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Xiaojuan Zhai Jingjing Wang

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Xiaojuan Zhai
Library, Nanjing University, Nanjing, China, and
Jingjing Wang
Library, Peking University, Beijing, China

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Abstract

Purpose – This study aims to investigate the effectiveness of library services according to user experiences (UXs). The study discusses underlying internal problems existing in libraries that affect user satisfaction. Furthermore, it seeks to identify ways to improve the UX.

Design/methodology/approach – The methodology comprised a questionnaire administered at Nanjing University Library, China. The survey examined users' satisfaction with the online public access catalogue, locating books on the shelves, and users' participation in the organization of library resources. This study used the annual reading quantity of users system, a new system of measurement that distinguishes between informal and avid library users.

Findings – The data analysis indicated poor user satisfaction. The problems were mainly associated with the libraries' resource organization, such as descriptive cataloguing, subject headings and classification, which is controlled by library administration. Moreover, users' feedback is not integrated within the library system. Because of the process-oriented architecture of the current integrated library system, librarians and users do not communicate effectively. These barriers between users and the library staff members are difficult to overcome.

Originality/value – The study describes that the results relate to user satisfaction with searching and locating books based on the patron's reading level. Differences were observed between light and avid readers in terms of satisfaction with the ease of searching and finding books. This demonstrates the internal connections of these results with library procedures. Furthermore, this study identifies improvement measures to resolve these problems.

Keywords Academic libraries, Customer relationship management

Paper type Case study

Introduction

The internet resource service sector has developed rapidly over the past decade. Google Scholar, book review websites, online bookstores and social networking sites (SNSs) have become very popular. Users increasingly use online resources instead of services offered within the library. Internet services have garnered – however undeservedly – an increasingly high reputation amongst users. However, despite this development, libraries have maintained an invaluable position. Users cannot conduct research without libraries, especially at the university and college levels. This is reflected in the high level of access and

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usage of online public access catalogues (OPACs) and electronic resources on academic library sites. It is evident, however, that the association between users and libraries is not as highly regarded as it once was in the past. To strengthen user loyalty, librarians must examine the user experience (UX) to identify gaps between library services and user requirements. Only when specific problems with library services are identified and resolved, will the relationship between libraries and their users be restored.

The significance of this study is as follows:

- Most previous research conducted on UXs emphasised on online library services while focusing less on physically locating books in libraries. This study, however, focuses equally on both OPAC and open shelf access. The study will help researchers comprehensively understand the UX and elucidate underlying problems.
- This study uses the annual reading quantity of users, a new measurement system for data analysis. This measurement distinguishes informal users from avid users; avid users are those who are more concerned and involved with library services. As the study results indicate, compared with other forms of measurement, data analysis based on the annual reading quantity of users system is the most beneficial.
- This survey invited respondents to explain their reactions to and feelings regarding being unable to locate a book in the library and their expectations of library services. This study also discusses users' lower satisfaction with library services rather than the corresponding internet resources, specifically, how internal library procedures significantly interfere with the UX. For example, erroneous data can make the library difficult for users to navigate. The unsatisfied recall ratio from the OPAC is revealed to be related to the system's form of subject headings. Book classification must also be improved to resolve problems with shelf listings. Finally, Web 2.0 applications should be used more extensively to enhance the UX.

This study also includes a literature review. The questionnaire content, respondent characteristics, methods of distribution and results are all explained in detail in the Methods section. In the Results section, the data analysis is discussed in relation to three main points:

(1) effectiveness of OPAC searching;

(2) locating books on open shelves; and

(3) users' willingness to participate.

The Discussion section examines the underlying reasons for users' dissatisfaction related to the library's internal procedures significantly interfering with UXs. The architecture of current integrated library system (ILS) systems apparently prevents libraries from responding to demands for change. Finally, the study proposes improvement measures to resolve these problems.

Literature review

Previous research has shown that UX is a commonly researched topic. In the early 1990s, along with the development of computer technology, re-designing library services to meet user demands received extensive attention (Shapiro and Long, 1994). To

provide satisfactory output to typical queries, the information retrieval system was measured, and information retrieval models were established according to user needs and preferences (Belkin *et al.*, 1993; Daniłowicz, 1994). Researchers carried out surveys asking users to comment on their information seeking and retrieval habits to determine what users wanted and required from libraries in the new computing age (Berger and Hines, 1994; Talbot *et al.*, 1998). In the late 1990s, the design of digital libraries was well suited to the behaviours and activities of users. Adaptive, flexible user interfaces enabled easy navigation through the complex information landscape (House *et al.*, 1996; Payette and Rieger, 1998). Groenendaal (1997) found that in the electronic library era, the personal relationships between users and library staff disappeared. Although the library information system is relatively simple to use and contains a large number of user-friendly add-ons, it does not provide what a user needs. Groenendaal believed that users required a high level of assistance in accessing local and remote information sources.

In the early 2000s, user evaluations of digital libraries again attracted the attention of researchers. Service quality, system performance efficiency and user opinion solicitation were seen as essential criteria for investigation. Researchers studied perceptions of library users to identify and investigate problems in the digital library system (Xie, 2006, 2008). Users experienced emotions, psychological needs and contextual factors that attracted particular research attention (Partala and Kallinen, 2012). *Measuring the User Experience: Collecting, Analyzing, and Presenting Usability Metrics* (Tullis and Albert, 2008) was one of the earliest books focusing on how to quantify the UX. The book discusses how to measure the UX within websites, digital products and other types of online products or systems. The measurement system the book suggests includes behavioural, physiological, emotional, aesthetic, gestural, verbal and physical measurements, as well as specialized methods of measurement, such as eye tracking and clickstream data.

Subsequently, with the further development of network technology, researchers attempted to enhance the UX in several different ways. Deng and Li (2008) discussed changing the user environment in digital libraries and brought new ideas to the fore, such as polishing website design, enriching library collections and improving the functionality of retrieval systems. Sadeh (2008) designed a discovery and delivery interface for library materials that satisfies the expectations of users who are accustomed to Web-based services while also suggesting that the method could help libraries attract users to the library environment. Sidorko and Tao Yang (2009) described the changes adopted in major Asian academic libraries and provided ideas that can be used to meet user expectations in the digital age.

Within the past five years, social networking services have gradually become a key component of internet usage. Web 2.0 applications encourage users to participate in resource construction. Libraries have attempted to adapt to user habits. To build relationships with students, libraries attempt to engage and establish rapport with students through venues such as Facebook. The university setting not only creates a good context for such connections but also offers a mutual set of experiences and values shared by libraries and students (Phillips, 2011). Richards and Sen (2013) evaluated LibraryThing, a Web 2.0 tool that allows users to catalogue books using data drawn from sources such as Amazon and the Library of Congress. It also offers tagging and interest groups. LibraryThing has been proven to be a valuable tool available to

libraries for promotional and user engagement purposes. Jiang (2013) presented background and behavioural data for regular users of Douban Books, the most influential Chinese language book review website. The research findings enrich our understanding of social library systems as a diverse, dynamic information-seeking environment and their use as reference sources for libraries. Kim *et al.* (2014) surveyed undergraduate students to determine which social media platforms they most commonly used as information resources. They found that most social media platforms are used as information resources, with wikis, user reviews and media-sharing sites emerging as the top sources. Their study suggested that information literacy programs should embrace social media as potential information sources and offer effective strategies for using and evaluating these increasingly popular social media sources. Boateng and Quan Liu (2014) explored Web 2.0 technology usage and trends in the top 100 US academic libraries. Their study provided academic libraries with helpful information that could be used to better meet users' needs by effectively applying Web 2.0 applications.

Furthermore, UX has become a unique research area, and measurements of the UX have become well developed. Law *et al.* (2014) conducted a survey on the measurability of UX constructs. Vacek (2014), President of the Library Information Technology Association (LITA), discussed the importance of investigating the UX for successfully establishing a user-centred design. A person's behaviours, attitudes and feelings regarding the Web UX significantly affect a library's effectiveness. Vacek further stated that LITA would undertake several initiatives to embrace the UX form of thinking. Ma *et al.* (2013) used the customer satisfaction theory to construct a model to measure user satisfaction with the effectiveness of database search results. The results revealed that user perceptions of value is the key factor amongst all those that affect satisfaction with search effectiveness. Furthermore, users are willing to make efforts to obtain a higher quality of data.

Schrader (2011) explored the challenges of going beyond raw numbers to capture and articulate the encompassing meaning of everyday library use. The study concludes that these challenges represent a shift in thinking about the measurement and evaluation of the value of libraries. It represents a change in thinking regarding the ability of those at the library to effectively and adequately portray the experiences and perspectives of the library user by focusing on a case study of a library in Canada that examined the use of a better statistical evaluation method for measuring patrons' perceived value of library visits. Han *et al.* (2014) described experiences at Tsinghua University in China. Their research provided a holistic view of how users' deep participation has been implemented in an academic library setting. Their focus was on engaging students as library partners or collaborators who work with librarians to complete independent projects.

After the development of computer technology and the internet, user habits and behaviours are continuously changing. Thus, research techniques and methods must also change. The user-centred way of thinking has always guided library researchers. This study attempts to provide a greater understanding of how users feel when users access libraries in Chinese academic settings. In the survey, the respondents were divided into several groups according to the nature of their library access patterns. Questionnaires were distributed in several ways according to the characteristics of each group.

Methods

Data were collected from a survey of 1,362 Chinese academic library users. For practical and economic reasons, the data collection was carried out mostly at Nanjing University. Nanjing University is one of China's most renowned academic universities, boasting a rich and long history. In 2015, the university marked its 113th anniversary. Nanjing University offers a broad range of courses and majors in the sciences and social sciences, as well as humanities. This was beneficial for the purposes of this survey, because it allowed a broader, richer data field. Furthermore, the survey respondents ranged from undergraduate students, postgraduate students and PhD candidates to professors, representing many ages and levels of experience and ensuring a diverse sample crowd. Therefore, it is felt that the survey respondents at Nanjing University provide a suitable representation of academic library users in China.

The survey comprises four categories: demographics, effectiveness of OPAC searching, experiences with open shelves and requirements of Web 2.0 applications. A new measurement system known as the annual reading quantity of users was used. Based on this new system, avid readers were distinguished from informal users. Key questions related to OPAC searching regarded the overall evaluation and satisfaction with the recall and precision of information retrieval. Data regarding open-shelf experiences were collected through questions on three topics:

(1) overall evaluation of convenience;

(2) the longest time it took a user to locate a book; and

(3) the number of times a user failed to locate a book.

Additional questions regarding Web 2.0 applications included users' preference for and expectations of library services. The survey was designed to provide a thorough understanding of users' feelings when accessing the library, especially avid users. This questionnaire was designed to continue the focus of previously performed studies and surveys of library users (Talbot *et al.*, 1998; Tracy and Searing, 2014; Tullis and Albert, 2008).

Each group of respondents was surveyed in different way:

- For on-site users, an online survey was presented via the library home page, campus bulletin board system and various SNS websites, such as SinaWeibo and Tencent Weibo. Push mails were used to gather information from professors who had been in touch with librarians before. In all, 583 online results were obtained.
- To obtain results from users who frequently visit library reading rooms, 300 respondents were selected. During one week, printed questionnaires were distributed at 10:00 a.m., 3:00 p.m. and 7:00 p.m. in science, liberal arts and media reading rooms, respectively. Most of the respondents were postgraduate students, and they all accepted the researcher's invitation to complete the survey, thus yielding a response rate of 100 per cent.
- For those users who were absent, printed questionnaires were distributed during resource lectures in several departments. In all, 300 questionnaires were distributed, yielding a response rate of 67 per cent.
- Nanjing University holds a one-week reading festival every year. During the most recent festival, a designated survey area was set up in the library hall, and

volunteer participants were surveyed face-to-face. Along with the topics in the questionnaire, the participants also shared their personal views regarding library services. In all, 278 results were collected.

All these survey methods combined provided 1,362 results. The total response rate was 76 per cent.

Results

Overview

Table I displays the general characteristics of the survey respondents, including age, gender, occupational identity, subject fields and annual reading level.

The users' ages range from 18 to 55 years; 66.6 per cent of the users were under the age of 25, and 24.4 per cent were over the age of 25 and under the age of 30. Approximately 10 per cent of the users were over 30 years old. In terms of gender, 56.0 per cent of the users were female and 43.5 per cent were male; 0.5 per cent of the respondents did not report their gender.

Further, 53.7 per cent of the users were graduate students and 28.0 per cent were undergraduate students. This indicates that most of the users encountered in the libraries and on campus were students, most of who were under the age of 30. PhD

Characteristics	Library users	% of sample
Age group (years)		
< 25	907	66.6
25-30	333	24.5
30-40	91	6.7
> 40	31	2.3
Total	1,362	100.0
Gender		
Male	592	43.5
Female	763	56.0
Unknown	7	0.5
Total	1,362	100.00
Occupational identity		
Undergraduate student	381	28.0
Graduate student	732	53.7
PhD candidate	171	12.6
Professor	78	5.7
Total	1,362	100.0
Subject fields		
Sciences	553	40.6
Social sciences	463	34.0
Humanities	346	25.4
Total	1,362	100.00
Annual reading quantity		
< 10	251	18.4
10-50	836	61.4
> 50	275	20.2
Total	1,362	100.00

Table I. Profile of survey respondents

candidates and professors were less often present either in libraries or online. The few professors who did complete the survey were those who often talked with librarians via e-mail. They indicated interest in the latest changes in library resources and services.

In addition, 40.6 per cent of those surveyed were involved in scientific fields, and most of those users chose to complete the questionnaire online. Social sciences and humanities users, on the other hand, preferred to read books in library reading rooms, and they were inclined to complete the survey face-to-face; 34.0 and 25.4 per cent of the respondents majored in the social sciences and humanities, respectively.

With the purpose of focusing on avid readers, the annual reading quantity of users measurement system was used to help researchers distinguish informal users from more avid readers. Over 80 per cent (61.4 + 20.2 per cent) of the respondents read more than 10 books per year. They were labelled as avid readers; 20.2 per cent of all the users read more than 50 books per year.

Table II shows the annual reading quantities of users grouped according to their occupational identities. In each group, the percentages of avid readers are quite close: 81.4 per cent of the undergraduate students, 80.1 per cent of the graduate students, 88.3 per cent of the PhD candidates and 82.1 per cent of the professors. This suggests that the proportions of avid users are very similar across occupational groups. Only PhD candidates reported a slightly higher percentage (88.3 per cent). As PhD candidates devote themselves to preparing their doctoral dissertations, it can be assumed that they are required to read more books than the other users. The survey results indicated that users' reading habits and their identities were not necessarily related. Avid readers visited libraries and used the library facilities more often; thus, their suggestions gave a higher reference value. With the purpose of distinguishing avid users, this study uses the annual reading quantity of users as the main system of measurement instead of identity.

Effectiveness of online public access catalogue searching

The OPAC is the main entry form for accessing the library collections. The recall and precision of information retrieval significantly affects search experiences, which is the most important measurement of user satisfaction. Search terms include titles, authors and subject terms, which are provided by librarians through descriptive cataloguing and subject headings. Therefore, the recall and precision ratios are deeply influenced by internal library procedures. The librarians are responsible for improving search efficiency and UX. The survey questions regarding user satisfaction with OPAC searching are listed in Appendix as Items 4, 5 and 6, and the results are summarized in Table III.

	Annual reading quantity					
User identity	≤ 10	≤ 10 (%)	10-50	10-50 (%)	≥ 50	≥ 50 (%)
Undergraduate	71	18.6	253	66.4	57	15.0
Graduate	146	20.0	450	61.5	136	18.6
PhD candidate	20	11.7	87	50.9	64	37.4
Professor	14	18.0	46	59.0	18	23.1

Table II. Annual reading quantity of users by occupational identity

Table III shows the results classified by the users' annual reading quantity. The differences among reading groups were significant. The satisfaction with a recall ratio declined from 29.5 to 20.7 per cent as reading quantity increased. The more books users read, the more problems they encountered with the recall retrieval of information. The results indicated that respondents were generally not satisfied with the recall ratio. Most of the unsatisfied respondents (80.2 per cent) claimed that a number of related topics were not retrieved in OPAC search results.

The precision of information retrieval was described as roughly the same by the different reading groups. A little over 70 per cent of the users that felt the precision ratio was quite satisfactory. The irrelevant results presented in the OPAC were different topics, different authors with similar names and other unrelated items at similar proportions.

The percentage of users who reported feeling generally satisfied decreased as the number of books read increased. A little over 15 per cent of the users who read less than 50 books each year reported overall satisfaction with the OPAC, whereas 13 per cent of those who read over 50 books per year reported overall satisfaction. In general, most of the users felt that OPAC searching had some problems. The results indicated that improving the quality of cataloguing descriptions and subject headings is necessary to increase searching efficiency in the OPAC.

Results are also categorized by user identity (Table IV). In comparison with the results shown in Table III, no significant changes were observed based on user identity. The percentages of users who reported being satisfied with the recall ratio were found to be almost the same (around 25 per cent) among undergraduate students, graduate students and PhD candidates. The percentage was higher for professors, who usually have more contact with librarians and, thus, are familiar with OPAC searching. Consequently, a predetermined tendency towards satisfaction should be evident in professors. Different groups reported the percentages of satisfaction with a precision ratio as a little over 70 per cent, with no obvious differences observed between groups. The percentage of users claiming general satisfaction dropped according to their identities, with the percentage for professors being higher for the reason stated above. When the results in Tables III and IV are compared, it is apparent that the data grouped

Table III.
Satisfaction with OPAC searching classified by users' reading quantity

Annual reading quantity	Total users	Satisfaction of recall ratio (%)	Satisfaction of precision ratio (%)	General satisfaction (%)
≤ 10	251	74 (29.5)	183 (72.9)	40 (15.9)
10-50	836	218 (26.1)	601 (71.9)	130 (15.5)
≥ 50	275	57 (20.7)	200 (72.7)	38 (13.8)

Table IV.
Satisfaction of OPAC searching classified by user identity

User identity	Total users	Satisfaction of recall ratio (%)	Satisfaction of precision ratio (%)	General satisfaction (%)
Undergraduate	381	98 (25.7)	280 (73.5)	68 (17.8)
Graduate	732	187 (25.5)	521 (71.2)	104 (14.2)
PhDcandidate	171	42 (24.6)	128 (74.9)	22 (12.9)
Professor	78	31 (39.8)	59 (75.3)	12 (15.0)

by user identity do not change as much as the data grouped by reading quantity. Reading quantity proved to be a more reasonable measurement method. Therefore, data presented in this study are mostly grouped according to the annual reading quantity of users method.

Locating books on open shelves

Users physically obtain books and manuscripts within library collections by locating books on open shelves. The books are mainly organized on the shelves using a classification system. In the Nanjing University Library, the Chinese Library Classification system is used as the basic shelving system; this system is also commonly used in other academic libraries in China. Three survey questions were included to gather information regarding this system and are listed in Appendix as Items 7, 8 and 9; the survey results are summarized in Table V.

Locating books on open shelves was convenient and simple for 45.5 per cent of readers who read more than 50 books each year (Table V). However, the percentage drops to less than 40 per cent for users who read fewer than ten books each year. Those who read over 50 books each year should be familiar with the Chinese Library Classification system. The results indicated that the more books a user read, the more comfortable he/she felt with the classification system. Thus, higher percentages were recorded for users who read more books each year.

In contrast, users who read more books per year spent the longest amount of time finding a book. Of the participants, 58.9 per cent of those who read more than 50 books annually claimed they had spent more than 10 min finding a book, whereas 47.4 per cent of the participants who read fewer than 10 books annually reported they took much less time. Familiarity did not help users reduce the amount of time they spent locating books. This suggests that books were not classified, and it was first thought that some problems are associated with the shelf listings.

It is interesting to note that the percentage of users who found books within 5 min varied according to reading quantity:

- 11.2 per cent for the group that read fewer than 10 books annually;
- 9.9 per cent for the group that read 10 to 50 books annually; and
- 13.1 per cent for the group that read more than 50 books annually.

These results suggest a connection between the effectiveness of shelving and different reading habits. An explanation for this connection was found in the data from the face-to-face survey. In all, 278 respondents completed the questionnaire in the library hall, and librarians interviewed them briefly. The percentage of avid readers among the

Table V. User experience with locating books on the open shelves

Annual reading quantity	Convenience of locating books (%)	Longest time to locate a book (%)			Failure to locate books (%)		
	Yes	1-5 min	5-10 min	> 10 min	Usually	Occasionally	Rarely
≤ 10	37.4	11.2	41.4	47.4	21.5	66.1	12.3
10-50	40.1	9.9	33.9	56.2	26.2	65.2	8.6
≥ 50	45.5	13.1	28.0	58.9	32.4	62.9	4.7

interviewees was 89.0 per cent, a little higher than that (81.6 per cent) of all respondents. The most common ideas expressed during the interviews are summarized in Table VI.

Those who read fewer than ten books per year indicated that they occasionally look for books on open shelves: of those, 11.2 per cent found the books within 5 min. When surveyed face-to-face, these respondents tended to state that most of the books they read were textbooks, exam reference materials or books concerning their major. They believed that most of these kinds of books were classified well. On the other hand, avid readers, apart from professional books, preferred a wider range of books, especially those involving several subjects. Over 50 per cent of these respondents thought that the book classification needed to be improved. The data suggested that the effectiveness of the classification of entry-level professional books was better than that of books concerning specific reading topics. Among avid users, the amount of time they spent was influenced by their familiarity with the book classification system. It is evident that the users who read over 50 books each year required less time to find books than their counterparts who read less.

The probability of failing to locate books increased with reading quantity. The more books users wanted to obtain, the greater chance of failure they had: 32.4 per cent of the users who read more than 50 books annually reported that they usually failed to locate books, whereas only 4.7 per cent of those in this group claimed to have rarely encountered this situation. The chance of failure increased according to the amount of

Table VI.
Summary of the face-to-face survey data

No.	Questions	Answers from most of the informal readers	Answers from most of the avid readers
1	Do you come to library frequently?	Occasionally, unless I need to prepare for exams	Yes, I often self-study in the library
2	What kind of books you prefer to read?	Textbooks, exam reference and books concerning major	Besides professional books, I have some other favourite books, such as literature work, history and books involving several subjects
3	Do you think most of books are well classified and easy to locate?	Yes, most of professional books are easy to find	Yes, but some of them need to be improved, for example, books involving several subjects
4	Do you think the library home page should share data with internet services?	Yes	Yes, the most important is book reviews
5	Do you think Web 2.0 applications should be presented on the library home page, such as Wiki, tagging or reviews?	Yes	Yes

books the users read. There might be several reasons behind a failure to locate books, such as shelving mistakes, errors in call number assignment, long time intervals between re-shelving of books and readers' unfamiliarity with the classification system. Because avid readers failed more often than the other users, it can be assumed that users' obstacles to locate books can be mainly attributed to internal library procedures.

Users' willingness to participate

Some problems are evident in descriptive cataloguing, subject headings and book classification; these problems lead to imperfect experiences with OPAC searching and locating books on open shelves. When users could not find books in the libraries, what they were likely to do next is worth investigating. The survey invited respondents to respond to the following question: "What do you do when you cannot obtain a book from the library?", listed in the Appendix as Item 13. The survey results are summarized in Table VII.

The questionnaire listed five alternative ways to find books, as noted in Table VII. Asking friends was not the primary way of obtaining books; however, among those who read fewer than ten books annually, a slightly higher percentage was recorded for this option (11.7 per cent). As reading quantity increased, the percentage for this option dropped. Users were also not inclined to request books on interlibrary loan. The percentage among all respondents for this option was less than 5 per cent, and users with higher reading levels tended to borrow books from other libraries slightly more frequently than did the other users.

As expected, search engines were one of the most popular choices to locate books. Over 50 per cent of all the users reported using search engines as the primary way to find books. Some of the users suggested that they turn to search engines even before accessing the OPAC.

Survey results also showed that book review websites were a useful way to find books. The percentages were 32.3, 75.0 and 72.4 per cent for users who read fewer than 10 books annually, those who read 10-50 books annually and those who read more than 50 books annually, respectively. Avid readers selected this option more often than they chose search engines. Doban Books is one of the most popular book review websites in China. Book terms in Doban Books are provided by Web visitors through the Web 2.0 system. The site presents book reviews, tagging, interest recommendations and original book classifications. Furthermore, Doban Books offers different ways to obtain books. It includes a "Where to buy" page, which offers links to various online bookstores, and a "Where to borrow" page, which connects to several local libraries offering interlibrary loan services. A 32-year-old PhD candidate in the Department of Liberal Arts stated that "Doban Books helps me not only to identify the books I really need but also to find and get them".

Annual reading quantity	Borrow from friends (%)	Inter-library loans (%)	Search engines (%)	Book review websites (%)	Online bookstores (%)
≤ 10	11.7	3.8	54.0	32.3	4.8
10-50	8.9	3.4	53.8	75.0	25.0
≥ 50	5.8	4.1	56.7	72.4	43.2

Table VII. Alternative ways to obtain books

Users who read often used online bookstores as an alternative way to obtain books; of those who read more than 50 books annually, 43.2 per cent tended to buy books when they could not borrow them from libraries. Respondents who read less did not use online bookstores as much.

The data in Table VI indicate that libraries are losing users, and, as previously mentioned, users turn to internet services when libraries do not meet their needs. However, a crisis always has the potential to create opportunities for improvement. Successful internet services can be catalysts and good reference points for libraries to use to transform themselves. Thus, researchers should seek to discover what users want from libraries. The following survey question relates to this area, "Would you like to use any of the interactive applications listed below on the library web page?" (Item 14 in the Appendix), and the results are presented in Table VIII.

Most of the respondents recommended enhancing the catalogue with a wiki on the library's website. Over 80 per cent of the users with high reading quantities felt this way. Among the users who did not read as many books, 79.7 per cent wanted to participate in wiki cataloguing.

Tagging is another Web 2.0 application that helps users identify books. Over 30 per cent of all the respondents wanted to add personalized tags to the OPAC. The desire to use tags was highest among users who read fewer than ten books annually (40.2 per cent).

Reviewing books is very popular on Web 2.0 websites, but libraries do not regularly offer the ability to review books. The users showed a significant desire to have this ability, as shown in Table VII. Approximately 50 per cent of users said that they would like to review books on the library web page, and this demand increased along with reading quantity.

The option to have a "reading record" involves recording the books a user has read, is reading or wants to read. The percentage of approval for this option was also considerable, with over 50 per cent of avid users expressing a desire to record what they read. Among the users who read less, 43.8 per cent expressed this desire.

The demand for sharing book information online did not vary that much between groups, with approximately 30 per cent of all three groups expressing this demand. Connecting to online bookstores is another way in which readers can obtain books that are not available at the library. The demands for online bookstores differed according to reading quantity; 20.3 per cent of the group that read fewer than 10 books annually, 28.0 per cent for the group that read 10-50 books annually and 30.2 per cent for the group that read more than 50 books annually. The users with higher reading levels were inclined to spend more money on books than were the other users.

The data shown in Table VII indicate that users would like to participate more in library resource organization. The users expressed enthusiasm for wiki cataloguing,

Table VIII.
Users' expectations

Annual reading quantity	Wiki cataloguing (%)	Tagging (%)	Book review (%)	Reading record (%)	Sharing with the Internet (%)	Connecting to online bookstores (%)
≤ 10	79.7	40.2	47.8	43.8	35.5	20.3
10-50	82.7	32.2	53.9	52.2	27.1	28.0
≥ 50	85.8	36.0	56.7	55.6	27.6	30.2

tagging, writing book reviews and sharing book information online. Libraries should further investigate these opportunities to improve their services to users.

Discussion

The data analysis shows that user satisfaction has extensive room for improvement. Because the collection generally met the user demands, it seems that the problems are associated with the organization of resources. Resource organization is based on library procedures, such as descriptive cataloguing, subject headings and classification. Although the procedures do not affect users directly, they significantly influence users' experiences. Several underlying problems with these internal procedures were found, which could result in users' dissatisfaction.

Underlying reasons

First, in terms of effectiveness of OPAC searching, user satisfaction was low. Less than 30 per cent of the respondents were satisfied with the recall retrieval rate of information. The percentages declined from 29.5 to 20.7 per cent as users' reading quantities increased. The results for searching precision were much higher. Over 70 per cent of all the users thought that the precision ratio was acceptable. No significant differences were found between the reading groups. The percentages of general satisfaction decreased according to the reading amount. The more books users read, the less satisfied they were with OPAC searching.

Librarians provide search terms through descriptive cataloguing and subject headings. The results indicating satisfaction with precision ratios show that the descriptive terms are accurate and useful. It is well known that cataloguers in Chinese academic libraries pay extensive attention to the standard descriptive format. Because over 80 per cent of the unsatisfied respondents claimed that some related items did not show up in search results, the problems with the recall ratio are most likely associated with subject headings, which may be caused by the long-held working habits of cataloguers. The cataloguers are accustomed to emphasise on the description rather than the subject heading. Subject terms provided by cataloguers are precise but are not comprehensive enough to describe books or journals. Another reason is the constant and rapid emergence of new vocabulary, especially new linguistic expressions on the internet. Librarians simply cannot keep pace with these rapid changes. Therefore, the rich references of resources cannot be comprehensively presented by the subject terms addressed by librarians.

Second, all groups of users claimed that locating books on open shelves was convenient. Nearly 50 per cent of those who read more than 50 books annually and who were more familiar with classification thought locating books was easy. However, approximately 50 per cent of those users spent over 10 min finding a book. It is evident that users experience difficulties in locating books on the shelves when they are shelved according to the current Chinese Library Classification system, especially books related to specific reading demands. The more books users wanted to obtain, the greater the chance they would fail (32.4 per cent failure rate in the group that read more than 50 books annually).

Books are shelved according to the classification system. The call number determines on which shelf a book is placed. The survey results, especially those from the face-to-face interviews, indicate that in addition to the shelf listing, book classification

requires further improvement. In recent years, the development of subjects in various areas has shown a tendency towards diversification. The number of interdisciplinary books has increased; therefore, it has become increasingly difficult for cataloguers to decide under which subjects a book should be classified. On the other hand, librarians with limited background experience cannot appropriately classify all professional books. Furthermore, user feedback is not used to amend classification. Librarians do not reconsider a decision once internal procedures are completed. If a book is given the wrong call number, it becomes a "dead book" that users cannot easily find. This is a waste of resources.

Third, when users are not satisfied with library services, they turn to public websites. Search engines are a popular way to access resources, with over half of the users reporting having used them. Book review websites are another way to find books; over 70 per cent of the users with an avid interest in reading use these sites. Internet search engines, book review websites and bookstores can be all used and linked together to help users find resources. Web 2.0 approaches are frequently applied to improve the UX through feedback control and user participation. The problems associated with OPAC searching and classification have already been solved by public resource services. Overall, it seems easier to find, select, identify and obtain resources on the internet.

Despite this, libraries are more often than not the original place in which users' academic endeavours begin. If libraries wish to improve themselves, users must come back and contribute, as they claimed to be willing to do in the survey. Around 80 per cent of the users stated that they desired to enhance book descriptions with Wiki cataloguing. Approximately 50 per cent of all the respondents hoped to review books in the OPAC. Nearly 40 per cent were inclined to add tags. All three groups of users expressed an expectation to share information between libraries and the internet.

The data analysis indicated some problems in library procedures. The difficulties and inconveniences of accessing library collections are the key causes of the gap between users and libraries. User feedback does not influence internal processes, which is necessary for cataloguing control. On the other hand, users are willing to participate in resource organization. This would enable the library to build content together with users. In China, several libraries have already tried to incorporate changes to improve relations with users. Many of these libraries choose to apply Web 2.0 approaches to establish a closer relationship with users. For example, the Tsinghua University Library (2008) incorporated Web 2.0 services, such as book grading, RSS feeds and linking book items with Google Scholar in its OPAC. The Xiamen University Library (2012) applied OAuth protocol to allow users to log in with SNS accounts. However, these attempts do not provide fundamental solutions. Because these Web 2.0 applications are not based on the ILS architecture, they will inevitably fail when the OPAC is updated.

Implications

The results presented above indicate that problems with resource organization mainly result in declining levels of user satisfaction. Internal library procedures significantly interfere with the UX. However, relations with users are not easily improved because of the following factors.

First, librarians have established working habits, and they may lack enthusiasm for changes. Comprehensive subject headings, cross-subject classifications and migrating vocabulary terms all need to be adapted.

Second, libraries urgently need to keep pace with technological advancements. Librarians must learn to enrich their library services by not only drawing on internet applications but also working in cooperation with their patrons. Cooperation with users to improve access to resources is very important in the Web 2.0 era.

Third, in addition to the organization of resources, issues with the current ILS should be addressed. Most of the ILSs used by Chinese academic libraries have been in use for over 10 years. Most of them utilize a process-oriented architecture. The ILS workflow ensures libraries' daily functioning, but it prevents them from changing frequently. Users' involvement in library workflows is peripheral in the circulation module. It is very difficult to establish a channel to connect users and internal procedures. Feedback data are rarely used as valid references. User contributions through Web 2.0 approaches are also hard to find in the ILS. In the current environment, it is difficult to meet the changing requirements of users. Consequently, cooperation with users is often blocked by the system itself. The fundamental solution to improve the relation is to re-design the ILS using user-oriented architecture. User-oriented architecture, which is based on an open platform, has great advantages for meeting users' changing demands. It has already been used successfully in many public internet services.

As a result, to adapt to changing Web environments and user requirements, academic libraries should innovate their system architecture, resource organization, working mechanisms and management.

Conclusion

The survey results show a gap between user expectations for academic libraries and current library services. The effectiveness of OPAC searching and locating books on open shelves is not satisfactory, and, among avid readers, the satisfaction rate is even lower. Underlying problems were found in the library's internal procedures. The subject terms assigned by cataloguers are precise but not comprehensive. Classification requires further improvement, especially for interdisciplinary books. Web 2.0 applications enabling users to contribute are insufficiently addressed. It is time for librarians to change not only their established working habits but also their patterns of thinking. Libraries must keep pace with current technological changes. We should listen to readers' voices, pay attention to their demands and learn from successful internet services to improve relations between users and libraries.

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Appendix

English translation of the survey (originally in Chinese)

My Library, My Way. Survey in the Reading Festival of Nanjing University Library

1. How many books (including e-books) do you read per year, on average?
   A. Fewer than 10
   B. 10-50
   C. More than 50

2. How many books have you ever needed to read but the library had not yet purchased them?
   A. Many
   B. Some
   C. A few
3. Do you think the library always purchases newly published books on time?
   A. Yes
   B. No
4. When you search the library's home page, does the online public access catalogue (OPAC) find most of the books/articles relevant to your query?
   A. Yes, I think so
   B. No, I don't think so

If no, what kind of relevant books/articles do you think are not included in the search results?

   a. Different print versions
   b. Authors with different name abbreviations
   c. Related subjects
   d. Others

5. Do the retrieval results in the OPAC always match your search terms?
   A. Yes
   B. No

If no, what kind of irrelevant books/articles are presented in the search results?

   a. Unrelated subjects
   b. Different authors with similar names
   c. Other unrelated items

6. Are you satisfied with the effectiveness of OPAC searches in general?
   A. Yes
   B. No
7. Do you think it is convenient to locate books on open shelves in general?
   A. Yes
   B. No
8. The longest time you ever spent locating a book was […]
   A. 1-5 min
   B. 5-10 min
   C. Longer than 10 min
9. Have you ever failed to locate books that were shown as available in the OPAC?
   A. Usually
   B. Occasionally
   C. Rarely
10. Do you think most of the books in our library are classified in the correct category?
   A. Yes
   B. No

If no, would you like to revise the book category in the OPAC?

a. Yes
b. No

11. Which way do you think is more reasonable for organizing books on shelves: book classification or listing books that match the user's interests?
    A. Book classification
    B. User interests
12. Do you think your reading demand can be satisfied under the current borrowing limits?
    A. Yes
    B. No

If no, which one is insufficient?

a. Loan quotas
b. Loan period

13. What do you do when you cannot obtain a book from the library?
    A. Borrow it from a friend
    B. Borrow it from another library (interlibrary loan)
    C. Turn to an online search engine
    D. Turn to a book review website
    E. Purchase the book from an online bookstore
14. Would you like to use any of the interactive applications listed below on the library web page?
    A. Wiki cataloguing
    B. Tagging
    C. Book reviews
    D. Recording what you have read, are reading and want to read
    E. Sharing resources, content or applications online
    F. Connecting to online bookstores
15. Age:
    A. < 25 B. 25-30 C. 30-40 D. > 40
16. Gender:
    A. Male B. Female
17. Occupational identity:
    A. Undergraduate student B. Graduate student C. PhD candidate D. Professor
18. Subject fields:
    A. Sciences B. Social sciences C. Humanities

About the authors

Xiaojuan Zhai is currently an Associate Professor at Nanjing University Library, China. She holds a PhD degree from Nanjing University. She has published a book titled "*Research on digital library business architecture*" and dozens of papers in CSSCI journals. She has attend the 78th IFLA World Library and Information Congress, 2012, to present her conference paper. Her research interests include library personalized service, new media marketing and ILS development. Zhai

Xiaojuan can be contacted at: zhaixj@nju.edu.cn Xiaojuan Zhai is corresponding author and can be contacted at: zhaixj@nju.edu.cn

Jingjing Wang is a Librarian in Peking University Library. Her main research areas are literature evaluation institution and quality control, publicity and promotion of library resources and services. Main theses are The Practice of Humanities and Social Sciences Oriented Information Resources Co- construction and Sharing, CASHL ILL Development and Countermeasures under the New Information Environment, ILL Quality Control Research on China's Library League by Taking CASHL as A Case Study and The Problems and Solutions of Interlibrary Loan and Document Delivery Quality Control of Library Resource-sharing Consortium in China. Jingjing wang can be contacted at: wangjj@lib.pku.edu.cn