered "research" (as defined in the methodology).
4. How many questions require a librarian holding the MLS and how many could be answered by a trained student or staff member.
5. The cost-effectiveness of staffing a reference desk with librarians.

LITERATURE REVIEW

A review of the literature found a number of studies that have analyzed reference transactions in an attempt to evaluate or refine reference question classification systems or to improve services in general.¹ Additional studies exist that analyze only online reference questions (email services, chat reference, digital reference services) to assess those services.² None of these, however, looked at the transactions in terms of whether they required librarians or trained staff to answer them.

In response to budget cuts and the need to find more cost-effective methods of delivering information services, Bracke et al. spent 2 years using various evaluative tools to develop new service and staffing models at the University of Arizona. After noting an 88% drop in reference desk transactions from 1991 to 2004, they determined that what was needed most was more information about the nature of questions customers were asking at service points, as well as more information on what their users thought about the quality of services the reference desks provided. Along with user surveys, they analyzed reference questions for three two-week periods and determined that 95% of the reference questions asked at all of their various service sites could be answered by students and trained generalists. In addition, the study reported actual costs (salaries, cost of training, cost of scheduling, cost of trading desk hours, cost of the hiring process, and the cost of supervising student employees) of staffing service points, although these costs were not broken down on a per-question basis. Not surprisingly, they concluded that the largest single cost of staffing service points was the salaries of permanent employees.³

Henry and Neville categorized more than 5500 reference questions asked during semester-long periods using both the Katz⁴ and Warner⁵ methods of classification to determine the most useful system for categorizing reference questions in a changing technology environment (their study included all questions answered by two participating librarians). While their main focus was to determine a better classification system for their library, their data pointed to the prevalence of rather simple questions and the need to reevaluate staffing a reference desk

with professional librarians. They found that "directional" queries accounted for most of the transactions, averaging 50% or more of the total questions. A second level of question (called "skill-based" by Warner and "ready reference" by Katz) made up 30–40% of the results, while fewer than 10% of the questions were considered "strategy-based." Although they raised some broad questions about staffing issues, they did not attempt to do a cost analysis of staffing the desk with librarians.⁶

In a short discussion on the fate of the traditional reference desk, Carlson reported that in 2005–2006 only 243 (5.5%) of 4400 questions at Temple University involved extensive interaction and research, about 2300 (52%) were simple reference questions, and 1800 (41%) were deemed directional. He concluded that "the bulk of [reference] questions could also be answered by students or staff members with minimal training."⁷

By almost every measure, reference desk transactions have declined over the past decade.⁸ Most authors agree that reference questions have changed due to technology, the Internet, and subscription databases. Rieh states that "the changes from mediated searching to end-user searching effect [sic] the traditional interactions between librarians and users" and found that "many users tended to ask more mechanical questions than subject-oriented or reference questions in end-user online searching environments."⁹ Tenopir and Ennis concur, noting that more technical questions are asked, including those about equipment, software, printing, downloading, emailing, document formats, networks, and connectivity.¹⁰ Bell states that "more and more front-line librarians are finding that what they thought would be reference work is turning out not to be reference work."¹¹

Opinions and studies on the usefulness of the reference desk abound. For decades, librarians have been arguing for or against maintaining a reference desk.¹² Ewing and Hauptman insisted in 1995 that traditional reference service offered by librarians should be eliminated (largely in response to the availability of information technologies), stating:

Many critics who have studied reference interactions have noted that an extremely high percentage are directional or simplistic in nature. It does not require any special educational preparation to direct a student or faculty member to a particular library department, a photocopier, a lavatory, or a general almanac... Most inquiries can be handled by moderately capable high school graduates; a little in-house training and an apprenticeship program would assure their success.¹³

They went on to assert that "any intelligent individual can quickly learn to ask a few basic questions in order to hone in on precisely what a patron desires..."¹⁴ As might be imagined, others argued strenuously that Ewing and Hauptman were wrong. Kong characterized their article as full of "gross generalities and conclusions based on assumptions of the 'typical' academic library reference service model" (especially concerning the capabilities of almost anyone filling in at the reference desk), but conceded that Ewing and Hauptman had also articulated a longing shared by many reference librarians "for a reference environment in which librarians are available to assist patrons with higher order, complex queries with minimal interruptions devoted to those tasks deemed to be less than professional."¹⁵

Likewise, Goetsch saw Ewing and Hauptman's conclusions as "impressionistic observations" that did not present a strong case for the elimination of reference services.¹⁶ Yet she, too, agreed that "it may well be that the reference desk has outlived its usefulness as the physical place where [the reference] intervention takes place" while arguing that the need for some type of

assistance would continue.¹⁷ More recently, Steven Bell recounted his well-publicized Columbia University debate with Sarah Watstein on the future of the reference desk. Bell advocates that academic reference desks should be eliminated by 2012 and offers some standard rationales for his position: mobile technology negates the need for a physical desk; students or paraprofessionals can staff a desk because reference questions are largely printer- and computer-related; and a “just-in-time” model of reference service (as opposed to “just-in-case” desk sitting) puts professional skills to better use elsewhere, including classrooms, residence halls, or academic departments. His opponent argued that the reference desk remains a powerful symbol of the culture of academic libraries; the value of personal service should not be underestimated; reference desks are busy despite decreased transactions; users of complex information tools need an intermediary; a teachable moment in person is not equal to a teachable moment online; and modern physical reference desks are designed to complement the versatile learning environments that are found in academic libraries.¹⁸

Neal responded to Bell’s call for the elimination of the reference desk with a rather pragmatic middle-of-the-road stand and calls for just the type of examination this study hopes to accomplish:

Especially with relatively few staff, a library with a busy reference desk can’t just get rid of it because of some ‘visionary’ proclamation. Similarly, a library with a slow reference desk can’t hold on to one for the sake of tradition, especially if time and money can allow librarians to engage in more visionary work. Ultimately, it’s up to individual libraries to decide whether ‘traditional’ reference desk duties seem more useful for their communities, or (time and money permitting) if librarians should do more than clearing various mechanical jams and pointing patrons to the bathroom... Some institutional honesty and a willingness to critically examine the nature of reference desk transactions seems a good place to start.¹⁹

Whitson advocates a “differentiated service” model that discards the idea of reference service as a single “desk” activity and categorizes different levels of service (directions, technical assistance, information look-up, research consultation, and library instruction) which must each be structured, staffed, supported, and evaluated on its own terms.²⁰ In a survey of literature on perceptions of reference services from the perspectives of managers, librarians, and users, Rieh concludes that “alternative reference service models can best be redesigned by looking more closely at how users are dealing with their information problems and how they get help from reference librarians in technological environments.”²¹ This study attempts to address the latter, based on the questions users posed at a reference desk; it looks at the actual cost-effectiveness of staffing a reference desk based on librarian salaries and the nature of the questions asked.

METHODOLOGY

Stetson University is a private university (approximately 2500 FTE) with a main library that holds about 336,000 volumes and bound periodicals, as well as 376,000 federal documents. The library subscribes to more than 100 subscription databases and holds more than 20,000 print and electronic journal titles. The reference desk is staffed for 68 out of 92 open hours per week, including nights and weekends, by four full-time and two part-time librarians, all of whom hold the MLS degree. During the study periods, the library housed between 27 and 40 public workstations that had Internet access and the Microsoft Office

suite of software loaded; each computer also had an individual printer attached. The library building offers both wired and wireless Internet access for laptops as well.

For a two-month period beginning in October 2002, Stetson University reference librarians recorded all reference questions asked at the reference desk along with the source(s) used to try to answer them. All questions were recorded that came to the reference desk in person, by phone, or by email. Although most questions came in person, no distinction was made in the data collection as to the manner in which the question came to the desk. The two-month study was repeated in spring 2003, spring 2006, and fall 2006 to account for changes in class assignments and changes over time.

The original study design focused not on the questions asked, but on the sources used to answer the questions. Librarians wanted to test their hypothesis that online sources were used far more than print reference books to answer questions. The 2002–2003 data were used in a previously published study that showed, as librarians had suspected, that online sources were used much more than print reference sources to answer questions.²² That study suggested as an area of further research “an analysis of what students want to know – in other words, what questions are students asking and can library reference services better address the students’ information needs.”²³ The current study, therefore, addresses that suggestion and focuses on the questions asked over the total eight-month study period.

To collect the data, reference librarians recorded each question along with the source or sources used to answer the question. The first 2 months, librarians manually recorded the questions and sources used to answer them and then the data were transcribed into an Excel spreadsheet. During the subsequent study periods, librarians typed the questions and sources directly into an Excel spreadsheet at the reference desk. Questions were necessarily paraphrased, but librarians tried to write or enter a question as soon as possible after the question had been asked to ensure the question was accurately represented and included all the answer sources. A data monitor reviewed the spreadsheet daily to clean up typographical errors, to maintain data consistency, and to assign categories to the sources used to answer the questions.

Because the original study focused on the answer sources and not the questions, it was decided in the study design to exclude two transaction categories as they would not yield any meaningful answer source data; therefore 2528 directional and “machine” transactions, though counted in the aggregate, were not logged as questions. Directional questions that did not refer to the collection (the location of the restroom, a campus building, or an office) were excluded, along with “machine” transactions (paper jams, cartridge changes, and copier problems) that did not directly relate to an information need. Directional queries that related to the collection (the location of a call number, the location of a dictionary, or the location of a specific format or collection), however, were included in the question spreadsheet. Similarly, if a hardware or software question related to an information need (for example, downloading a document, addressing error messages, printing documents, or performing standard functions in the Microsoft Office suite programs), it was included in the question spreadsheet.

Data Analysis

To facilitate data analysis in the current study, the four spreadsheets from the four study periods were combined into

one spreadsheet. Many of the questions were listed more than once because more than one source had been used to answer the question and each source had been listed on a separate row. (4431 questions were logged into the spreadsheet; 6,365 sources were used to answer those questions.) Duplicate question rows were eliminated from the spreadsheet and questions were then divided into four major categories: Directional, Look-Up, Reference, and Technology (see Table 1).

None of the existing classification systems found in the literature worked well for this study. The categories used were specifically designed to differentiate questions that could be answered by a trained staff member as opposed to a librarian. While the assignment of a category is somewhat subjective in any reference transaction, adherence to the definitions of each provided as much consistency as possible. Examining the sources actually used to answer the questions also helped ensure that the question had been assigned to the most pertinent category.

Look-Up: A known item search, such as the title of a book, video, or DVD. Examples: “Do we own this book?” “Do you have a second copy of this video?”

Directional: A collection-oriented need for a location of an item or a location. Examples: “How can I find the location ‘new book’?” “Where are the encyclopedias?”

Technology: An information-related question about library hardware or software. Examples: “How do I print an article inside the frame?” “I can’t open the a: drive to download my paper.”

Reference: All information queries that did not fall into one of the categories above. Examples: “Do you have a periodical database for articles on excommunication?” “I need current and historical books and materials on war with Iraq, presently and the Gulf War.”

The “reference” category was of most interest because it comprised questions from a broad range of types, topics, and difficulty. Questions that fell into the reference category were pulled into a new worksheet and divided into more detailed

subcategories. A column was added to note how many sources were used to answer the question (see Table 2).

The number of sources can be indicative of the nature of the question and helped determine whether a question was a quick subject search in the catalog or a complicated research question. Again, having access to the actual sources used to answer the questions helped with categorizing the questions correctly and having definitions of the subcategories also helped maintain consistency. Categories were designed not only to pinpoint as closely as possible the type of question, but also to differentiate those questions that might be handled by trained staff members from those that might require a librarian.

Catalog Search: A subject search in the library’s catalog. Examples: “How do I find a guide to Florida Fish?” “I need a book on graduate programs in business.”

Citation Help: Questions regarding citing material in a variety of formats and styles. Examples: “How do I cite a government document in MLA style?” “How do I cite a newspaper article?”

Database Help: Suggestions on search strategies or help with specific functions of subscription databases. Examples: “How do I limit ProQuest to search only one journal title?” “I’m searching for education articles in ERIC, but I’m having trouble.”

Guide to Correct Database(s): Suggestions on which database(s) to use for a particular question. Examples: “How can I find articles on biology for a lab report?” “How do I find articles on co-dependency? I need a sociology database.”

Personal Knowledge or Referral: Either the librarian knew the answer without using any source or the question was referred to someone outside the library. Examples: “I need this book on Seminole Indians, but what does ‘in-process’ mean?” “I need to contact an alumnus.”

Quick Internet Search: Questions that can be answered with a basic Internet search. Examples: “I need directions from Stetson to Ormond Beach.” “How can I find websites for school counselors?”

Research: Questions that do not fall into any of the other categories. Often involved multiple search concepts. Examples: “I need an article utilizing a Marxist approach to a religious studies issue.” “I need articles and books for a paper on applying a Lacanian literary analysis to an autobiography by Reinaldo Arenas, *Before Night Falls*.”

Serials Solutions: Searches for specific journal articles and full-text of articles that can be answered using Serials Solutions. (In the first two study periods, the library used a home-grown online journals list which linked directly to subscription databases; the library had purchased Serials Solutions during the last two study periods. The two systems performed the same function, however, and all questions in this category were tagged as “Serials Solutions” for consistency.) Examples: “How do I find articles from National Geographic?” “Can I get the full-text of these articles?”

Determining Cost-Effectiveness

To calculate the cost-effectiveness of staffing the reference desk, each reference librarian’s salary during the four study periods was first translated to hourly rates (based on 1950 annual paid work hours) and then averaged to come up with a single hourly rate for each librarian during the four-year study period. Then the exact number of hours that each librarian worked during the study periods was determined using reference schedules and library calendars to ensure accuracy. Although librarians sometimes switch shifts, it is usually an hour-for-hour trade, so switching should have had a minimal

Table 1 Sample Questions and General Categories			
Number	Date	Question	Category
1	Fall02	How do I know if Stetson has these journals?	Look-up
2	Fall02	How do I get files to open in Blackboard in my dorm room?	Technology
3	Fall02	How do I find reserve readings?	Directional
4	Fall02	What is a folio and where are they?	Directional
5	Fall02	How do I save PowerPoint files in Blackboard to the desktop?	Technology
6	Fall02	I can’t find this book on the shelf.	Directional
7	Fall02	This book is missing from the shelf.	Directional
8	Fall02	How do I find articles on Internship Programs in Colleges?	Reference
9	Fall02	How do I find articles in biology?	Reference
10	Fall02	I need background information on Vedic religions.	Reference

Table 2
Sample Questions and Reference Subcategories

Date	Question	Category	Subcategory	Number Sources Used to Answer Questions
Fall02	How do I cite a government doc in MLA style?	Reference	Citation help	1
Fall02	Can't find articles in LexisNexis on gay and lesbian marriage.	Reference	Database help	1
Fall02	How can I find specific articles in EbscoHost?	Reference	Database help	1
Fall02	How can I find journal articles in psychology?	Reference	Guide to correct Database(s)	1
Fall02	Are the ERIC documents available through the computer?	Reference	Personal knowledge or referral	0
Fall02	Are there other full-text databases besides ProQuest?	Reference	Personal knowledge or referral	0
Fall02	Help me find the Baseball Hall of Fame web site.	Reference	Quick internet	1
Fall02	Are there statistics on workplace violence?	Reference	Research	1
Fall02	How can I find peer-reviewed articles on Thurgood Marshall's court decisions?	Reference	Research	1
Fall02	How can I tell if we own a journal?	Reference	Serials solutions	1
Fall02	Do we have any videos on Brazil?	Reference	Catalog search	1
Fall02	Do we have children's books on China?	Reference	Catalog search	1
Fall06	Where can I find directions to Stetson from Ormond Beach.	Reference	Quick internet	1
Fall06	Where can I find critical review/analysis of: Star Trek II The Wrath of Khan?	Reference	Research	6
Fall06	I need help finding current, full-text journal articles about women and higher education.	Reference	Guide to correct database(s)	3
Fall06	I need to find this NYTimes article	Reference	Serials solutions	1
Spring03	I need articles and books for a paper on applying a Lacanian literary analysis to an autobiography by Reinaldo Arenas, <i>Before Night Falls</i> (<i>Antes que anochezca</i>).	Reference	Research	4

effect on the data. By multiplying the hours worked by each librarian during the eight-month period by his or her average hourly rate, the estimated cost of staffing the reference desk was obtained. No attempt was made in this study to account for benefits, overhead, or administrative costs, as they would be difficult to quantify and are relatively minor compared to the librarians' salaries.

RESULTS

Very instructive to the current study was the answer "source" data included in the original studies conducted by Stetson

University librarians. Based on both published and unpublished data, perhaps the most surprising finding was that for the 4431 recorded questions, librarians could answer 1569 of them (35%) without using a single source (using only their own knowledge of the library or the collections). "Librarian knowledge" accounted for 25% of the total sources used to answer questions. Print reference books, on the other hand, were used only 506 times (7.9%) to answer questions. Of those 506 times, only 256 unique print reference titles were used (2.6% of the average number of 9,776 reference titles available in the collection during the study periods). Some type of online source (databases, the library catalog, the

Internet) accounted for 57% of the sources used to answer questions.

“...perhaps the most surprising finding was that for the 4,431 recorded questions, librarians could answer 1,569 of them (35%) without using a single source...”

Another interesting result was that librarians used only one source to answer a question 75% of the time and used fewer than four sources 95.8% of the time. While this may indicate the lack of complexity in the questions, it may also reflect the power of the online sources to answer questions quickly and efficiently. These numbers suggest that librarians are highly dependent on online sources, and by default, the way they answer questions has changed significantly over the past decade. It is doubtful that anyone would dispute the impact the Internet and technology has had on the way librarians answer questions. Spencer and Dorsey’s research seemed to support the predominantly “simple” questions trend as it indicated that 70.9% of questions at one urban university library took 5 min or less to answer. (The mean time was 5 min; the median was 4.1 min.)²⁴

Results of the current question analysis study also confirm that many questions can be considered simple directional or machine-related. As seen in Table 3, the 2528 non-informational direction and machine transactions accounted for 36.3% of all of the transactions during the eight-month study period. Few would argue that these “restroom” and “paper jam” transactions require the attention of a librarian.

Collection-oriented directional queries (where is the “H” section?) accounted for 1075 (15.4%) of the total transactions and quick look-ups for known items (do you have this book?) comprised 627 (9%). Together these two categories made up another 24.4% of the total transactions that, by definition, could

Table 3
Transactions by Category and Occurrence

Category	Number	Percentage
Direction and machine: non-informational	2528	36.3
Directional: information-oriented	1075	15.4
Technology: information-oriented	862	12.4
Research	784	11.3
Look-up	627	9.0
Guide to correct database(s)	289	4.2
Catalog search	275	4.0
Serials solutions	185	2.7
Citation help	114	1.6
Database help	96	1.4
Personal knowledge/referral	78	1.1
Quick internet	46	0.7
Total transactions	6959	

Table 4
Median Number of Sources Used to Answer “Reference” Category Questions

Subcategory	Median Number Sources Used to Answer Questions
Catalog search	1.2
Citation help	1.2
Database help	0.9
Guide to correct database(s)	1.6
Personal knowledge or referral	0.7
Quick internet	1.2
Research	2.2
Serials Solutions	1.2

be answered by any staff member familiar with the library, collections, and the use of the online catalog. Another 862 (12.4%) questions fell into the “technology” category. While a few technology questions could be considered complicated (creating formulas in Excel, for example), most concerned printing, downloading, identifying drives, network connections, logins, passwords, and other issues unique to the library’s particular workstation configurations. Again, a trained staff member could handle these as well as a librarian. These first four categories totaled 73.2% of the transactions. That left 1867 questions (26.8%) that fell in the “reference” category and required more detailed analysis.

Reference Questions

As noted in the methodology, questions categorized as “Reference” were subdivided into eight categories. It quickly became clear that all reference questions are not created equal. Table 3 shows that “Guide to Correct Database(s)” applied to 289 (4.2%) of all the transactions with a median of 1.6 sources used to answer the questions. (See Table 4 for median sources used.) Here, questions could be answered by referral to a subscription database or databases. “Catalog Search” was assigned to 275 (4%) of the questions; unlike the general “Look-Up” category where the patron sought a known item, the Catalog Search category was assigned to those questions requiring subject searches, and presumably, more knowledge of subject terms and search strategy. Only 1.2 median sources were needed to answer catalog search inquiries. “Serials Solutions” accounted for 185 (2.7%) of the questions and was assigned to those questions where full-text articles in particular journals or newspapers were sought; a median of 1.2 sources was used for this category. One hundred fourteen (2.7%) of the questions fell into the “Citation Help” category. All of these questions dealt with how to construct citations for a variety of formats using different style guides. The median number of sources used to answer citation queries was 1.2. Ninety-six (1.4%) of the questions were assigned to the “Database Help” category. Here, the questions concerned specific functions or search strategies for a particular database.

Librarians could often answer database help questions without referring to any sources; therefore the median number of sources used was 0.92 – less than one source. The “Personal Knowledge or Referral” category applied to 78 (1.1%) of the

questions; all of these questions could be answered by the librarian based on his or her knowledge of the library and the collection (including knowing when the question would have to be referred to someone outside of the library). By definition, librarians did not need any sources to answer most of these questions, although a referral counted as one source; the median for the Personal Knowledge or Referral category was therefore the lowest in sources used (0.71). It is interesting to note that although by this study's defined categories, only 1.1% of the transactions fell into the Personal Knowledge or Referral category, in reality Stetson librarians handled the 2528 non-informational direction and machine transactions, as well as 1569 of the recorded questions (together accounting for 58.9% of the total 6959 transactions studied) without using a *single source* other than their knowledge of the collections, library policies and procedures, the library's hardware and software configurations, and the University campus in general.

Although the Internet figures so prominently in libraries, Internet searches (excluding subscription databases) was the least used category. Only 46 questions (0.7%) were considered "Quick Internet" that required a basic Google or Internet search engine search with a median of 1.2 sources used. This last finding suggests that patrons are already finding these "Quick Internet" answers themselves and are likely not consulting librarians for a number of questions for which they may have sought help in pre-Internet days.

Research Subcategory

While questions categorized as "Research" varied widely in complexity and most could be answered with few sources, all were considered by definition potentially complicated enough to be referred to a librarian. The "Research" category, the most prevalent of all the reference question subcategories, was assigned to 784 (11.3%) of the total transactions. Of those 784 questions, 32 (4.1%) were answered without consulting any sources; 299 (38.1%) were answered with one source; and 641 (81.8%) were answered with three or fewer sources. Only 42

questions (5.4%) were answered with more than five sources (see Table 5). The median number of sources used to answer the "Research" questions was only 2.2.

Although it can be difficult and subjective to determine exactly which reference transactions require the skills of a librarian, more easily addressed are those questions that do not need a librarian. This study included enough concrete data to prove that many of the transactions are simple enough to be addressed by trained staff, or even by students. Study data showed that relatively few of the inquiries that came to the reference desk between 2002 and 2006 required a librarian to answer them. Those categories that most clearly do not need librarian intervention include the non-informational directions and machine queries, look-ups of known items, quick Internet searches, and technology questions; these categories accounted for 5,138 of the 6,959 reference desk transactions (73.8%).

"This study included enough concrete data to prove that many of the transactions are simple enough to be addressed by trained staff, or even by students."

The other categories that make up the remaining 26.2% are much more subjective, but an argument can be made that the non-research categories can also be answered by well-trained staff members with the occasional librarian referral (see Table 6).

Guiding patrons to the correct database and help with database functions (385 transactions; 5.5%) may be traditional librarian territory, but do not necessarily require a librarian's education. Similarly, checking for titles in Serials Solutions (2.7%), conducting most catalog searches (4%), and citation help (1.6%) do not require a particularly sophisticated skill set. That leaves personal knowledge or referrals (1.1%) that can usually be handled by those with a good knowledge of the libraries collections, resources, and policies. These categories combined constitute less than 15% of the transactions and can arguably be relegated to a trained staff member with the occasional referral to a librarian. The only category that would seem to argue for routine librarian intervention is the research category. With only 11.3% of the total reference transactions, it seems reasonable to conclude that these might be referred to librarians rather than have librarians sit at a desk and wait for relatively few more complex questions.

As shown in Fig. 1, 89% of the reference transactions in this study could be handled by students or staff trained in basic knowledge of the library's electronic resources, hardware and software issues, and procedures and policies, with an occasional referral to a librarian. Many librarians would argue that much of the skill set they use to answer reference questions was not learned in a graduate library program, but is based on their familiarity and knowledge of their particular library's print and electronic collections. In fact, many librarians working today received no graduate training on the Internet, databases, or websites as those resources did not exist at the time they attended library school. Librarians have also learned to deal with hardware problems and software issues as they arise and evolve. If librarians can learn with on-the-job training, it is reasonable to expect that other library staff members could be trained to use these resources effectively as well. A look at the

Table 5
Number of Sources Used to Answer "Research" Category Questions

Number Sources	Number Occurrences	Percentage
0	32	4.1
1	299	38.1
2	201	25.6
3	109	13.9
4	70	8.9
5	31	4
6	22	2.8
7	8	1
8	7	0.9
9	3	0.4
10	1	0.1
17	1	0.1

Table 6
Staffing Needs by Transaction Category

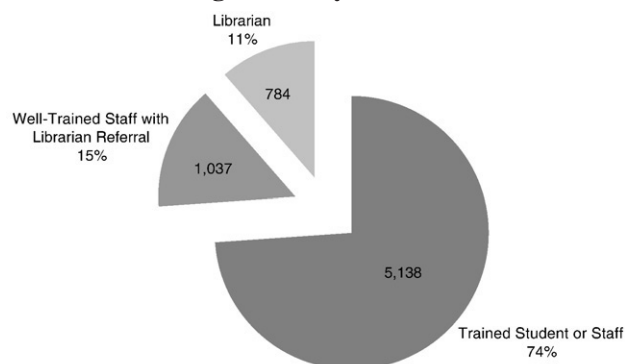
Category	Number	Percentage	Suggested Staffing Levels
Direction and machine: non-informational	2528	36.3	Trained student or staff
Directional: information-oriented	1075	15.4	Trained student or staff
Quick internet	46	0.7	Trained student or staff
Technology: information-oriented	862	12.4	Trained student or staff
Look-up	627	9.0	Trained student or staff
Serials Solutions	185	2.7	Well-trained staff/ occasional librarian referral
Personal knowledge/referral	78	1.1	Well-trained staff/ occasional librarian referral
Guide to correct database(s)	289	4.2	Well-trained staff/ occasional librarian referral
Catalog search	275	4.0	Well-trained staff/ occasional librarian referral
Citation help	114	1.6	Well-trained staff/ occasional librarian referral
Database help	96	1.4	Well-trained staff/ occasional librarian referral
Research	784	11.3	Librarian
Trained student or staff	5138	73.8	
Well-trained staff with librarian referral	1037	14.9	
Librarian	784	11.3	

cost of staffing a reference desk with librarians makes that argument even more compelling.

COST-EFFECTIVENESS OF THE REFERENCE DESK

With the Stetson reference desk open 68h/week, librarians worked at the desk exactly 2100h during the eight-month study period. The five full-time and three part-time librarians who participated in the study earned an average salary of \$23.77/hour. Multiplying the number of hours each librarian worked by their individual four-year average hourly wage rate and then

Figure 1
Staffing Needs by Transaction



totaling those figures resulted in estimated salary expenditures of \$49,328 for 8months of reference desk coverage. Dividing the amount by the 6959 transactions shows that the library spent an average of \$7.09 per transaction. While that does not seem particularly expensive to answer the 784 “research” questions (\$5559), consider that during the same time frame the library spent \$7.09 on each of the 2528 times that a printer cartridge was changed, or a paper jam fixed, or directions were given to a building across campus (totaling \$17,924). Of course, the exact cost per transaction cannot be calculated because it is unknown how many minutes were spent on each transaction and directions to the restroom surely take less time than most research questions. With 75% of the recorded questions answered with just one source, however, it can be reasonably deduced that a quick look-up, a catalog search, or directing a user to the correct database may not take any longer than fixing a paper jam or teaching a student to adjust the margins in Word. Spencer and Dorsey’s finding that 71% of transactions at one academic

Table 7
Staffing Costs (Salaries) Per Transaction

Categories	Number	Average Cost Per	Total Cost
Direction and machine: non-informational	2528	\$ 7.09	\$ 17,919.41
Directional: information-oriented	1075	\$ 7.09	\$ 7620.00
Technology: information-oriented	862	\$ 7.09	\$ 6110.18
Research	784	\$ 7.09	\$ 5557.29
Look-up	627	\$ 7.09	\$ 4444.41
Guide to correct database(s)	289	\$ 7.09	\$ 2048.54
Catalog search	275	\$ 7.09	\$ 1949.30
Serials Solutions	185	\$ 7.09	\$ 1311.35
Citation help	114	\$ 7.09	\$ 808.07
Database help	96	\$ 7.09	\$ 680.48
Personal knowledge/referral	78	\$ 7.09	\$ 552.89
Quick internet	46	\$ 7.09	\$ 326.07
Total transactions	6959		\$ 49,328.00

Table 8
Average Transactions Per Day by Type

Category	Number	Average Per Day
Direction, machine, technology (all types)	4465	20.8
Other non-research	1710	8.0
Research	784	3.6

library took 5 min or less to answer also lends support to the fact that most transactions are dealt with quickly and that an “average” transaction cost is at the very least generally instructive for library managers. Table 7 shows the salary costs of each category of reference transaction based on an average cost per transaction.

The number of transactions librarians handle per day is also instructive in determining the cost-effectiveness of desk staffing. The four study periods included a total of 215 days with an average number of 32.4 transactions per day (about 3.3 per hour) (Table 8). As seen in Fig. 2, librarians addressed an average of 20.8 directional, machine, and technology transactions each day and an average of eight other non-research transactions per day. An average of only 3.6 research questions per day came to the desk. With librarians working the desk for 12 h each weekday, the efficiency in staffing a desk for that long for less than four research queries must be questioned.

When studying the cost of reference services using a variety of instruments, the University of Arizona determined that the most important underlying issue was how the time of professional librarians was utilized. Two smaller campus libraries eliminated all librarian time at the information desks, saving \$1680 per week at one library and \$567 at the other. In the main library, they replaced some of their librarians with paraprofessionals at the reference desk during some open hours that resulted in a cost savings of \$774 per week.²⁵ Their findings led to a change in the library’s strategic plan to reflect the idea of “new work” for librarians; new work included “making sure that the library was a player in scholarly communications issues on campus; shifting [the] instructional role from simply responding to requests from faculty for single library instruction sessions to a curricular approach to information literacy that also integrates reusable learning objects to eliminate duplicative work; and augmenting revenue flow into the library by radically ramping up grant-seeking activity.”²⁶

According to Dennison, staffing public services, in particular reference desks, is one of the most important considerations for a library. He argues that “overstaffing wastes the most valuable and expensive resource: personnel. It diverts personnel time from other valuable services... Overstaffing can also be very damaging to a library’s public image... Overstaffing in a single area of a library can be harmful to staff morale.”²⁷ At the same time, however, he warns of the danger of understaffing. He advocates studying reference desk use patterns to determine the best allocation of staff, to consider the use of paraprofessionals at the desk, and to develop on-call librarian services.²⁸

While Whitson recognizes the advantages of a traditional reference desk staffed with librarians (convenience for the patron, efficiency, and maximum chance of a successful answer by using the most qualified staff), he believes that the disadvantages of the librarian-staffed reference desk are more

compelling in an age of budget stringency: high costs, lack of control in how questions are answered, inflexibility in the utilization of staff, lack of accountability of effectiveness at the desk, reinforcement of unrealistic client expectations of what can be answered on the spot, duplication of services at more than one service desk, and reinforcement of the image of the librarian as a clerk.²⁹ He states that “the time has come... for libraries to take control over their services, and require that clients adjust their behavior sufficiently to allow libraries to perform their work in the most effective way. Virtually no other agency in contemporary society, public or private, attempts to accommodate its services to the convenience of the client to the extent libraries do in the provision of reference services.”³⁰

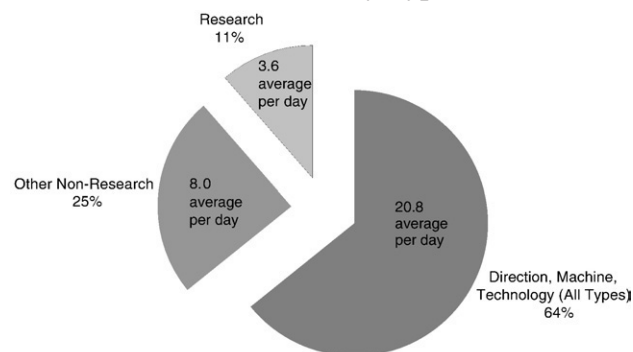
Alternative Service Models

A variety of reference service models exist and many have been discussed in library literature. Of course, the traditional reference desk staffed only by professional librarians still exists in many libraries, and others staff a desk with a combination of librarians, paraprofessionals, and/or students. Some libraries have gone to a tiered reference desk model with paraprofessionals and/or students answering questions at a desk and referring questions to on-call librarians as needed; both Brandeis University and the Welch Medical Library at Johns Hopkins University have used variations of this model.³¹ Still others have eliminated the desk and have established one information point (often the circulation desk) that uses a variety of staffing models; New York College of Pennsylvania and Northwest Missouri State University, for example, have closed their reference desks and use one information/circulation service point with librarians on-call.³² Warner describes a team approach at a single service point that employs both a circulation staff member and a librarian; the librarians do the in-depth reference work while the circulation staff member can help with collection-related requests.³³

Some librarians advocate getting away from the desk and “roaming” through the library or setting up mobile information stations in locations on campus where students congregate; the University of Florida librarians supplement traditional reference service with mobile reference kiosks.³⁴ Although no examples in practice could be found, Ewing and Hauptman suggest the development of artificial intelligence agents as a possible substitute for reference services and even offer the possibility of eliminating all reference services to let patrons fend for themselves.³⁵

When confronted with the idea of eliminating the reference desk, or reducing the use of librarians at the reference desk,

Figure 2
Transaction by Type



library managers often ask what reference librarians will do with their new “free” time. In even the most complete elimination of a reference service point, most would agree that librarians must still be available for research consultations in some capacity. Besides assisting patrons with one-on-one research needs, however, numerous opportunities exist for reference librarians to work behind-the-scenes. The University of Arizona’s “new work” was described above; many other tasks can be addressed with more available librarian time. Instructional content can be developed for library websites, more thorough database evaluations can be undertaken, and innovative online services can be explored and developed. Librarians may want to develop virtual reference services, blogs, social networking sites, or other non-traditional outlets of communication. Information literacy efforts can be initiated or enhanced across campus. More in-depth continuing education efforts could be addressed; librarians need to keep up with changes in search engines, systems, and various technology upgrades. Librarians in libraries that offer the Microsoft Office software could take classes in advanced features of Word, Excel, Access, and PowerPoint to be able to help with the more complicated features of those programs. Print reference collections, which often sit unused on the shelves, could be rigorously evaluated and weeded to ensure a leaner, more relevant selection of materials.

CONCLUSIONS

The following findings should lead library administrators to reconsider staffing a traditional reference desk with librarians:

- Only 11% of the reference transactions in this study were classified as “research” questions (and these required a median of only 2.2 sources to answer); only 10% of reference questions in the Henry and Neville study were considered strategy-based; Carlson reported that at his university library, only 5.5% of the questions required extensive interaction and research.

“Only 11% of the reference transactions in this study were classified as “research” questions (and these required a median of only 2.2 sources to answer)...”

- Eighty-nine percent of the transactions in this study could be handled by trained students and staff members; 95% of the questions in the Bracke et al. study could be answered by students and trained generalists; Carlson concluded that “most” of the questions at his university library could be answered by students or staff with minimal training.
- Fifty-nine percent of the total reference transactions (including non-informational directions and machine queries) in this study could be answered using only the librarian’s knowledge of the library; 75% of recorded questions in this study (excluding non-informational directions and machine queries) were answered with only one source; 71% of the questions in Dorsey’s study were answered in 5 min or less.
- Stetson reference librarians addressed an average of 20.8 directional, machine- and technology-related transactions

per day and an average of only 3.6 research questions per day during the study periods.

- Each reference transaction in the current study (including paper jams, changing print cartridges, and giving directions) averaged \$7.09 in salary costs.
- Stetson University spent approximately \$49,300 on reference desk librarian salary costs during the eight-month study period to answer only 784 “research” questions (this equates to about \$60,000 annually).

Hisle claims that despite a decrease in the number of queries at traditional reference desks, “reference librarians report that reference questions now tend to be more complex.”³⁶ Watstein argues that reference desks are still “incredibly busy.”³⁷ Others argue that many simple, general inquiries evolve into more in-depth research questions and therefore require librarians to answer them. None of these assertions held up particularly well in this study. With the median sources used to answer questions at less than two in all categories except “Research” (which was less than three sources), it would appear that most questions can be answered with few sources and cannot be called in-depth or particularly complex. With the reference librarians in this study only answering about three questions an hour (including all the paper jams and directionals), the reference desk could almost never be called incredibly busy.

AREAS FOR FURTHER STUDY

While this study used actual reference transactions to evaluate the cost-effectiveness of staffing a reference desk, and the data points to the ineffectiveness of staffing the desk full-time with librarians, additional research is needed before closing the desk completely. User surveys would be useful in determining what types of reference and research services students and faculty expect and their satisfaction level with alternative reference service models. Any new service model must be fully articulated and planned carefully; if new paraprofessional staff members are hired to staff a reference desk, the additional cost must be balanced against what is gained in terms of librarian time. New staffing relationships must be built if librarians, staff, and students are to be teamed at a single information service point. A thorough training program (with an emphasis on appropriate referrals) must be put into place if paraprofessionals and/or students are to staff reference desks. And finally, library managers must make clear to librarians relieved of reference desk duties what new tasks are expected of them.

“This may bolster the argument that librarians can leave answering most questions to others and can now concentrate on working on tasks that better utilize their training and experience...”

Many past studies have concluded that reference librarians often provided wrong or incomplete answers to reference questions or couldn’t answer them at all. With all of the online and Internet resources available, it would be interesting to replicate

those studies in the current technology environment. One survey of librarians noted that what used to be impossible questions to answer (e.g., the number of occurrences of the word 'love' in a D.H. Lawrence novel) can now be easily and effectively answered.³⁸ The ability to search huge amounts of information online in minutes makes once obscure questions fairly easy to address. This may bolster the argument that librarians can leave answering most questions to others and can now concentrate on working on tasks that better utilize their training and experience, as well as learning new skills that benefit the library, the users, and the institution.

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