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Exploring Library 2.0 on the Social Web

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Abstract: Library 2.0 literature has described many of the possibilities Web 2.0 technologies offer libraries. Case studies have assessed local use, but no studies have measured the Library 2.0 phenomenon by searching public social networking sites. This study used library-specific terms to search public social networking sites, blog search engines, and social bookmarking sites for activity associated with librarians and library users. Blog search data about the recentness of activity or the popularity of a blog post indicate Library 2.0 technology has many early adopters but provide less evidence of sustained use. The results follow a curve resembling the 80 / 20 rule and also resemble Chris Anderson's "long tail" effect, in which very few authors create the vast amount of content. These exploratory results can be used as a starting point for future studies. Librarians who use tags to describe Web-based content might use these findings to select more effective tags. Librarians implementing a blog or a social networking presence might use this study to balance the benefits with the amount of work required to maintain an up-to-date presence.

Keywords: Web 2.0, library 2.0, social networking, bookmarking, folksonomy, tagging, assessment, blog search

From 2005 through 2009, the number of articles about Web 2.0 and Library 2.0 published in the library and information science literature increased dramatically. In the database Library Literature and Information Science Full Text (H.W. Wilson), the number of articles went from 89 in 2005 to 459 in 2008 and dropped to 340 in 2009 (see Appendix A). The preponderance of this literature describes Web 2.0 services and how they can benefit libraries and library patrons; some studies measure how much Web 2.0 technologies are being used in individual libraries.

For this study, Web 2.0 refers to dynamically generated Web sites that allow information sharing between users and are characterized by social networking. A fundamental characteristic of Web 2.0 as defined here is the ability for Web site users to generate content rather than simply receive and consume the content provided by Web site producers. Library 2.0 is defined as Web 2.0-enabled content contributed by and / or commented on by librarians and library users. While Library 2.0 can be placed within the technological context of Web 2.0, this definition is limited and incomplete. As Meredith G. Farkas stated, “Some people see it as being all about technology. Some see it more as a service philosophy. Others see it more about organizational change” (2008). This study adds context to the largely unknown territory regarding the use of Library 2.0. There is much discussion surrounding the meaning and use of the phrase Library 2.0. A comparable amount of study should be devoted to how Library 2.0 tools are used.

Attempting to quantify the Library 2.0 phenomenon as a whole is like attempting to count all the pages on the Web. Even if it were possible to determine a single number, that number would not begin to tell the whole story. A major obstacle to quantifying Library 2.0 is the sheer size of the user population. It is one thing to measure a library blog’s use or to measure a patron’s participation in an online library program; trying to measure Library 2.0 activity across several multi-million-user Web sites is another matter altogether. This study does not

attempt to provide exact numbers or analyze data for statistical significance. Rather, it identifies salient characteristics of library-related content retrieved from searches in major Web 2.0 sites.

This study was performed so the library community could see patterns in Web 2.0 technologies that are being used in the service of libraries and library users, providing a snapshot of the Library 2.0 landscape in spring 2009. The study searched Web 2.0 content such as user pages, bookmarks, blog posts, and forum posts from nine popular social software spaces such as Facebook (<http://facebook.com>), Delicious (<http://delicious.com>), and Technorati (<http://technorati.com>). The search terms ensured the results were highly likely to have a direct association with libraries, librarians, or library users. In addition to the content of blogs, user pages, and forums, the study relied on user-generated classification, also known as tags or folksonomy. Tagging is a popular way to add a social element to online bookmarks such as Delicious (<http://delicious.com>), photo-sharing sites like Flickr (<http://flickr.com>), and music sharing sites like LastFM (<http://lastfm.com>).

Literature review

User-generated content, Web-based collaboration, and social networking sites serve the diverse needs of librarians and library users. Given the growing body of literature on social software in library journals, discovering how frequently these tools are being used is a timely endeavor. Understanding how and why to adopt Library 2.0 tools is valuable knowledge, and the library literature abounds with case studies and guides to social software. Two major works in this area, Farkas' *Social Software in Libraries: Building Collaboration, Communication, and Community Online* (2007) and Nancy Courtney's *Library 2.0 and Beyond: Innovative*

Technologies and Tomorrow's User (2007), provide excellent reviews of the technologies and guidance to their implementation.

In the “ARL SPEC Kit 304: Social Software in Libraries,” Matthew Bejune and Jana Ronan (2008) presented a highly developed profile of the social software used in academic libraries. While the study showed the adoption of new Web technologies, it did not attempt to discover the use of Library 2.0 in public social software spaces. A literature is beginning to emerge on methods of measuring social software in libraries. David Stuart (2009) wrote about a variety of metrics that can be employed to measure a library's Web 2.0 efforts, concluding, “It is important that librarians develop methods for measuring the use and effectiveness of the technologies so that time is not wasted and the implementations are justifiable to upper management” (Stuart 2009, 22). Ying Ding et al. (2009) described social tagging behavior in three major social network sites (SNSs), concluding that a profile of an SNS can be drawn from the tagging behavior of its users. Alexander Halavais (2009) analyzed more than 6,000 comments from Digg (<http://digg.com>) to study the effect of user feedback on Digg participants. Nancy K. Baym and Andrew Ledbetter (2009, 408) surveyed users of the SNS Last.fm to investigate the depth of relationships based on a shared interest in music. Mike Thelwall (2008) examined MySpace member profiles for demographic data, numbers of friends, and gender information with the goal of adding statistical data to other conjectural, qualitative research. Many studies, such as Matthew Bejune and Jana Ronan (2008), Laurie Charnigo and Paula Barnett-Ellis (2007), Anne Morris and Katie Allen (2008), and Nguyen Cuong Linh (2008), used a survey methodology to learn to what extent Library 2.0 is used in libraries or by library users.

Several authors expressed a great deal of enthusiasm for Library 2.0's potential. In his article “The Future of Reference in Special Libraries Is What Information Pros Can Make It,”

Steven Abram (2007, 35) urged librarians to embrace the shift from a technology-centric attitude to an end-user-centered attitude. He argued Web 2.0 technologies can help librarians make that attitude shift, and he challenged librarians to create a new paradigm in which reference services are available regardless of patrons' physical or Web location.

Former ALA president Leslie Burger (2007) lauded Library 2.0, saying information is an open commodity freely available for the asking. Burger said, "By using Web 2.0 software, people are sharing information, answering each other's questions with amazing speed, and are cataloging and finding information by creating tags with terms they can easily understand" . Like Abram, Burger sees Library 2.0 as a way to break away from the limits of a physical location to provide services.

Some of the literature is a reaction to the laudatory rhetoric about blogs, wikis and tagging, challenging the relevance of reference librarians and even the future of libraries in a world where so much information is available at a user's fingertips. Brian Mathews (2007) asked whether in a time of diminishing in-person reference transactions, libraries can adapt to social technologies and remain vital to an increasingly online user community. Similarly, Jerry Campbell underscored the need for reference librarians to continually step back from their practices in order to see the change occurring "at the speed of Moore's law" . If we can understand more about how Library 2.0 tools are being used now, perhaps we can anticipate change and adapt in order to remain relevant.

Criticism of Library 2.0 is often one of two kinds. The first argument critiques the clutter created by user-generated content and descriptive tagging, arguing it reduces the power of descriptive indexing. This concern is expressed in Elaine Peterson's "Beneath the Metadata: Some Philosophical Problems with Folksonomy" (2006). In her defense of the cataloger's art,

Peterson said the relativism of folksonomy turns on its head the “traditional classification statement such as ‘A is not B’ because in a folksonomic classification A is relative to B” (n.p.). Peterson stated, “In the networked world of information retrieval, a display of all views can also lead to a breakdown of the system”; in the networked world of information retrieval, however, we are constantly dealing with multiple systems and multiple forms of classification.

A second variety of criticism claims librarians’ many expectations of Library 2.0 are overly optimistic, especially the expectation that Library 2.0 tools make users instantly more adept at search and retrieval. Marydee Ojala (2007) pejoratively described Library 2.0 as utopian because she believed its devotees envision an erasure of the dichotomy between librarian and user; that is, they mistakenly assume that user-generated content creates a conversation between equals. For Ojala, such an assumption is flawed. Information professionals enjoy the problem-solving aspect of search and retrieval, whereas library users, whether they generate content or not, are generally interested only in their immediate information needs. The professional, who is in it for the chase, will likely always be able to provide information the pedestrian searcher is unable to find. What Ojala doesn’t address is that communication enabled by Library 2.0 tools, specifically tagging, creates potential for information discovery beyond what traditional classification is able to provide. As descriptive metadata, the tags are as important as any method of classification used by the social networking site.

Much of the literature on folksonomy focuses on the validity of the idea that user-generated tags can rival formal classification in organizing information so that it is more easily retrieved. David Weinberger, in his essay “Why Tagging Is Important,” may make the broadest statement in support of the utility of user-generated classification when he proclaims, “Tagging repudiates one of the deepest projects our culture has undertaken again and again: the rendering

of all knowledge into a single universal framework” . Arguing against the utility of tagging, Peterson’s (2006) observation about the relativism of folksonomic classification predicts that an object will be tagged so idiosyncratically that the tags become useless to anyone except the person tagging the object. But while idiosyncratic tags are possible in a user-generated classification, it is counterintuitive to think users will tag objects without a significant overlap of common language.

At the time of writing, the literature did not contain a study reporting on Library 2.0 activity across several public social software sites. This study attempts to paint a broad picture of use across such sites.

Methodology

Library-specific terms and phrases were searched in nine popular social software-enabled Web sites. There were three types of sites: social networking sites (SNSs), blog search engines, and social-bookmarking sites (see Figure 1). The SNSs were Facebook, MySpace (<http://myspace.com>), Friendster (<http://friendster.com>), and Orkut (<http://orkut.com>). The blog search engines were Technorati (<http://technorati.com>) and Google Blog Search (<http://blogsearch.google.com>). The social bookmarking sites were Delicious, Digg, (<http://digg.com>), and Diigo (<http://diigo.com>).

Figure 1. Web 2.0 sites reviewed

1.	http://Facebook.com
2.	http://MySpace.com
3.	http://Friendster.com
4.	http://Orkut.com
5.	http://Technorati.com
6.	http://blogsearch.google.com
7.	http://Delicious.com
8.	http://Digg.com
9.	http://Diigo.com

The search terms selected were phrases like “reference librarian,” “information literacy,” or “public librarian” — library terminology or terms connected in some way to a librarian or allied professional (see Figure 2). The terms were chosen to be specific enough to nearly always return hits created by or directly associated with a library. They could easily be employed by library users as well as librarians. In this way, both library-generated content and user-generated content would be retrieved within the scope of Library 2.0 services. While library jargon was generally avoided, “information literacy” and “library instruction” were included because they both concern user education and communication, which are especially relevant to Library 2.0. Many other potential search terms could have returned hits associated with libraries, such as “academic librarian,” “information professional,” or “classification system.” However, these terms were not selected because they were deemed sufficiently esoteric that they would almost never be used by the general public, and therefore, as search terms, they are skewed toward results originating with librarians.

Examples of Library 2.0 use include communication between librarians, between patrons, or between librarians and patrons. While this methodology provides a tool that can gather highly relevant search results, it is limited in its capacity to differentiate between user populations.

Figure 2. All Search terms and phrases

- | |
|--|
| <ol style="list-style-type: none">1. library2. librarian3. research help4. reference help5. research library6. reference library7. research librarian8. reference librarian9. information literacy10. library instruction11. public library12. public librarian |
|--|

The same searches were performed on every site. Every Web site provided different content and features. For this reason, search results were analyzed using the most relevant filters provided by the Web site. For example, SNSs like Facebook and MySpace offered limiters by the type of account, such as “people” accounts for individuals or “page” accounts for groups, organizations, or celebrities. In bookmarking sites and blog search sites, result sets were filtered by relevance, by creation date, or by popularity (where those features were available). Options used in each site will be explained in greater detail in the results. Unless otherwise noted, all sites used an implied Boolean “AND” search.

The results of each of the twelve searches were compared to other results from the same site. They were also compared to results from other sites in the same category. For example, the results for “reference librarian” searched in Facebook were compared to the results for the same search in the other SNSs. Since each site had different ways to categorize or sort the search results, the results could not be analyzed in the same way from site to site. This places a significant limitation on how the results can be compared. It was impossible to make any statistically significant statements about the data since none of the data could be analyzed with a single tool. Despite this limitation, this study was performed to explore and describe Library 2.0 phenomena on public sites to see if emerging patterns could be discerned.

Social Networking Sites

All twelve searches were entered into the default search box in each SNS. Result sets were then filtered by features provided by the SNS. Every SNS provided filters for different kinds of users or services, variously labeled as “people,” “groups,” “affiliations,” “communities,”

or “forums.” For example, a search in Facebook might return 375 hits. Facebook allows you to separate those 375 hits into four categories: people, groups, pages, and applications.

Facebook

Facebook returned strikingly different results between “librarian” and “library” (see Table 1). “Library” returned the maximum search results (500) for people, pages, and groups. In the applications category, “library” returned 475 results. By contrast, “librarian” returned 500 results for people and groups, but only 22 for pages and eleven for applications. “Library research” returned more than 500 results, but “library reference” only 232. In groups, “librarian research” returned 40 results; “librarian reference” returned 22. “Information literacy” returned 399 groups pages, but “library instruction” returned only 88.

Table 1. Results for searches in Facebook

Search terms	People	Pages	Groups	Applications
library	500	500	500	475
librarian	500	22	500	11
research help	484	2	500	119
reference help	64	0	500	7
library research	500	10	500	14
library reference	363	7	232	3
librarian research	45	0	40	4
librarian reference	137	0	22	0
reference desk	93	2	85	2
information literacy	15	2	399	0
library instruction	33	0	88	0
public library	500	500	500	21
public librarian	337	0	92	0

MySpace

Results from MySpace were separated into people, groups, and forums categories. Additional filters were placed on the search results from forums. The forums selected were “campus life” and “culture, arts & literature.” Searches for the terms “library research,” “library

reference,” “librarian research,” and “librarian reference” in the groups category returned zero results except for a single result for “library research” (see Table 2). Those same searches in the people category returned three results, all for “librarian reference.” By contrast, there were 175 people results for “librarian” and 255 groups results for “public library.”

Table 2. Results for searches in MySpace

Search terms	People	Groups	Forums
library	500	25	300
librarian	175	21	300
research help	0	4	300
reference help	0	0	300
library research	0	1	297
library reference	0	0	300
librarian research	0	0	19
librarian reference	3	0	7
reference desk	0	5	59
information literacy	0	1	51
library instruction	0	0	59
public library	6	255	300
public librarian	0	0	59

The largest numbers of results for all search terms in MySpace came from the MySpace forums (see Table 3). The largest MySpace forum results were in the forums culture, arts & literature and campus life. With the exception of the single terms “library” and “librarian,” the terms “research help” and “reference help” consistently returned higher results than other terms in campus life forums across all school levels (high school, undergraduate, and graduate).

Table 3. Results for searches in MySpace Forums: "Campus Life" and "Culture, Arts & Literature"

Search terms	Culture, Arts & Literature	General	Arts	Literature	Campus life general	High school	Undergraduate	Graduate
library	300	76	0	0	65	129	55	18
librarian	77	2	0	0	9	26	6	0
research help	211	46	0	0	54	41	59	30
reference help	103	16	0	0	4	4	2	1
library research	21	4	3	14	0	0	1	2
library reference	14	0	0	11	0	0	0	0
librarian research	3	0	0	1	0	0	1	0
librarian reference	1	0	0	3	0	0	1	0

reference desk	8	1	1	6	1	0	0	0
information literacy	5	0	2	1	0	0	0	0
library instruction	1	0	0	1	0	0	0	0
public library	41	7	0	28	3	0	1	0
public librarian	3	1	0	2	1	3	0	0

Friendster

The Friendster categories were people, groups, affiliations, interests, and apps (applications). In the people category, “public library” led with 1,000 hits, followed by “library research” (717). The greatest number of results in Friendster came from the affiliations category. “Library” returned 1,118 results, “public library” returned 307 results, and “librarian” returned 96 results (see Table 4). In the interests category, the search for “library” produced 2,910 hits. All the other searches produced fewer than 200 hits. Four searches produced fewer than ten results, and five searches produced zero results.

Table 4. Results for searches in Friendster

Search terms	People	Affiliations	Groups	Interests	Apps
library	14	1188	948	2910	2
librarian	2	96	223	157	0
research help	0	0	1607	3	0
reference help	0	0	542	0	0
library research	717	0	1552	6	0
library reference	305	0	1580	0	0
librarian research	199	0	1564	0	0
librarian reference	147	1	824	0	0
reference desk	229	0	201	1	0
information literacy	79	0	1574	6	0
library instruction	0	0	1554	0	0
public library	1000	307	1532	195	0

Orkut

The categories in the Google social networking site Orkut were users, communities, and topics. Since Orkut has a very large international community, results were limited to English and to the United States. The user results dropped more than 90 percent between the Boolean and

phrase searching in seven out of eleven searches (see Table 5). For example, the Boolean search for the words “research librarian” returned 117 hits, but the phrase search returned only nine hits.

Both “library” and “librarian” returned 1,000 results, which is the maximum for Orkut searches. When the language and country filters were applied, “library” still returned more than 1,000 results, but “librarian” dropped to 558 (see Table 5). None of the communities searches for combinations of “library,” “librarian,” “research,” and “reference” returned more than five hits. Ten out of 24 topics searches reached 1,000 hits, and six sets still reached 1,000 after filtering.

Table 5. Results for searches in Orkut

Search terms	Users	+English	+US	Communities	+English	+US	Topics	+English	+US
library	1000+	1000+	1000+	546	518	20	1000+	1000+	1000+
librarian	1000+	1000+	558	63	57	2	1000+	1000+	445
research help	1000+	1000+	557	3	3	0	1000+	1000+	1000+
"research help"	7	7	0	1	1	0	84	82	23
reference help	343	325	41	0	0	0	1000+	1000+	1000+
"reference help"	0	0	0	0	0	0	21	19	2
research library	812	780	106	1	1	0	1000+	1000+	1000+
"research library"	9	8	1	0	0	0	98	49	7
reference library	175	166	52	2	2	0	1000+	1000+	1000+
"reference library"	12	12	4	2	2	0	278	259	74
research librarian	117	112	37	0	0	0	490	478	59
"research librarian"	9	9	6	0	0	0	8	8	1
reference librarian	88	83	56	1	1	1	294	279	45
"reference librarian"	43	42	31	1	1	1	23	21	8
reference desk	54	52	25	0	0	0	1000+	1000+	233
"reference desk"	2	0	0	0	0	0	17	17	6
information literacy	72	69	18	0	0	0	1000	1000	336
"information literacy"	24	23	12	1	1	0	32	22	2
library instruction	13	13	6	0	0	0	782	730	121
"library instruction"	2	2	2	0	0	0	1	1	1
public library	1000	1000	454	59	53	3	1000	1000	1000
"public library"	205	187	85	60	52	3	1000	1000	243
public librarian	366	331	92	0	0	0	721	711	91
"public librarian"	0	0	0	0	0	0	3	3	0

Blog Search Engines

Google Blog Search (GBS) and Technorati had better search functionality than the SNSs. This allowed a more nuanced view of Library 2.0 activity as seen in blogs. Both sites used phrase searching and an implied Boolean AND. GBS also allowed the searches to be limited to blog titles and also could limit for the time since the blog's last update. Technorati assigned blog posts a level of "authority," which indicated how influential a post was. A blog post has "authority" based its recentness and the number of blogs that link to it. The blog posts with the greatest number of unique links achieve the highest rank. Although "authority" is given a number, Technorati summarized those numbers into four levels: "any authority," "a little authority," "some authority," or "a lot of authority."

Google Blog Search

The phrase "information literacy" retrieved 3,058 hits. Limiting that search to blogs updated within the past year lowered the retrieval to 33 hits, and the search found only ten blogs updates in the past month with "information literacy" in the title (see Table 6). Similarly, the search for "information and literacy" in the blog title returned more than 8,000 results. Of those 8,000, 3,554 had been updated in the last year, 99 in the last three months and twelve within 30 days of the search.

Table 6. Results for searches in Google Blog Search

Search terms	Last update: anytime	Last update: Past year	Last update: Past 3 months	Last update: Past month
inblogtitle:library	1,740,661	618,518	40,981	22,110
inblogtitle:library inblogtitle:help	1358	1286	10	6
inblogtitle:librarian	216,941	15,384	5923	2642
inblogtitle:librarian inblogtitle:help	1	1	1	0
inblogtitle:research inblogtitle:help	26	13	9	5
inblogtitle:"research help"	7	5	1	0
inblogtitle:reference inblogtitle:help	15	10	3	0
inblogtitle:"reference help"	2	2	2	0
inblogtitle:library inblogtitle:research	7576	27	18	15
inblogtitle:"research library"	3465	1001	10	7

inblogtitle:reference inblogtitle:library	1385	54	31	22
inblogtitle:"reference library"	1420	7	3	3
inblogtitle:research inblogtitle:librarian	4	2	0	0
inblogtitle:"research librarian"	1	0	0	0
inblogtitle:reference inblogtitle:librarian	223	9	3	0
inblogtitle:"reference librarian"	173	7	3	0
inblogtitle:information inblogtitle:literacy	8126	3554	99	12
inblogtitle:"information literacy"	3058	33	19	10
inblogtitle:library inblogtitle:instruction	364	73	5	1
inblogtitle:"library instruction"	27	10	2	1
inblogtitle:library inblogtitle:public	261,623	9644	4612	2825
inblogtitle:"public library"	256,375	135,495	4046	2164
inblogtitle:public inblogtitle:librarian	292	71	4	0
inblogtitle:"public librarian"	8	4	2	1

Technorati

There were 511 hits for blog posts that had “any authority” and contained the phrase “library instruction.” For posts with “a little authority” there were 404 hits; with “some authority,” the number dropped to 44. Finally, there were only three posts containing “library instruction” that were given “a lot of authority.” Searched as a phrase, “information literacy” returned 2,109 hits when “any authority” was allowed. When “a lot of authority” was required, the number dropped to 36, or just 1.7 percent of the original result set (see Table 7). The search for “public library” presented a similar decline. Without applying limits, 39,749 blog posts contain the phrase “public library.” Blog posts with “a lot of authority” numbered only 1,138 (2.8 percent).

Table 7. Results for searches in Technorati

Keywords	Any authority	A little authority	Some authority	A lot of authority
library	743,299	616,644	145,668	16,149
librarian	57,167	48,402	13,459	1205
library and research	51,935	44,412	13,015	1213
library and reference	25,218	21,387	5783	607
"research library"	2112	1812	547	39
"reference library"	2113	1779	490	78
librarian and research	3932	3503	1296	93
librarian and reference	2440	2263	659	49
"research librarian"	210	168	48	5
"reference librarian"	1341	1102	221	10

research and help	487,059	403,125	110,671	12,702
"research help"	427	390	90	19
reference and help	112,600	93,243	26,671	3143
"reference help"	83	72	9	1
"information literacy"	2109	1913	514	37
"library instruction"	511	404	55	3
public and library	83,615	74,725	23,038	2934
"public library"	39,749	34,305	9079	1138
public and librarian	12,440	10,613	3087	331
"public librarian"	367	305	86	10

Social Bookmarking Sites

Social bookmarking sites allow an individual to save links to a Web page of interest and to add a description and tags for easier retrieval. The bookmarking sites allow users to search for other users' bookmarks and tags. Delicious, Digg, and Diigo had different search and filtering capabilities.

On Delicious, the default search for exploring tags is a Boolean AND. Tags can be any word or words, but they cannot contain spaces. Multi-word tags can be joined with any character (or no character such as in "publiclibrary"). The hyphen and the underscore (" _ ") are frequently used to create multi-word tags.

Digg organizes its content into seven categories (and several subcategories): technology, world & business, science, gaming, lifestyle, sports, and offbeat. Limits were placed on Digg searches to focus on Library 2.0 content. Searches were limited to the science subcategory general sciences and the lifestyle subcategories arts & culture and educational. These were selected because they cover the broadest subject areas. Library 2.0 content could arguably be in any Digg category, but the others were excluded because they were considered too narrow to identify communication, news, or discussion related to libraries. Only the titles and descriptions of news articles were searched, excluding video and images.

Diigo is a hybrid of a bookmarking site and a social networking site. Diigo offers functionality similar to a social networking site by allowing users many ways to associate with other users around common interests. Total Diigo results and filtered results for Diigo categories people, groups, and bookmark lists were recorded.

Delicious

Of nine searches that used two-word tags, seven of them returned less than 1 percent of the results of the Boolean searches. For example, searching for the terms “reference AND librarian” returned 1,368 results, but searching “Reference_librarian” returned just thirteen. By contrast, the “reference_desk” search returned 54 percent (151) of the “reference AND desk” search, which returned 276 results (see Table 8). “Public” AND “library” returned 4,497 results. “Public_library” returned 84 percent fewer hits with 721. Two notable exceptions to this trend were the two-word tags “information_literacy” and “library_instruction.” “Information AND literacy” returned 4,831 hits, whereas searching “information_literacy” returned 35,093. “Library_instruction” returned 2,238, but “library AND instruction” returned 2,403 (see Table 9).

Table 8. Results using Delicious Single Word Tags

Tags with implied AND	Bookmarks	Rank
Research (AND) library	50,131	2
reference (AND) library	114,270	1
research (AND) librarian	737	7
reference (AND) librarian	1368	6
reference (AND) desk	276	8
information (AND) literacy	4831	3
library (AND) instruction	2403	5
public (AND) library	4497	4
public (AND) librarian	89	9

Table 9. Results using Delicious Two Word Tags, With Underscore

Tags connected with ' '	Bookmarks	Rank
library research	230	5
research library	54	8
library reference	663	4
reference library	167	6
research librarian	1	11
reference librarian	13	9
reference desk	151	7
information literacy	35,093	1
library instruction	2238	2
public library	721	3
public librarian	6	10

All Delicious searches were also performed with the terms run together without a space (see Table 10). These searches returned fewer results than the tags joined by an underscore, with one exception: “publiclibrary” returned 868 hits, 20 percent more than the 721 for “public_library.”

Table 10. Comparison of Results for Delicious Two Word Tags connected with no space and with ‘_’

Tags	Nospace	Underscore	Percent change
libraryresearch	171	230	-25%
researchlibrary	34	54	-37%
libraryreference	113	663	-83%
referencelibrary	105	167	-37%
researchlibrarian	0	1	-100%
referencelibrarian	0	13	-100%
referencedesk	146	151	-3%
informationliteracy	17,983	35,093	-49%
libraryinstruction	1163	2238	-48%
publiclibrary	868	721	+20%
publiclibrarian	3	6	-50%

Digg

A “Digg” is a vote for a blog post or news article made by any Digg user. The posts that receive the greatest number of Diggings rise to the highest rank and are seen by the most people. Since Digg is a ranking site rather than just a search engine, the number of Diggings a result receives is as important as the number of results in a search. For example, “reference desk”

received more overall hits than either “information literacy” or “library instruction,” but the greatest number of Digg hits for any “reference desk” story was 176 (see Table 11). By contrast, “information literacy” and “library instruction” had stories with 1,503 and 1,125 Digg hits respectively.

Digg results were generally fewer than Delicious or Diigo. “Library” received more than 18,000 hits, “public library” received 1,486, and “librarian” received 1,105. All other searches received fewer than 500 hits (see Table 11). Digg has a chronological sort function, which uses the age of results. Five of the eleven searches received Digg hits made between 4.1 and 4.3 years ago. The oldest Digg hit for a “reference desk” result was only 2.6 years (see Table 11).

Table 11. Results for searches in Digg

Keywords	Results	Most “Digg” (Next Largest Numbers)	Least “Digg” (results with 0 or 1 digg)	Newest result	Oldest result
library	18000+	5915 (4551, 3732, 3621, 3398, 3355, 3242, 3179, 3045, 2991)	1000+	2 days	4 years 110 days
librarian	1105	3044 (2842, 1779, 1754, 1478, 1469, 1424, 1027, 951)	300	17 hours	4 years 99 days
library research	421	1064 (940, 924, 885, 809, 718, 626, 568,)	144	17 hours	4 years 99 days
library reference	239	1609 (1367, 1218, 1102, 425, 162, 141, 73)	76	5 days	3 years 329 days
librarian research	54	96 (64, 57, 32, 20, 18)	14	12 days	3 years 189 days
librarian reference	25	20 (19, 18, 11, 9, 9)	4	21 days	3 years 81 days
reference desk	81	176 (next highest, 26, 17, 10, 9, 7, 7, 6, 5)	37	22 days	2 years 228 days
information literacy	58	1503 (509, 224, 42, 27, 16)	22	5 days	3 years 235 days
library instruction	80	1125 (414, 111, 48, 20)	24	8 hours	3 years 242 days
public library	1486	2423 (1602,1505, 1423, 1262)	513	8 hours	4 years 99 days
public librarian	108	2842 (1469, 819, 636, 170, 147)	21	7 days	4 years 37 days

The results with the oldest Digg hits are naturally the oldest stories. But sets containing the oldest Digg hits might also have Digg hits made as recently as that same day, illustrating the perceived

importance and the stability of the meaning of a search phrase. “Library instruction” and “public library” had results that received Diggs only eight hours prior to being searched. The “reference desk” search contained articles that had Diggs no older than 2 years, 228 days, and no younger than 22 days (see Table 11).

Diigo

The largest result sets in the people category were “library research” and “library reference.” They received 2,392 and 2,635 results respectively. Only “library” received more, with 4,009. “Information literacy” received 578 people and 86 groups results. “Library reference” was associated with 171 groups.

“Information literacy” and “library research” filtered by the bookmark list category returned 360 and 340 results, respectively (see Table 12).

Table 12. Results for searches in Diigo

Keywords	Diigo	People	People rank	Groups	Group rank	Bookmark lists	List rank
library	16,588	4009	1	332	1	80	8
librarian	751	234	7	29	6	14	11
library research	2961	2392	3	159	3	340	2
library reference	4456	2635	2	171	2	129	5
librarian research	217	182	9	18	8	271	3
librarian reference	238	183	8	17	9	60	9/10
reference desk	374	156	10	2	11	60	9/10
information literacy	942	578	4	86	4	360	1
library instruction	236	354	6	20	7	100	6
public library	473	514	5	42	5	154	4
public librarian	24	53	11	9	10	83	7

Results

Social networking sites

The results revealed several patterns. Across the social networking sites, the people category results for “library” outnumbered the results for “librarian.” The results for “public

library” were consistently high across all SNSs in every category. Facebook retrieved 92 groups for “public librarian.” Conversely, “public librarian” retrieved zero groups in Friendster, MySpace, and Orkut. The results illustrate SNSs’ popularity and offers insight into the audience a site attracts. Librarians designing Library 2.0 services might use this kind of information to determine where to focus their efforts for the greatest effect. For example, there were very few people or groups pages in MySpace that meet the search criteria for the words “reference” or “research,” whereas Facebook and Friendster returned many hits for those terms. These results suggest SNS users have chosen Facebook or Friendster as the place for their library’s profile. Libraries should focus on these sites rather than MySpace as a place to promote their institution.

Blog search engines

Google Blog Search and Technorati provided particularly helpful analytical tools. The “time since last update” filter in GBS and the “recentness” and “authority” search limiters in Technorati brought patterns into relief. The “time since last update” filter showed blog technology has been widely adopted in libraries. The number of blog “early adopters” can be approximated by searching GBS without placing any limits on the date of creation or the date of last update. A “time since last update” filter allows you to see how many blogs within a search set have been updated since a given date. This filter shows a steep decline in the number of blogs that are consistently updated. In GBS, the number of blogs updated over the course of one year dropped by a power of 100 — or sometimes even 1,000. For this study, searches were filtered for updates in the past year, in the past three months, and in the past month (see Table 6).

The same steep curve existed when applying the Technorati authority filter. In every Technorati search, the results with “any authority” far outnumbered results with “a lot of

authority.” Recall that authority is measured by the number of original blog posts linking to a story. For example, the search for the phrase “reference librarian” returned 1,341 results possessing “any authority.” When the search was limited to results possessing “a lot of authority” the result dropped to ten, or just seven-tenths of one percent. While the “time since last update” filter in GBS indicated very few Library 2.0 bloggers were consistently writing, then the Technorati authority filter indicated very few bloggers were consistently read.

Social Bookmarking Sites

Overall, the bookmarking sites revealed patterns similar to those found in the other sites. “Library” outnumbered “librarian,” “research” outnumbered “reference,” “information literacy” outnumbered “library instruction,” and “public library” outnumbered “public librarian.”

In Delicious, “information_literacy” returned 35,093 results. “Information (AND) literacy” returned 4,831. “Informationliteracy” without a space returned 17,983 hits, or 51 percent of the “information_literacy” results. This was the only instance in which a multi-word tag retrieved more hits than two single-word tags. A similar but far less dramatic outcome resulted from the multi-word “library_instruction” search, which returned 2,238 hits — 93 percent of the 2,403 hits for the single-word tag search “library (AND) instruction” (see Tables 9-11). Both these tags illustrate that “library instruction” or “information literacy” mean something more specific as word pairs than they do as single-word tags. Perhaps this is because of the relative ambiguity of the term “information” when it is not paired with a contextualizing term such as “literacy” or “technology.” Librarians should be conscious of the need for specificity when creating tags for their social bookmarks. Subtle distinctions like this can make a

difference in the relevance of a user's tag search. Applying tags that are too general will lower the relevancy of your bookmark in user searches or bury it in large sets of results.

When ranked from most Diggs to least, all search result sets showed the story with the most Diggs had far more than the story with the next highest number (see Table 11). For example, the top-ranked result from the "information literacy" search possessed 1,503 Diggs. The fifth-ranked result from that search set had just sixteen (see Table 11). The phrase "library reference" also showed a steep drop. The result with the most Diggs had 1,603, which dropped to 73 within six results. On average, 30 percent of results from each search set had zero or one Digg. Digg can help make a few library-related issues highly visible, but the majority of them will be seen by very few users through the Digg interface. Knowing this, libraries should not expend too much effort ensuring their promotional content is included in Digg.

One of Diigo's most powerful features is the ability to create what Diigo labels bookmark lists. These lists can be played back as slide shows. Bookmark lists indicate greater participation in Diigo because bookmark lists require a purposeful assembly of links that are intended to be shared as a presentation, while most bookmarks are only passively available for discovery. Because the search terms were designed to return results related to library or librarian-produced content, a high number of bookmark lists for a given search suggests an active community of Diigo users who are also library users and / or library professionals.

The Diigo searches revealed users were more likely to create bookmark lists about a topic than they were to join Diigo groups on the same subject. Searches for bookmark lists consistently returned higher numbers than searches for groups. The Diigo category searches also revealed levels of user participation. Results from a search for people indicated the basic level of participation in the service. A people result shows an account had been created, and the account

holder described her interests and / or populated her account with bookmarks. No other information could be presumed. But when a user associated an account with other users by starting or joining a group, a higher level of participation is indicated.

Discussion

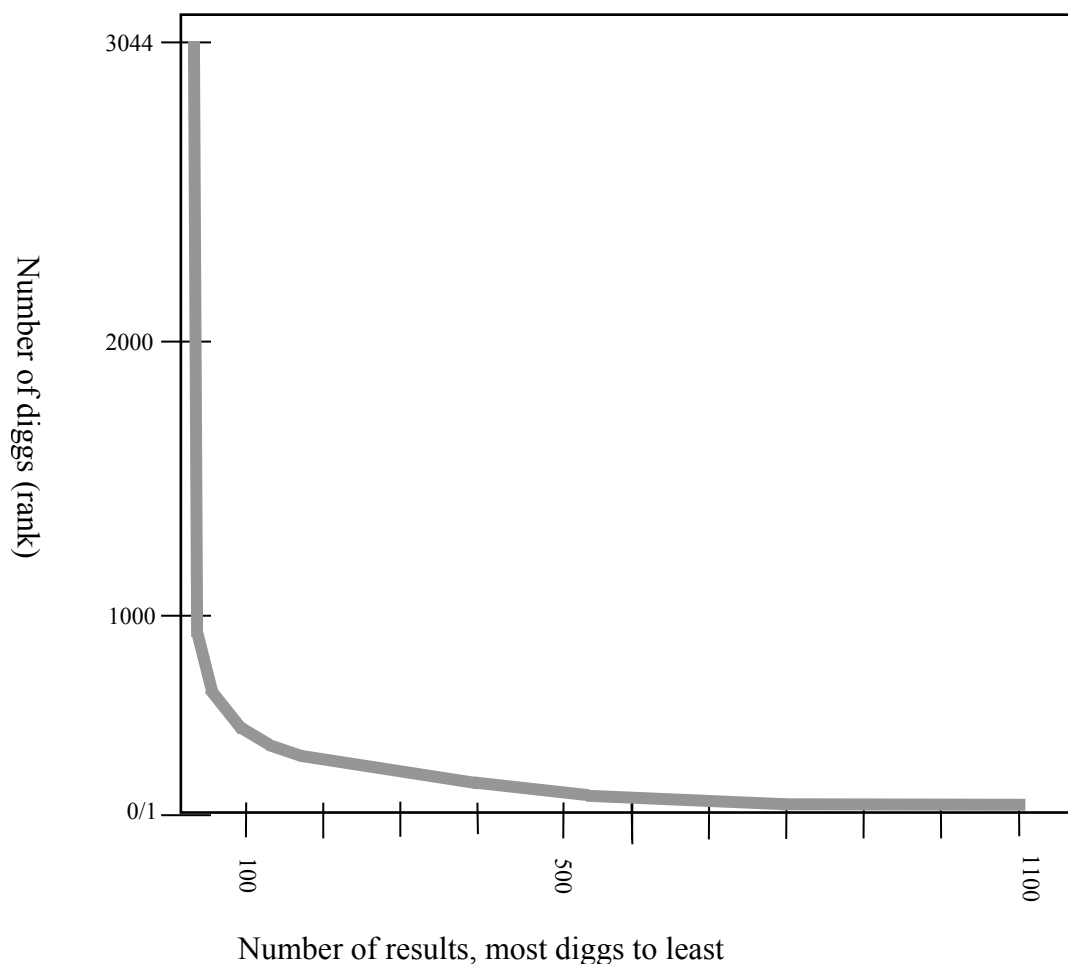
Every site in the study produced large numbers of results for the term “library.” At first glance, these numbers seem to provide evidence of a vibrant and bustling Library 2.0 community. While this might be true, the search results for that term alone do not merit this conclusion. The term “library” has an entirely different meaning to audiences other than the library community. For example, “library” is a common computer programming term. It is also a term in frequent use with music, video, or film enthusiasts referring to the devices on which their media files are stored and played.

The study was designed so a search for the term “library” would always be followed by searches for terms strongly associated with libraries. In this way, the ratio of relevant hits to the total set was much higher than if “library” had been searched as a single keyword. Additionally, since the search terms were very specific, they were not likely to refer to concepts unrelated to libraries. This means an individual who classifies a bookmark with the tag “reference librarian” intends that tag to indicate the bookmark has something to do with a reference librarian as opposed to an unrelated concept.

The chronological and ranking data shows the landscape of Library 2.0 is punctuated with high peaks that drop precipitously and level out. Results from Digg illustrate this idea: in every search, the result with the most Digg has far more than the result with the second most, which has far more than the result with the third most, and so on. Furthermore, a very high

percentage of the hits in a search have very few Diggs at all. For example, take the search for “librarian” (see Table 9). The highest number of Diggs given to any of the 1,105 “librarian” news stories was 3,044. Within eight stories, just 0.7 percent of the results, Diggs have dropped 69 percent to 951. At the low end of that search, 300 news stories (27 percent) had zero or one Digg (see Graph 1). The Technorati results also help to illustrate the topographic metaphor. At a high point in the landscape, the search results with the greatest rank — with “a lot of authority” in Technorati’s terms — represented only 2 percent of the total search set. Down in the valley, search results with the lowest rank — “a little authority” — represented 85 percent of the set.

Graph 1, Digg Curve



Some of this study's findings parallel two concepts or principles: Chris Anderson's "long tail" and the Pareto principle (the 80 / 20 rule). The steep curves produced by graphing the Digg and Technorati results resemble Anderson's concept of the "long tail" in which Internet sales of a product can be represented by a curve that peaks soon after the initial release and is followed by a steep decline (2006). The "long tail" is the succession of a low volume of sales over a long period of time. In this case, the curve is represented on the x-axis by a search set from Digg, Technorati, or Google Blog Search, and the y-axis is the ranking of each hit. The application of Anderson's idea suggests that in any search set, very few items receive the major percentage of value (Diggs or "authority"), and a great many of the items in the set receive very little value. The long tail concept has similarities to the Pareto Principle, also known as the 80 / 20 rule. It is interpreted here to mean that in a search result distribution, 80 percent of the total Diggs are received by 20 percent of the hits .

In the Google Blog Search results, the number of blogs that were updated over the course of one year dropped by a power of 100 or at times by 1000. This lack of consistency in blog posting is instructive and should serve to caution librarians designing Library 2.0 services. Policies that require consistent submission to a library blog may be necessary to avoid stagnation.

When people tag bookmarks, they engage in a social, meaning-making activity. If we apply the 80 / 20 rule to folksonomies, a small number of user-generated tags, which are intuitive and have shared meaning(s), are attached to a large percentage of the bookmarks added to the site. The greater number of unintuitive, narrowly defined, or highly idiosyncratic tags are attached to only a very few social bookmarks. Thus, while user-generated folksonomy terms

allow the possibility of association with a semantically unrelated bookmark, the practice of idiosyncratic tagging is infrequent enough as to have little impact on the results of the study.

The results suggest only a small percentage of Library 2.0 content creators are making a sustained effort. These dedicated few are diligently posting to library blogs, adding useful pages to social bookmarking sites, and making library research services more accessible and more discoverable through third-party social networks like Facebook and MySpace. But low frequency does not make the Library 2.0 movement less significant. If we assume the validity of Pareto's rule, and 80 percent of the users of Library 2.0 generate only 20 percent of its content, so be it. Librarians enable communication, increase the accessibility of information, and encourage an informed and participatory citizenry. That Library 2.0 is in use is proof enough of its legitimacy in the library's suite of information services. Just as libraries do not discard books that aren't frequently circulated, libraries should not neglect a service just because it does not serve the entire population of users.

Where the question of Library 2.0's value becomes salient is in the allocation of resources to the creation, support, and maintenance of these services. The use and practice of Library 2.0 is still relatively new. A search across librarian job listings will return frequent mentions of "Web 2.0" or a facility with "emerging technologies" as a required or preferred qualification. It is harder to find a job description that clearly defines the practices and competencies required to provide effective Library 2.0 service. Even if current levels of Library 2.0 communications are small when compared to all social networking activity, it is remarkable that library-related searches produce the maximum search results allowed in Facebook in twelve instances. As the shock of the new subsides, librarians and users alike will adapt to an online environment suffused with integral, yet invisible services that we now consider novel.

Additional Research

This study has described a rough shape to the terrain of Library 2.0, but many fruitful directions for research remain. Studies that refine the search terms would help determine which results were relevant to library services and which were not. Additional metrics need to be established in many areas. By what measure are Library 2.0 services considered successful? What aspects of library services are best enhanced by Library 2.0 functionality? Library 2.0 services are available directly from a library's Web site, but they are also integrated into publicly available social software. This study focused on the presence of libraries within public sites. Are self-hosted Library 2.0 services having a greater impact than the user participation garnered via the public social networks? Finally, in our effort to remain on the leading edge of information services, libraries are allocating personnel and financial resources to the development of Library 2.0. What is the most prudent path to take as the technology advances? It is the author's hope that continued research will contribute to this discussion.

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Appendix A: Library Literature Databases search

1. Library Literature Search Strategy

Searched using Boolean OR
"web 2.0"
"library 2.0"
"two point oh"
"social network"
blog
wiki
folksonomy
mashup
"application programming interface"
tagging

Database: Library, Information Science & Technology Abstracts (Ebsco)

year: results

2005: 462

2006: 829

2007: 1,336

2008: 1,511

2009: 1,188

Database: Library Literature Index (FirstSearch)

year: results

2005: 37

2006: 115

2007: 326

2008-4/6/2009: 461

(additional 2009 data unavailable)

Database: Library Literature and Information Science Full Text (H W Wilson)

year: results

2005: 89

2006: 185

2007: 308

2008: 459

2009: 340