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# The Knowledge Base as an Extension of Distance Learning Reference Service

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## Abstract

This study explores knowledge bases as extension of reference services for distance learners. Through a survey and follow-up interviews with distance learning librarians, this paper discusses their interest in creating and maintaining a knowledge base as a resource for reference services to distance learners. It also investigates their perceptions about the feasibility and practicality of a reference knowledge base. Primary findings indicate that the majority of participants view a knowledge base as an extension of distance learning reference services positively but see issues related to workload and quality control, in particular, which might hinder the development and maintenance of this type of repository.

A knowledge base is a long-term repository of individual facts that support the performance of individuals within an organization or those served by the organization (Boling, Cai, Brown, & Bolte, 2000). Although the term often tends to be used to refer to an online, searchable database maintained by corporations, such as Microsoft (<http://support.microsoft.com/>), it also encompasses any collection of facts in any format that individuals within an organization contribute to, maintain, and refer to for problem-solving. In the library world, a knowledge base can be as vast as the library itself and as narrow as procedure manual or an FAQ related to a course assignment. Most commonly in an academic library, a knowledge base is a repository of information comprised of frequently-asked questions, such as how to print from a library workstation or locate information related to a specific course.

Reference librarians, in particular, develop knowledge bases to capture the answers to questions they receive more than once. With the advent of electronic methods of offering reference services, librarians have the ability to compile information from email or chat transcripts in an online, searchable format that they can use internally as a resource for answers to reference questions or make available to the institution's students at any time from the library's website to provide an extension of reference services.

Because distance learning students often encounter difficulty communicating synchronously with reference librarians due to geographic distances, different time zones, and outside obligations, reference interactions with them occur many times virtually through email or chat, which provides a record of the information. Since some questions and answers recur, librarians can capture them in a repository or knowledge base that students can research from the library's website at any time. While there is some research in the literature of library and information science (LIS) on the development of knowledge bases from virtual reference interchanges, there is none that focuses specifically on the distance learning environment. This study explores that issue by posing the following questions. Is a knowledge base developed from institutional virtual reference practical, feasible, or desired among distance learning librarians? If so, are there successful examples?

## Literature Review

The concept of a reference knowledge base long predates the technological age. In the nineteenth century, reference librarians' need to facilitate knowledge exchange among themselves led them to create special cards or card files with the goal of storing information related to users' questions and librarians' answers (Bosancic, 2010). As emerging technologies allowed for different methods of capturing and maintaining this information, the card files turned into internal repositories for the librarians' use, such as archives of email reference interactions. Reference librarians also began to systematize the information

into static collections of frequently-asked questions (FAQs) on their websites or provide pathfinders to commonly-requested information for specific courses or programs, so that students had access to them 24/7.

As reference service began extending to email and chat, capturing interactions to populate a knowledge base became much easier. Digital reference, in which an expert provides human intermediation in direct response to a user's request, generally contains the text of the answer as well as references to web pages, journal articles, and other information (Nicholson & Lankes, 2007). The assumption is that if the information is useful to one student, it may well be helpful to others doing research in the same area, and this is proving to be the case. Pomerantz (2011), studies the Internet Public Library's archive of answered virtual reference questions and concluded that a portion of resources in a digital reference knowledge base is reusable and may have a half-life of approximately 11 years. Nicholson and Lankes (2007) add that if libraries are able to create a large database for digital reference transactions, researchers might be better able to study the process of user investigation and create tools for measurement and evaluation. They outline a process for developing such a database, which may extend the ability of libraries to formulate digital reference knowledge bases.

Examples in the LIS literature of libraries implementing a knowledge base are sparse. Probst (2005) describes a digital reference management system at Penn State that includes a knowledge base. At the time of publication, however, it was not accessible to external users due to concerns about privacy. Ralph and Ellis (2009) investigated the use of the QuestionPoint<sup>1</sup> knowledge base by member libraries. Through a survey, follow-up interviews, and unobtrusive observation, the authors discovered that the culture of the majority of the participant libraries did not support the knowledge base. In many cases librarians did not contribute questions and answers or search the knowledge base for information. In addition, of those who did contribute, there was little evidence of quality control processes.

Bishop, Sachs-Silveira, and Avet (2011) describe the results of a series of focus group interviews among librarians participating in the Florida Ask a Librarian reference consortium. Many of the participants revealed that they tended to go directly to another member library website or refer a user to that library rather than search the consortium's knowledge base for another library's local information. As a result, the consortium restructured the knowledge base to make it more responsive to the types of local information needed. In addition, they increased training for participating librarians on the use and benefits of the knowledge base.

### Research Design and Methodology

This study consisted of a mixed methods approach and employed both quantitative and qualitative techniques. The quantitative portion was a survey the investigator administered to distance learning librarians via an electronic list. Follow-up personal interviews comprised the qualitative portion of this research. Both the survey and the interview instruments were approved by the Embry-Riddle Aeronautical University Institutional Review Board for the Use of Human Subjects.

Subscribers to the Offcamp electronic list serve as the population for the survey and the interviews. Offcamp provides an electronic forum for issues related to the provision of services and resources to students in distance learning programs. In October 2011 the list had 732 subscribers, many of whom are members of the Distance Learning Section (DLS) of the Association of College and Research Libraries (ACRL).

The investigator developed an anonymous survey designed to explore the existence of knowledge bases in use by distance learning library services as well as to ascertain the interest among distance learning librarians towards implementing and maintaining them. She tested the survey repeatedly among colleague

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<sup>1</sup> QuestionPoint provides a reference management service that includes a knowledge base, which is developed by member libraries adding reference questions and answers. Libraries have the option of maintaining a local knowledge base or participating in the global version (OCLC, 2011).

librarians until it accurately reflected the study's research questions. (See Appendix A for the survey questions.)

The Northeast Florida Library Information Network (NEFLIN), of which the investigator's library is a member, hosted the instrument using Zip Survey software. The survey was available for two weeks in late October 2011. The investigator publicized the survey by sending a message with a link to the instrument to the Offcamp list on the day it opened and again at the midpoint. At the conclusion of the survey period, NEFLIN staff provided a statistical analysis of the responses.

One of the survey questions asked respondents, who were willing to participate in a follow-up personal interview, to indicate this by supplying contact information.<sup>2</sup> The investigator contacted everyone who had supplied contact information. She scheduled a personal interview by telephone with those who indicated availability during the second week of November 2011. The investigator began each interview by asking prepared questions (see Appendix B for a list) and probed further with follow-up questions specific to each of the conversations. She took notes that captured the answers to each of the questions and any additional discussion.

## Findings

### Survey

Sixty-seven people answered the survey for a response rate of 9.15%.<sup>3</sup> Of those, sixty-seven percent work at university libraries and a further 30% work in other academic libraries, and one works in a military library. Sixty-two percent are public services librarians and 19% are administrators. The remainder identified as information technology librarian or indicated their primary role was not on the list supplied in the survey. Sixteen respondents or 24% indicated that their libraries use a knowledge for distance learning reference assistance. The majority of them responded that someone at the institution had developed the knowledge base from local reference transactions. (See table 1.)

Table 1  
*How the Knowledge Base Was Developed*

From local reference transactions	56%
By a vendor based on virtual reference customer responses	25%
By a virtual reference consortium	12%
Other	6%

Among the libraries that participants specified had a knowledge base, the majority say they are at least available to all of the reference librarians at the institution. In some cases, however, access is restricted to certain library staff, while other make their knowledge bases globally accessible. (Table 2 shows a breakdown of the responses.)

Table 2  
*Access to the Knowledge Base*

Only reference librarians at the institution	50%
All students, faculty & staff at the institution	25%
Only distance learning students, faculty, and staff	8%
Only certain reference staff	8%
Anyone with an Internet connection	8%

Of those respondents who have a knowledge base, 25% evaluate its effectiveness or user satisfaction. The most common method is to collect informal feedback either from users or reference

<sup>2</sup> The personal information was separated from the answers to other questions by the Zip Survey software, assuring anonymity.

<sup>3</sup> The low response rate may be due in part to difficulties some potential participants had in accessing the instrument.

librarians, although 16% report that they have conducted surveys among users and 11% say that they have interviewed faculty and students. Based on these evaluations, 75% of the respondents agree that the knowledge base is an effective extension of their reference services to distance learners. In addition, 58% say that they plan to maintain the knowledge base in the next year, while 42% plan to improve it. The primary improvements that respondents anticipate are adding more information, gathering better statistics, and moving the content to a vendor-developed product.

In response to open-ended questions asking for examples of successes or challenges with the knowledge base, some participants mentioned that they know many people are accessing the knowledge base but have no data on what is being used or the success or failure rates of users. One respondent added that the system they use prompts students to email a reference librarian if the knowledge base does not contain the needed information. This, to some degree, points to instances where the knowledge base is not the most effective resource for all questions.

The majority of those who participated in the survey, 51 or 76%, reported that their libraries do not currently have a knowledge base. Of those, 59% state they are unsure they would implement a knowledge base if they had the resources. Ten percent of respondents say they would not implement a knowledge base and 32% express a desire to create one. In relation to all survey respondents, 42% are either unsure or unlikely to implement a knowledge base. The main reasons they give for their uncertainty are listed in Table 3.

Table 3  
*Reasons Participants May Not or Will Not Implement a Knowledge Base*

Workload issues	39%
Quality control issues	18%
Reference interactions do not produce standard answers	18%
Privacy concerns	12%
Intellectual property concerns	2%

In addition, 12 % of the participants gave other reasons for their lack of certainty about implementing a knowledge base. Two respondents stated that they are unclear about the potential usefulness of a knowledge base, while another replied that they had never thought about this issue before answering the survey. One person expressed the opinion that the value of having a live librarian answer reference questions is primary, while another volunteered that a U.S.-wide knowledge base makes more sense than everyone duplicating work locally.

Several additional comments from those who have a knowledge base echo the uncertainty about its effectiveness that came out in the answers of those who were unsure or unlikely to create one. One participant writes, “The KB seems to me to be underutilized in proportion to the work required for maintenance.” Another participant surmises that questions from distance learning students may not be reusable because the distance learning coordinator at their library does not appear to either contribute to or use the knowledge base.

#### Interviews

Ten of the survey respondents indicated that they would be willing to take part in a follow-up telephone interview. The investigator contacted all of them by email in November 2012 with an invitation to participate. Eight of the ten responded affirmatively and two did not answer the message for a response rate of 80%. Two or 25% of the interviewees do not currently have a knowledge base, while the other six, or 75%, were positive or reasonably sure that their library has one.

The two librarians, who reported that their institutions do not currently have a knowledge base, said that it was a service they considered valuable and planned to implement at some point in the future. One stated that her library was in the process of investigating vendors and expected to have a decision by the end of 2011 about how to proceed. The other mentioned that her library was exploring knowledge

bases but not actively because the development of one had moved lower on the list of priorities for the organization.

Two of the six interview participants positively stated that they have a knowledge base. The other four were somewhat hesitant and asked for clarification of the definition of a knowledge base before acknowledging that they have one. In fact, one of them mentioned that before the interview she associated the term, knowledge base, more with a commercial website than a library.

The four participants, who had asked for clarification on the definition of a knowledge base, stated that electronic pathfinders and FAQs on their websites are the primary knowledge bases their libraries maintain. In two cases the librarians discussed particular electronic pathfinders developed from answers to common reference questions recorded in a notebook over the years. They all discussed subject electronic pathfinders they created to provide information for particular courses or class assignments. One participant mentioned using an openly-accessible electronic pathfinder from other academic libraries as a knowledge base when she was developing her information literacy program.

The other common type of knowledge base the four participants, who were initially unsure, mentioned was archived email reference transactions. In one case reference librarians share their answers to email reference questions they think others may encounter. Once a semester they look through the archived responses and glean the purest form of questions and answers that appear to be recurring and add them to a knowledge base for internal use. At another institution, librarians developed their knowledge base organically as they note repetition in email reference interactions. In this case they create video tutorials based on frequently-asked questions for student use as well as an internal FAQ for librarians with suggested responses to questions and class assignments. In addition, the librarians at several different distance learning sites for this institution collaborate on the knowledge base development in order to ensure quality control and standardization.

Another participant discussed quality control issues as well. She stated her opinion that libraries can place more information in an internal knowledge base than in one that is accessible by students and faculty. She remarked that she would not always trust the answers other librarians give and believes that a reference librarian would understand better how to evaluate this type of information than the lay person could.

One of the participants, who answered definitely that his library has a knowledge base, reported that it is intended for an internal audience. Traditionally at this library, reference librarians shared common questions and answers through email and in conversation. In the last year, they formalized these interactions by creating a reference blog. Librarians share information on questions and class assignments in this blog. The interviewee stated that the formalization has been successful and noted that during the first six months of its existence, librarians had accessed the 26 posts in the blog a total of 109 times.

The other interview participant, who was positive about his library having a knowledge base, reported that they are using a commercial product that enables librarians to enter questions and answers as they complete a reference interaction or in anticipation of an assignment. He said that the knowledge base clearly extends reference service to distance learners. Statistics prove that many students are locating answers on their own and that it makes the job of the reference librarians easier. He did add, however, that the one challenge he sees is that not all of the reference librarians either use the knowledge base as a resource or add to it when appropriate. As the system administrator, he is addressing these challenges through training and highlighting successes.

## Discussion

There is a major difference between the results of the survey and the interviews in terms of the existence of a knowledge base as an extension of reference services for distance learners. In the former, 76% replied that their library did not have a knowledge base, while in the interviews, 75% said they had one. Four of the six participants in the interviews admitted to giving a negative answer on the survey and

reconsidering this answer after a discussion with the interviewer clarified the meaning of the term, knowledge base.

This discrepancy may stem from the fact that many people think of a knowledge base as a term that applies more to information technology than to libraries. It is possible that some librarians who answered negatively in the survey to the question about the existence of a knowledge base in their institutions did so because of their concept of the term, knowledge base. However, their libraries may maintain FAQs, electronic pathfinders, and internal archives of virtual reference questions as do those of the four interviewees who asked for clarification. But, they did not equate them with a knowledge base such as the ones maintained by companies like Microsoft and Apple. In addition, librarians may think of a knowledge base in the library world to be a commercial product such as QuestionPoint or one developed by a consortium like the Florida Ask a Librarian venture.

The majority of data from this study point to some desire among distance learning librarians for a virtual reference knowledge base developed either locally or in conjunction with others. Perhaps the strongest trend that emerges, however, is one of uncertainty. Participants question whether the actual effectiveness of a knowledge base compensates for the additional work. They also have concern about the quality of answers other librarians may contribute.

In regard to the practicality or feasibility of implementing a knowledge base for the use of distance learning students, uncertainty again prevails due to workload or quality control issues and a perception that distance learning questions may not be reusable.

Those participants from libraries that maintain a knowledge base were generally positive about it as a resource for distance learning reference. But even the most enthusiastic mentioned the need to train colleagues and encourage them to participate to make the knowledge base most effective.

### Conclusion

Most distance learning library services are likely to have some type of knowledge base for external use in the form of a pathfinder or FAQ and for internal use, such as an archive of virtual reference questions and answers. Many librarians do not think of these resources as a knowledge base because their perception of that term evokes a large technical database of information such as one finds on the Microsoft website rather than anything the library offers. Perhaps a reconsideration of the term to include the information repositories libraries generate from frequently-asked reference questions is due.

As more students engage in distance learning programs and conduct research at times the library is not open, it makes sense to develop a local knowledge base where they can find the information they need. Librarians seem to agree that this is a good idea; however, they may not know how to implement and maintain such a repository given current resource constraints in many libraries. One area for further research on this topic may be to explore the idea of distance learning librarians collaborating on the creation of a knowledge base. Another might be to investigate libraries that have successful knowledge bases and analyze them to develop a blueprint for others.

This study represents a beginning of an exploration of the use of a knowledge base as an extension of distance learning reference services. It began with a question the investigator had about the ways academic libraries might create and maintain a knowledge base and developed as she came to realize there was not much information on this topic in the literature. The study raises more questions than it answers, but it does reveal that a knowledge base sounds attractive to many of the distance learning librarians who participated in the study and may spur others to discuss the issues and collaborate on ways to implement, maintain and publicize library knowledge bases more widely.

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## Appendix A

### Survey Questions

This survey investigates the experience with and views of distance learning librarians about the use of a knowledge base for reference services at their libraries. It should take approximately 10 minutes to complete. For the purposes of this study, a knowledge base is defined as follows:

A knowledge base is a repository of information partially developed from transcripts of reference transactions recorded by the host institution. The knowledge base may be accessible either to all users of the library or limited to librarians to enhance their access to information specific to their institutions.

1. Does your library use a knowledge base for distance learning reference assistance?
  - a. Yes (Go to Q 2)
  - b. No ( Go to Q 11)
  
2. How was your knowledge base developed? (please check all that apply)
  - a. At your institution from local reference transactions
  - b. By a virtual reference consortium
  - c. By a vendor based on virtual reference customer responses (e.g., QuestionPoint)
  - d. Other (please specify)
  
3. Who has access to your library's knowledge base?
  - a. All students, faculty and staff at your institution
  - b. Only distance learning students, faculty and staff at your institution
  - c. Only reference librarians at your institution
  - d. Other (please specify)
  
4. Do you evaluate the effectiveness of or satisfaction with your knowledge base?
  - a. Yes
  - b. No
  
5. How do you evaluate? (Select all that apply)
  - a. Conduct surveys of students or faculty
  - b. Conduct interviews with students or faculty
  - c. Collect informal feedback received from students or faculty
  - d. Collect informal feedback from reference librarians
  - e. Do not evaluate currently
  - f. Other (please specify)
  
6. Based on your evaluation, is the knowledge base an effective extension of your reference service to distance learners?
  - a. Yes
  - b. No
  - c. Not applicable. We do not currently evaluate.
  
7. If you are you aware of any instances when a distance learning student or faculty member used the knowledge base successfully, please elaborate here.

8. If you are you aware of any instances when a distance learning student or faculty member attempted to use the knowledge base but was unable to acquire the information they needed, please elaborate here.
9. In the next year, do you plan to
  - a. Maintain the knowledge base
  - b. Improve the knowledge base
  - c. Discontinue the knowledge base
  - d. Other (please specify)
10. Please elaborate on your plans for the next year. (Go to Q 14)
11. Would you implement a knowledge base at your institution, if you had the resources?
  - a. Yes
  - b. No
  - c. Unsure
12. If you are unsure or would not implement a knowledge base, why not? (please check all that apply)
  - a. Our institution does not produce the type of standard reference interactions required for a knowledge base
  - b. Privacy concerns
  - c. Intellectual property concerns
  - d. Workload issues in maintaining the knowledge base long-term
  - e. Quality control issues
  - f. Other (please specify)
13. If you have any additional comments, please list them here.
14. In what type of library do you work?
  - a. University
  - b. Four-year college
  - c. Two-year college
  - d. Public
  - e. Government
  - f. Special
  - g. Other (please specify)
15. What is the broad category of your position?
  - a. Public services librarian
  - b. Technical services librarian
  - c. Information technology librarian
  - d. Library administrator
  - e. Library staff member
  - f. Other (please specify)

16. If you would be willing to participate in a brief follow-up telephone interview, please supply your contact information below:
- a. Name
  - b. Email address
  - c. Telephone number

## Appendix B

### Personal Interview Questions

1. How long has your library been using your knowledge base?
2. Do you think it is an effective extension of your reference service to distance learners? (Please elaborate.)
3. How did your library construct your knowledge base?
4. How does your library maintain and update your knowledge base?
5. Do you have any advice for librarians who are considering developing a knowledge base?
6. Do you have anything to add on this subject?
7. May I explore your knowledge base and include a reference to it in my presentation and article?