

# Accuracy of Answers Provided by Digital/Face-to-Face Reference Services in Japanese Public Libraries and Q & A Sites

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We asked the same 60 questions using DRS (digital reference services) in Japanese public libraries, face-to-face reference services and Q & A (question and answer) sites. It was found that: (1) The correct answer ratio of DRS is higher than that of Q & A sites; (2) DRS takes longer to provide answers as compared to Q & A sites; and (3) The correct answer ratio of face-to-face reference services in public libraries that provide (do not provide) DRS is higher than (the same as) that of Q & A sites. Considering that a majority of the Japanese public libraries do not provide DRS, the result indicates that Q & A sites and face-to-face reference services are comparable in terms of their ability to answer questions. However, the public libraries that earnestly provide DRS can outperform Q & A sites.

*Keywords:* reference services, DRS (digital reference services), virtual reference services, e-mail reference services, Q & A (question and answer) sites, public libraries, accuracy, Yahoo! Answers

## Introduction

Reference services in Japanese public libraries are now being challenged by Q & A (question and answer) sites on the Web. In this paper, we define Q & A sites as those sites where anybody can ask questions for free, and in many cases, receive answers from other users or specialists. In Japan, “Yahoo! Chiebukuro” and “Oshiete! goo” are typical Q & A sites. Employing unobtrusive testing, Tsuji, Umehara, Kikawada and Hara (2010) asked the same questions using Oshiete! goo and face-to-face reference services (henceforth “face-to-face”) in Japanese public libraries and found no difference between the accuracy of answers provided by both these sources. However, Tsuji et al. (2010) investigated only face-to-face and municipal libraries. If they had investigated e-mail DRS (digital reference services) and prefectural libraries, which possess more human and information resources, the result may be varied. DRS are similar to Q & A sites in terms of their availability on the Internet. If the answers obtained by using DRS prove to be more accurate than those from Q & A sites, people may begin using DRS instead of Q & A sites. Against this background, we asked the same 60 questions to: (1) DRS in prefectural and municipal libraries; (2) face-to-face; and (3) Q & A sites. Subsequently, we compared the accuracy of the answers provided by each of these sources.

This paper may be criticized with respect to the following two problems: (1) unobtrusive testing; and (2) focusing on the correct answer ratio. With regard to “unobtrusive testing”, it is believed that unobtrusive testing may lower the morale of librarians who are investigated and may waste library resources (Weech, 1974).

However, providing feedback to the libraries based on findings may aid them in improving their services (Kaske & Arnold, 2002). In addition, in the US, where progressive reference services are observed, unobtrusive testing is performed rather frequently, as mentioned subsequently. With regard to “focusing on the correct answer ratio”, we understand that reference services consist of various services and therefore, various evaluation measures have been proposed. A popular measure is the degree of user satisfaction, which provides potential for future research.

### **Related Studies**

In this section, we describe the related studies and current status of Q & A sites and reference services.

#### **Q & A Sites**

There are numerous Q & A sites in Japan, including Yahoo! Chiebukuro, Oshiete! goo, OKWave, Hatena::Question and livedoor knowledge<sup>1</sup>. Among them, Yahoo! Chiebukuro is the largest and comprises over 60.5 million Q & A and had 8.0 million registered users as of April 2011. Oshiete! goo and OKWave are the second largest and both comprise 5.5 million Q & A each. In the US, Yahoo! Answers, WikiAnswers and AnswerBag are the most popular<sup>2</sup>. According to Hitwise (2008), the number of Q & A users in the US is rapidly increasing and number of visitors to Q & A sites increased by 889% from February 2006 to February 2008. Coffman and Arret (2004) stated that a large number of commercial reference services that worried librarians had either died, or were so gravely wounded that they could no longer constitute a threat to anybody. However, currently, Q & A sites are gaining popularity, and we are uncertain whether or not their optimism will hold in the future.

There are no prior studies evaluating the accuracy of answers obtained from Japanese Q & A sites except Tsuji et al. (2010), whose work has been previously mentioned. As for the US and the UK, Margariti and Chowdhury (2003), Lochore (2004), Roush (2006) and Bivens-Tatum (2001) evaluated the Q & A sites. However, their investigations were relatively limited.

#### **Reference Services**

Crews (1988) reviewed 39 papers, which employed unobtrusive testing for evaluating the accuracy of answers provided by reference services. Among them, Herson and McClure (1986) and Crowley (1971) are the most popular. Kaske and Arnold (2002), Lochore (2004) and Nilsen and Ross (2006) investigated the accuracy of answers provided by DRS. Lochore (2004) asked ten questions using DRS (a librarian in the UK and DRS by UCLA (University of California, Los Angeles)) and a Q & A site (AllExperts) and found that the two DRS provided three and five correct answers, respectively, and the Q & A site provided four. Studies comparing the accuracy of answers obtained by using DRS and Q & A sites are limited.

### **Method**

In this section, we will describe: (1) the public libraries and Q & A sites that we used for the investigation; (2) questions; and (3) answer categories.

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<sup>1</sup> Yahoo! Chiebukuro (Retrieved from <http://chiebukuro.yahoo.co.jp/>); Oshiete! Goo (Retrieved from <http://oshiete.goo.ne.jp/>); OKWave (Retrieved from <http://okwave.jp/>); Hatena::Question (Retrieved from <http://q.hatena.ne.jp/>); livedoor knowledge (Retrieved from <http://knowledge.livedoor.com/>).

<sup>2</sup> Yahoo! Answers (Retrieved from <http://answers.yahoo.com/>); WikiAnswers (Retrieved from <http://wiki.answers.com/>); AnswerBag (Retrieved from <http://www.answerbag.com/>).

### **Public Libraries and Q & A Sites**

We selected six prefectural libraries in Kanto district and 25 municipal libraries around Tokyo and asked questions face-to-face. In addition, we chose six prefectural libraries and three municipal libraries and asked questions using their DRS. The number of samples of libraries for evaluating the accuracy of answers provided by DRS is small because Japanese municipal libraries do not provide DRS, and even if they do, the users are restricted to the residents of their service area for a majority of such libraries. With respect to Q & A sites, we selected Yahoo! Chiebukuro and Oshiete! goo.

### **Questions**

For the purpose of our study, questions must be answerable and easy for us to evaluate the accuracy of their answers. Based on this, we employed 30 questions that have been used in the classes of “reference service practice” at our university and 30 questions that have been asked by users in public libraries and stored in their reference records. It must be noted that confidential questions asked by users were not included. In 2009, we asked the 60 above-mentioned questions using: (1) face-to-face (mainly from August 28 to October 6); (2) DRS (from November 17 to December 2); (3) Q & A sites (from December 9 to December 11).

With respect to face-to-face, on an average, we asked two questions to each library. With respect to DRS, we asked about eight and six questions to each prefectural and municipal library respectively. It was ensured that the same questions were not asked using face-to-face and DRS in the same libraries. With regard to Q & A sites, we asked a different set of 30 questions each using Yahoo! Chiebukuro and Oshiete! goo.

### **Answer Categories**

We classified the answers based on: (1) amount of correct answers; (2) amount of incorrect answers; and (3) whether or not the correct answer was provided directly (i.e., by introducing certain books, etc.). A few of the questions that we employed consisted of multiple sub-questions. For example, a question that enquires the title and publisher of a book consists of two sub-questions, one each for enquiring about the title and publisher of the book. Therefore, the answer to one question can be partially correct (for example, the title could be correct and the name of the publisher could be incorrect or vice versa). On the basis of these classifications, the answers provided by the three services were classified into nine categories in the following manner: (1) Correct answer was provided directly and completely. Incorrect answer was not provided; (2) Books, Web pages or other materials that included the correct answer were indicated; the answer could be found easily. Incorrect answer was not provided; (3) Books, Web pages or other materials that included the correct answer were indicated; however, it was not easy to find the answer (i.e., it required additional time, skill or knowledge). Incorrect answer was not provided; (4) Books, Web pages or other materials that included the correct answer were indicated; however, it was not easy to find the answer. Incorrect answer was provided; (5) Part of the correct answer was provided directly. Incorrect answer was not provided; (6) Part of the correct answer was provided directly. Incorrect answer was provided; (7) Neither the correct answer nor reference materials were provided (this refers to those cases where librarians were unable to find the answer or Q & A sites provided no answer). Incorrect answer was not provided; (8) Neither the correct answer nor reference materials were provided. Incorrect answer was provided; and (9) Difficulties to evaluate the accuracy of the answer (includes cases where the answer advises visiting the national library or provides names of a large number of books and advises referring to all of them).

Henceforth, we term the ratio of answer categories A and B among all the answers as “correct answer

ratio". In addition, we group answer categories A and B to represent "Good"; C and D to represent "Not Good"; and E, F, G and H to represent "Bad" in the interest of brevity.

### Results and Discussions

In this section, we initially indicate the basic results, followed by the results according to question topics, time required, answers sources and relationship between DRS and face-to-face.

#### Basic Results

The correct answer ratios of DRS, face-to-face and Q & A sites are indicated in Tables 1, 2 and 3 respectively. As indicated in Tables 1 and 3, 20 out of 46 (i.e., 43.5%) answers provided by DRS were classified into category A while only 8 out of 30 answers (i.e., 26.7%) provided by Yahoo! Chiebukuro were classified into category A.

Table 1

#### *Answer Categories by DRS*

	Prefectural (%)		Municipal (%)	
A	20	(43.5)	8	(57.1)
B	11	(23.9)	4	(28.6)
C	9	(19.6)	1	(7.1)
D	0	(0.0)	0	(0.0)
E	2	(4.3)	0	(0.0)
F	1	(2.2)	0	(0.0)
G	1	(2.2)	1	(7.1)
H	0	(0.0)	0	(0.0)
I	2	(4.3)	0	(0.0)
Total	46	(100)	14	(100)

Table 2

#### *Answer Categories by Face-to-Face*

	Prefectural (%)		Municipal (%)	
A	6	(50.0)	25	(52.1)
B	2	(16.7)	5	(10.4)
C	2	(16.7)	3	(6.3)
D	1	(8.3)	1	(2.1)
E	1	(8.3)	6	(12.5)
F	0	(0.0)	0	(0.0)
G	0	(0.0)	5	(10.4)
H	0	(0.0)	3	(6.3)
I	0	(0.0)	0	(0.0)
Total	12	(100)	48	(100)

Based on Tables 1, 2 and 3, the following can be established: (1) The correct answer ratio of DRS in municipal libraries is 85.7% (i.e., 57.1% + 28.6%), which is higher than that of prefectural libraries (67.4%, i.e., 43.5% + 23.9%), as well as the correct answer ratio of face-to-face and Q & A sites; (2) The correct answer ratio of DRS in a prefectural library is higher than that from a Q & A site; (3) The number of incorrect answers provided by DRS (i.e., answers categories D, F and H) are fewer than those by face-to-face and Q & A sites; (4) The correct answer ratios of face-to-face in prefectural and municipal libraries do not differ significantly; (5) The

correct answer ratio of face-to-face in municipal libraries is 62.5% (i.e., 52.1% + 10.4%), which is slightly higher than that of Oshiete! goo (56.6%, i.e., 43.3% + 13.3%). Tsuji et al. (2010) have described that the correct answer ratios of face-to-face in municipal libraries and that of Oshiete! goo do not differ significantly. Similar results have been obtained in this study; and (6) The correct answer ratio of Oshiete! goo (56.6%) is a slightly higher than that of Yahoo! Chiebukuro (50.0%, i.e., 26.7% + 23.3%), although it is not statistically significant.

Table 3

*Answer Categories by Q & A Sites*

	Yahoo! Chiebukuro (%)		Oshiete! Goo (%)	
A	8	(26.7)	13	(43.3)
B	7	(23.3)	4	(13.3)
C	3	(10.0)	2	(6.7)
D	0	(0.0)	1	(3.3)
E	3	(10.0)	3	(10.0)
F	0	(0.0)	0	(0.0)
G	5	(16.7)	6	(20.0)
H	2	(6.7)	1	(3.3)
I	2	(6.7)	0	(0.0)
Total	30	(100)	30	(100)

**Question Topics**

We classified the questions into eight topics (persons/organizations, geography, history, events, languages, books, reference books and journals/newspapers) and investigated the correct answer ratio for each topic. Tsuji et al. (2010) reported that the correct answer ratio of Q & A sites for questions with regard to “books” was higher than that of face-to-face. However, such tendencies were not observed in our study. Correct answer ratios of face-to-face for questions regarding “books” were 60.0% and 55.6% for prefectural and municipal libraries respectively. On the other hand, the correct answer ratios for questions regarding “books” were 50.0% and 46.7% of Yahoo! Chiebukuro and Oshiete! goo respectively. With respect to DRS, the correct answer ratios for questions regarding “books” were 75.0% and 85.7% for prefectural and municipal libraries respectively.

**Time Required**

We investigated the time required to obtain answers from DRS, face-to-face and Q & A sites and their respective correct answer ratios. In this paper, “time required to obtain answers” is defined as the sum of “the time taken by the services to reply” and “time taken by us to find answers by referring materials, such as books and Web pages, which were suggested in the replies”. Undoubtedly, the time taken in the latter case is nil when the replies directly indicated the answers (i.e., in case of category A answers).

The time required to obtain answers from DRS, face-to-face and Q & A sites and their respective correct answer ratios are shown in Tables 4, 5 and 6 respectively. As indicated in Table 4, nine answers were provided by DRS in prefectural libraries after one day and within two days and 77.8% (i.e., seven answers) of them were classified into category A or B. We can see in these tables that we obtained answers for only two questions within an hour using DRS. On the other hand, we obtained answers for 53 and 22 questions within an hour using face-to-face and Q & A sites respectively. It may be the future task for DRS librarians to reduce the time to answer questions. However, we must keep in mind that the correct answer ratio of DRS was the highest among these services.

Table 4

*Time Required by DRS*

		Prefectural (%)		Municipal (%)
Within 1 hour	2	(50.0)	0	(-)
1 to 2 hours	1	(100.0)	3	(66.7)
2 to 3 hours	0	(-)	2	(100.0)
3 to 4 hours	5	(60.0)	1	(100.0)
4 to 5 hours	5	(60.0)	0	(-)
5 to 6 hours	4	(75.0)	2	(100.0)
6 hours to 1 day	5	(80.0)	1	(100.0)
1 to 2 days	9	(77.8)	2	(-)
2 to 3 days	2	(50.0)	1	(-)
3 to 7 days	8	(62.5)	0	(-)
More than 7 days	4	(75.0)	0	(-)
Other	1	(0.0)	2	(100.0)

Table 5

*Time Required by Face-to-Face*

		Prefectural (%)		Municipal (%)
Within 5 minutes	0	(-)	5	(80.0)
5 to 10 minutes	1	(100.0)	8	(37.5)
10 to 15 minutes	1	(100.0)	9	(55.6)
15 to 20 minutes	0	(-)	1	(0.0)
20 to 30 minutes	4	(25.0)	6	(66.7)
30 minutes to 1 hour	3	(100.0)	15	(73.3)
1 to 2 hours	1	(0.0)	0	(-)
More than 2 hours	0	(-)	0	(-)
Other	2	(100.0)	4	(75.0)

Table 6

*Time Required by Q & A Sites*

		Yahoo! Chiebukuro (%)		Oshiete!goo (%)
Within 5 minutes	2	(100.0)	2	(50.0)
5 to 10 minutes	1	(100.0)	4	(50.0)
10 to 15 minutes	3	(66.7)	3	(100.0)
15 to 20 minutes	3	(66.7)	0	(-)
20 to 30 minutes	2	(100.0)	0	(-)
30 minutes to 1 hour	1	(100.0)	3	(33.0)
1 to 2 hours	3	(66.7)	5	(80.0)
2 to 3 hours	0	(-)	1	(100.0)
3 to 4 hours	1	(0.0)	2	(50.0)
4 to 6 hours	1	(0.0)	0	(-)
6 hours to 1 day	5	(60.0)	4	(25.0)
1 to 2 days	0	(-)	3	(66.7)
2 to 3 days	3	(0.0)	2	(100.0)
No answer	5	(0.0)	3	(0.0)

Answers were obtained for 29 and 11 questions within 30 minutes using face-to-face in municipal libraries and Yahoo! Chiebukuro respectively. Concerning these, the average correct answer ratios of face-to-face in municipal libraries and Yahoo! Chiebukuro which can be calculated from those in Tables 5 and 6 are 55.2% and 81.8%, respectively (for instance, the average correct answer ratio of Yahoo! Chiebukuro is  $(2 + 1 + 2 + 2 + 1)/(2 + 1 + 3 + 3 + 2) = 81.8\%$ ). The face-to-face is the fastest source for obtaining answers, and Q & A sites are comparatively faster than DRS.

### Sources

We investigated the sources that were referred in the answers obtained from DRS, face-to-face and Q & A sites. We cannot indicate all the sources referred by the other services owing to the limitation of space. In brief, a majority of the referred sources in DRS were dictionaries (for 20 questions) followed by NDL-OPAC<sup>3</sup>. DRS in prefectural and municipal libraries often did not refer sources (for six and four questions in prefectural and municipal libraries respectively). Five of these answers were for questions that investigated titles or publishers of books<sup>4</sup>. If the source (such as NDL-OPAC (Online Public Access Catalog of National Diet Library), Webcat Plus<sup>5</sup> or their own OPAC) is indicated, the users could learn of its existence and may use it subsequently<sup>6</sup>.

Q & A sites often referred no source as well (for 17 questions) and referred Wikipedia (for nine questions). However, they referred NDL-OPAC or Webcat Plus (for nine questions) as sources including DRS and reliable government homepages (for five questions). Furthermore, Q & A sites referred the image of the body of a book provided by Google Books (for one question). Tsuji et al. (2010) also found that a few of the answers on Q & A sites referred such images of books provided by Google Books. If we regard printed books as reliable sources, it may be established that Q & A sites as well as reference services in libraries refer reliable sources for their answers. In addition, reference librarians must learn to utilize such sources for their DRS.

### Face-to-Face Where DRS Is Being Provided

Table 7 indicates the correct answer ratios of face-to-face by three categories of public libraries including: (1) libraries that provide DRS; (2) libraries whose central library provides DRS ("C-Provide" in Table 7); and (3) libraries that do not provide DRS. Table 7 indicates the correct answer ratio of face-to-face in public libraries that provide DRS is 87.5% (i.e.,  $7/(7 + 0 + 1)$ ) and is significantly better than those that do not provide DRS (57.7%, i.e.,  $15/(15 + 3 + 8)$ ). Tables 2 and 3 indicate that the correct answer ratios of face-to-face by public libraries that provide DRS outperform those of Q & A sites. However, those public libraries that do not provide DRS do not differ significantly from the correct answer ratios of Q & A sites.

Table 7

*Correct Answer Ratio of Face-to-Face by Three Categories of Public Libraries*

	Good (%)		No good (%)		Bad (%)	
Provide	7	(87.5)	0	(0.0)	1	(12.5)
C-provide	8	(57.1)	1	(7.1)	5	(35.7)
Not provide	15	(57.0)	3	(11.5)	8	(30.8)

<sup>3</sup> NDL-OPAC is an OPAC in Japan.

<sup>4</sup> Five other answers were for those questions that the librarians could not find answers to.

<sup>5</sup> Webcat Plus is a nation-wide OPAC of Japanese university libraries.

<sup>6</sup> With regard to face-to-face, no source was referred for only four questions.

## Conclusions

We asked the same 60 questions using DRS in Japanese public libraries, face-to-face, and Q & A sites. It was found that: (1) The correct answer ratio of DRS in prefectural libraries is higher than that of Q & A sites; (2) The correct answer ratio of DRS in municipal libraries is rather high; (3) DRS takes longer to provide answers to questions as compared to Q & A sites; (4) There is no significant difference between the correct answer ratio of face-to-face in public libraries that do not provide DRS and that of Q & A sites; and (5) The correct answer ratio of face-to-face in public libraries that provide DRS is higher than that of Q & A sites.

Considering that most of the Japanese public libraries do not provide DRS, the result indicates that Q & A sites and ordinary face-to-face reference are comparable in terms of their ability to answer questions. However, if the public libraries earnestly provide DRS, they could outperform Q & A sites. We should take these results into account while considering the future of reference services.

Subsequently, we will investigate DRS and face-to-face in locations other than Kanto district. In addition, we will interview DRS librarians in order to examine the relationship between the process of answering questions in libraries and correct answer ratio. Finally, we would like to evaluate the satisfaction levels of users employing DRS.

## References

- Bivens-Tatum, W. (2001). Expert services on the Web: The commercial competition for libraries. *C & RL News*, 62(7). Retrieved from <http://www.ala.org/ala/mgrps/divs/acrl/publications/crlnews/2001/jul/expertservices.cfm>
- Coffman, S., & Arret, L. (2004). To chat or not to chat: Taking another look at virtual reference, Part 1. *Searcher*, 12(7). Retrieved from <http://www.vrd2003.org/proceedings/presentation.cfm?PID=196>
- Crews, K. D. (1988). The accuracy of reference service: Variables for research and implementation. *Library and Information Science Research*, 10(3), 331-355.
- Crowley, T. (1971). The effectiveness of information service in medium size public libraries. In T. Crowley, & T. Childers (Eds.), *Information service in public libraries: Two studies* (pp. 1-71). Metuchen, N.J.: Scarecrow Press.
- Hernon, P., & McClure, C. R. (1986). Unobtrusive reference testing: The 55 percent rule. *Library Journal*, 111(7), 37-41.
- Hitwise. (2008). *US visits to question and answer websites increased 118 percent year-over-year*. Retrieved from <http://www.hitwise.com/press-center/hitwiseHS2004/question-and-answer-websites.php>
- Kaske, N., & Arnold, J. (2002). An unobtrusive evaluation of online real time library reference services. *Library Research Round Table, Annual Conference of American Library Association*. Retrieved from <http://www.lib.umd.edu/groups/digref/kaskearnoldunobtrusive.html>
- Lochore, S. (2004). How good are the free digital reference services? A comparison of library-based and expert services. *Library Review*, 53(1), 24-29.
- Margariti, A., & Chowdhury, G. G. (2003). Digital reference services: Do we still need libraries. *Proceedings of the 6th International Conference on Asian Digital Libraries (ICADL 2003)*, 158-167.
- Nilsen, K., & Ross, C. S. (2006). Evaluating virtual reference from the users' perspective. *The Reference Librarian*, 11(2), 175-182.
- Roush, W. (2006). What's the best Q & A site? *Technology Review*. Retrieved from <http://www.technologyreview.com/InfoTech/17932/>
- Tsuji, K., Umehara, K., Kikawada, A., & Hara, A. (2010). Correctness of answers provided by Q & A sites and reference services of public libraries. *The Library World*, 61(6), 594-608. (in Japanese)
- Weech, T. L. (1974). Evaluation of adult reference service. *Library Trends*, 22(3), 315-335.