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Influence, Reciprocity, Participation, and Visibility: Assessing the Social Library on Twitter

Influence, réciprocité, participation, et visibilité : Évaluation de la bibliothèque sociale sur Twitter

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Abstract: This article assesses the social profiles and online activities of 400 public libraries on Twitter to explore the changing nature of library presence online and the new Web 2.0 metrics and models that are emerging for assessing libraries in social space. The results of this study examine library activities, influence, and self-presentation practices in Twitter and provide insights into how social libraries are representing themselves and interacting with users in online microblogging environments.

Keywords: Twitter, microblogging, libraries, social media

Résumé : Cette étude évalue les profils sociaux et les activités en ligne de 400 bibliothèques publiques présentes sur Twitter, afin d'explorer les changements dans la présence en ligne des bibliothèques, les nouvelles mesures web 2.0, ainsi que les modèles émergents d'évaluation des bibliothèques dans l'espace social. Les résultats de cette étude examinent les activités des bibliothèques, l'influence et les pratiques d'auto-présentation dans Twitter, et donnent un aperçu de la façon dont les bibliothèques sociales se présentent elles-mêmes et interagissent avec les utilisateurs dans les environnements de microblogage en ligne.

Mots-clés : Twitter, microblogage, bibliothèques, médias sociaux

Introduction

The library in social space creates a new context for libraries with new ways of manifesting library presence. In launching Web 2.0 sites such as Twitter, the library creates a social “self” complete with a personal profile, biographical text, and self-images expressed in profile pictures. The library is imbued with a voice, a personality, and a social life in Twitter, conducting online activities such as saving “favourite” tweets, attracting “followers,” and sharing daily activities.

Within the social library, new ways of assessing how a library manifests itself as a social entity are emerging. In the new metrics of social spaces, a library must not only be “authoritative” in providing expert, trustworthy information

but also “influential” in attracting followers who will re-share its postings. Further, the library must support “participatory interactions” and engage in “reciprocity” with its users—not only sharing its own content with Twitter followers, but following other users on Twitter as well as re-sharing or “re-tweeting” the content of others (Solomon 2011; Mon and Phillips 2015). This study explored the social profiles and online activities of 400 public libraries on Twitter to examine how libraries present themselves and engage with users in social microblogging environments and in the new Web 2.0 assessment models and metrics that are emerging for libraries in social space.

Social Libraries and Twitter in the Literature

Twitter is a social media microblogging service that allows registered users to post a short “tweet” of up to 140 characters. These tweeted messages can consist of text messages only, or they can include links to other sources such as pictures, videos, and websites. Twitter users can also “follow” other users to receive all of their tweets and create curated “lists” of users who are of particular interest. When launching in Twitter, libraries select a user name of up to fifteen characters and create a profile page that can include personal profile images and biographical text of up to 160 characters. This Twitter username (also known as a Twitter “handle”) and biographical text become the primary means for finding the library’s Twitter persona when searching online.

Twitter users can post and read tweeted messages from Internet-connected computers, but those lacking computers can still access Twitter from mobile devices such as smartphones and tablets. In the United States, 24 percent of teen Internet users were estimated to be using Twitter as of 2012 (Madden et al. 2013; Pew Research Center 2014). Twitter also has gained in popularity among younger Black American Internet users aged eighteen to twenty-nine, of whom 40 percent are Twitter users (Smith 2014). One of the reasons suggested for Twitter’s growth in popularity among younger users is a sense of greater anonymity (Horn 2013). Unlike other social sites such as Facebook, Twitter does not require users to register using a real name.

Although Twitter launched in March 2006, little evidence existed by 2008 of the adoption of Twitter by public libraries in the United States (Lietzau 2009, Mon and Randeree 2009). However, during 2009, Twitter usage surged in the library community (Stuart 2010; del Bosque, Leif, and Skarl 2012). By 2012, 84 percent of the largest public libraries in the United States had launched Twitter sites (Wanucha and Hofschire 2013). Research by Walt Crawford (2014) found that among 5,958 US public libraries studied in thirty-eight US states, 953 libraries (about 16 percent) were on Twitter. Among the many ways that libraries experimented with using Twitter included tweeting to promote new additions to the library’s collections (Rodzvilla 2010) and to publicize library programs, services and events (Aharony 2010); to monitor information needs and provide assistance with bibliographic instruction (Filgo 2011); to monitor tweets about the library and respond with reference assistance or complaint resolution (Fichter and Wisniewski 2008), to recruit volunteer participation in library projects (Petit 2011); to gain user feedback about the library

(Cahill 2011); and to tweet examples of reference questions answered (Fields 2010) or of books being borrowed from the library (Forrestal 2011).

Research on social libraries using Twitter primarily has focused on ascertaining how many libraries are using Twitter (Mon and Randeree, 2009; Stuart 2010; del Bosque, Leif and Skarl, 2012; Wanucha and Hofschire, 2013) or on case studies of how individual libraries are using Twitter (Fields 2010; Cahill 2011; Filgo 2011; Petit 2011), but as yet there has been only limited research into other aspects of assessing Twitter activity by libraries, such as practices in completing biographical text in social profiles, activity in posting and tweeting, reciprocity in following other users, and other measures of social impact in perceived authority or influence. To date, metrics for assessing social libraries explored by researchers have included:

- *Style of tweeted messages*: Noa Aharony (2010) analyzed 1,812 tweets by fifteen US academic and 2,103 tweets by fifteen US public libraries for language formality, finding that the public library tweets generally used more informal language than the academic libraries.
- *Frequency of tweeting*: Aharony (2010) noted that the fifteen public libraries averaged 1.55 tweets posted daily, and 46.67 tweets per month. Walt Crawford (2014) found that the public libraries in his study tweeted once daily on average or about thirty tweets per month.
- *Reciprocity in following*: Crawford (2014) examined reciprocal-following behaviour for US public libraries on Twitter, finding that, overall, libraries were following about half as many users (48 percent) as were following libraries.
- *Audience and reach*: In comparing the percentage of Twitter followers to the total population in a public library's service area, Crawford (2014) observed that, on average, public libraries had attracted audiences smaller than 1 percent of the service area population (.24 percent) as Twitter followers. Robin Sewell (2013) analyzed the followers of a university library's Twitter account, discovering that fewer than half (45 percent) of the Twitter followers were actually directly affiliated with the university.

This study expands further upon these initial explorations of the new metrics for assessing social libraries, to better understand how US public libraries are building social identity and interacting with users in the microblogging environment of Twitter.

Research Questions

Although libraries increasingly are “becoming social” in launching sites such as Twitter, a key resulting challenge has been the question of how to assess a social library. To explore the new metrics for assessing social libraries on Twitter, this study asks the following research questions:

1. What are the practices of US public libraries in using Twitter's social features to engage in online social activities, such as tweeting, completing Twitter biographies, and following other users?

2. What do social activity and influence measures such as Twitter lists and Peer-Index scores reveal about the impact of Twitter activities on the audience, perceived authority, and social influence of US public libraries on Twitter?

Method

To explore how US public libraries are creating social identities online and engaging in activities and interactions within the microblogging environment of Twitter, this study examined a sample of 400 US public library Twitter accounts. Libraries in this study were selected according to the following criteria. To derive a random set of 400 US public libraries, we searched US public libraries on Twitter.com and on Google.com with search keywords “library,” “public library,” “county library,” and “city library.” From among those libraries located, we limited the sampling to US public libraries listed in the most recently available data set of the *Public Libraries Survey: Fiscal Year 2011* (Swan et al. 2013), which was made available from the Institute of Museum and Library Services (IMLS) in 2013. This data set, which was maintained by the US government, represented at the time of this study the most current available official listing of 9,233 US public library administrative entities within the fifty US states and the District of Columbia.

The sampling method was informed by findings from two prior research studies. In a study of public libraries in thirty-eight US states, Crawford (2014) noted the inability to accurately determine whether a public library was using Twitter based solely on an examination of each library’s homepage, since many libraries did not directly link to their Twitter pages. Further, there is no comprehensive directory or listing for finding all US public libraries on Twitter. He therefore used searching via Twitter, Google, and Facebook to more accurately determine the existence of 16 percent of the public library Twitter pages included in his study (85).

In addition, other prior observational research on US libraries and social media (Wanucha and Hofschire 2013) demonstrated the importance of including library-size data in terms of the size of a library’s population service area, since findings revealed different rates of Twitter adoption by public libraries of different sizes. The inclusion of population size data from the most recent edition of the *Public Libraries Survey: Fiscal Year 2011* (Swan et al. 2013) provides a criterion for assessing the extent to which this study’s sample is representative of US public libraries of all sizes, and three prior studies of social media in US public libraries have used the library size data from the IMLS public libraries survey in their study designs (Lietzau 2009; Lietzau and Helgren 2011; Wanucha and Hofschire 2013). It should be noted that one limitation is that size data for population of a US public library’s legal service area is only publicly available at the administrative entity level (such as a county library system or a city library system) rather than for an individual branch library or book-mobile.

Figure 1 shows the US public libraries in this study grouped by population size served, from the smallest libraries with a geographic service area of under 10,000 users to the largest libraries serving populations of 500,000 or more.

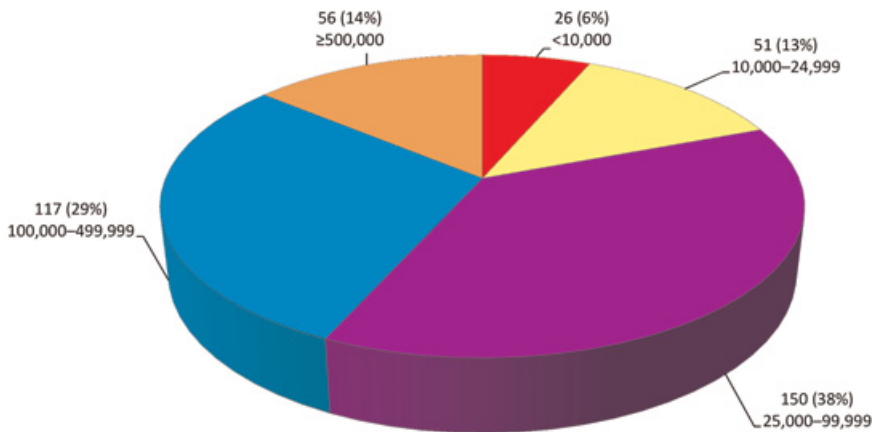


Figure 1: US public libraries by population size

Table 1: US public libraries on Twitter by state, 2014

AK	2	IA	6	MI	21	NV	2	TX	22
AL	5	ID	3	MN	7	NY	18	UT	4
AR	2	IL	32	MO	8	OH	17	VA	13
AZ	8	IN	10	MT	2	OK	4	VT	2
CA	27	KS	7	NC	7	OR	8	WA	7
CO	10	KY	8	ND	1	PA	17	WI	13
CT	11	LA	4	NE	5	RI	2	WV	1
DC	1	MA	19	NH	6	SC	5	WY	2
FL	8	MD	9	NJ	12	SD	2		
GA	5	ME	5	NM	3	TN	7	N =	400

Altogether, 227 (56.8 percent) of the US public libraries in this data set were serving populations smaller than 100,000, and 173 libraries (43.2 percent) were serving populations of 100,000 or larger. The 400 US public libraries with a presence on Twitter in this study represented forty-seven of the fifty US states and the District of Columbia, as seen in table 1.

US Public Libraries on Twitter by State, 2014

To examine library social self-representation and activities on Twitter, each library's Twitter profile was downloaded during the week of 28–31 May 2014 using Nvivo 10 qualitative analysis software and integrating the NCapture feature for importing social media data. The social library data analyzed in this study included:

- *biography text* (maximum of 160 characters used in Twitter profiles, as a social measure of the visibility to users searching for the library's Twitter self-representation);
- *followers* (Twitter users choosing to follow the library, a social measure of the library's audience and potential reach);

- *following* (users that the library chooses to follow on Twitter, a social measure of the library's reciprocity toward other Twitter users);
- *total tweets* (tweets by the library since joining Twitter, a social measure of the library's activity on Twitter, based on a target date of 27 May 2014);
- *joining date* (the year that the library launched in Twitter, a measure relevant to assessing the library's activity on Twitter); and
- *lists* (the library's appearances on lists created by other Twitter users, a social measure of the library's influence and perceived authority).

We also included data on:

- *library size* (the total number of people living in the geographic area served by the library); and
- *PeerIndex scores* (a score from one to 100 used to assess influence in social media).

The library size statistics were downloaded for each library from the most recent available IMLS *Public Libraries Survey: Fiscal Year 2011* in which the statistics of the population of the library's legal service area is described as "the number of people in the geographic area for which a public library has been established and from which (or on behalf of which) the library derives revenue" (Swan et al., 2013).

The PeerIndex influence scores for the libraries were downloaded during the week of 18–21 May 2014 using PeerIndex's PIQ tool (<http://blog.peerindex.com/author/peerindex/>) and SocialBro (<http://www.socialbro.com/>), a social assessment site for Twitter that provided integrated PeerIndex scores (Polese 2012). PeerIndex algorithms assessed influence by assigning scores to Twitter users on a scale of one to 100, with 100 representing a highly influential social user. PeerIndex has been used by researchers in exploratory studies of social media influence (del Campo-Avila, Moreno-Vergara and Trella-Lopez 2013; Nguyen and Zheng 2013).

To examine library activity on Twitter, we used SPSS statistical analysis software to compute Spearman's rho correlation analysis in exploring these social activity, audience, reciprocity, and influence variables. Spearman's rho is a correlation coefficient used to assess the strength and direction of relationships between two variables and is appropriate for use with data that are skewed rather than normally distributed (Muskaka 2012) as well as for use with both ordinal and interval data.

Findings

This study explored the activities of US public libraries on Twitter by examining new metrics for assessing social libraries. In examining library self-representations, activity in completing biography text fields, and activity in examining Twitter activities was assessed, and the study reviewed new social metrics for libraries of visibility, participatory activity and reciprocity, audience, and influence.

Table 2: US public libraries by year of joining Twitter and service area population

Year joined	<10,000	10,000–24,999	25,000–99,999	100,000–499,999	>= 500,000	Total
2007	2 (7.7%)	3 (5.9%)	4 (2.7%)	1 (0.9%)	2 (3.6%)	12 (3.0%)
2008	0 (0%)	7 (13.7%)	17 (11.3%)	9 (7.7%)	16 (28.6%)	49 (12.3%)
2009	11 (42.3%)	25 (49.0%)	77 (51.3%)	68 (58.1%)	27 (48.2%)	208 (52.0%)
2010	3 (11.5%)	6 (11.8%)	24 (16.0%)	18 (15.4%)	11 (19.6%)	62 (15.5%)
2011	6 (23.1%)	5 (9.8%)	14 (9.3%)	12 (10.3%)	0 (0%)	37 (9.3%)
2012	3 (11.5%)	4 (7.8%)	8 (5.3%)	6 (5.1%)	0 (0%)	21 (5.3%)
2013	1 (3.8%)	1 (2.0%)	5 (3.3%)	3 (2.6%)	0 (0%)	10 (2.5%)
2014	0 (0%)	0 (0%)	1 (0.7%)	0 (0%)	0 (0%)	1 (0.3%)
Total	26 (100%)	51 (100%)	150 (100%)	117 (100%)	56 (100%)	400 (100%)

Self-Representation and Visibility

Libraries present a social “self” on Twitter by creating a personal profile that includes self-representation via a biographical text field. This biography field provides key textual content searched by users seeking to find the library’s Twitter self-representation in social space. Twitter user names or “handles” are limited to fifteen characters. However, because Twitter biographies allow libraries to add 160 characters of additional self-representative text, the biography text field not only presents a social self but also becomes a key aspect of searching and finding the library’s Twitter profile, thus increasing the library’s social visibility. Among the 400 Twitter libraries in this study, 374 libraries (94 percent) provided at least some textual content in their Twitter biography field. However, twenty-six libraries (6 percent) left their biography fields entirely blank. On average, libraries entered ninety characters of biographical text (including spaces, using a little more than half (56.2 percent) of the available space. Only 47 percent ($n = 186$) of the public libraries typed 100 characters or more into their Twitter text biographies.

Activity

The participation of social libraries on Twitter encompasses a variety of activities, from launching a Twitter page to tweeting a message. In examining the launching activity of the libraries on Twitter, we found that more than half of the libraries in this study had joined and launched their Twitter sites during 2009, mirroring the 2009 surge in library Twitter adoptions observed in other studies (Stuart 2010; del Bosque, Leif and Skarl 2012). By the end of 2009, 67 percent of the libraries in this study ($n = 269$) had already established their Twitter sites. For libraries of all sizes, the largest number of Twitter launches occurred during 2009, as seen in table 2.

US Public Libraries by Year of Joining Twitter and Service Area Population

A tendency for the largest US public libraries to be earlier adopters is also seen here, as all of the largest libraries in this study serving populations of 500,000 or

more were using Twitter by 2010. However, libraries of all sizes were counted among the earliest Twitter adopters in 2007, including two of the smallest libraries with service area populations of fewer than 10,000. The major activity for libraries on Twitter revolves around posting messages or “tweeting.” In assessing a social library, the total tweets that the library has posted since launching in Twitter represent a key indicator of the library’s activity level. On average, libraries in this study had tweeted 2,532 messages. The most active library had posted 23,670 tweets since its launch, while the smallest number of tweets observed was forty-one. Overall, 94 percent of the libraries in this study ($n = 377$) had posted over 300 tweets.

Two questions relevant to Twitter activity concern (1) whether the larger libraries serving larger populations of users would tend to be more active on Twitter than the smaller libraries, thus amassing a larger total number of total tweets and (2) whether libraries that joined Twitter more recently would have fewer total tweets. We examined whether a relationship existed between a library’s population size and a library’s total tweets using a Spearman’s correlation analysis, finding a significant but only moderately correlated positive relationship ($r_s = .44$, $n = 400$, $p < .001$). A Spearman’s correlation analysis on a library’s total tweets and the year that the library launched in Twitter revealed a negative correlation that was significant but weak ($r_s = -.388$, $n = 400$, $p < .001$).

Audience

For social libraries, audience is a key consideration in assessing successful engagement on Twitter. The primary metric for assessing audience on Twitter is the number of followers. A Twitter user who “follows” the social library receives all of the library’s tweets within the daily stream of tweeted updates. The social library on Twitter seeks to attract more followers to increase the audience receiving tweeted messages. On average, the 400 US public libraries in this study had 1,587 Twitter followers, with nine followers being the smallest following observed for an individual library’s Twitter page, and 14,505 followers representing the largest Twitter audience. The majority of the libraries in this study (75.8 percent, $n = 303$) had attracted 300 or more followers on Twitter.

In addition to receiving the library’s tweeted messages, the library’s Twitter followers can choose to amplify a social library’s audience and reach through their willingness to engage in social sharing by re-tweeting the library’s messages to their own followers. A Twitter follower who re-tweets the library’s message not only augments the library’s chances of being seen by the library’s current Twitter followers with a second exposure of the message, but also extends the reach of the message beyond the library’s current followers to an expanded audience of the “followers of followers,” therefore potentially gaining the library an opportunity to attract new followers. In this sense, a social audience does not only serve as a passive recipient for a library’s messaging but also plays an active role in growing and expanding the library’s audience and reach.

For libraries seeking to build a Twitter audience, active and frequent tweeting has been advised to be optimal for building a following in the research literature

(Zarrella 2013). We conducted a Spearman's correlation analysis to examine whether in fact an association existed between the total number of tweets by libraries in this study and the size of the library's audience of followers on Twitter. Results found a significant strong positive correlation between the library's total tweets and the library's total number of followers ($r_s = .67$, $n = 400$, $p < .001$).

Reciprocity

One aspect of social reciprocity enabled by Twitter affordances allows social libraries to "return the favour" by following other users in return for having been followed (also known as "following back"). However, Twitter is structured so that this reciprocity is not a requirement in the same way that it is on other social sites such as Facebook, which danah boyd (2009) refers to as Twitter's support for directionality in its social graph—that is, relationships on Twitter can be "one-way," with one person following another who does not follow back, instead of always being required to be mutual, as when both users must mutually agree to be friends on Facebook. We examined the social reciprocity of the public libraries in this study by assessing the extent to which they chose to voluntarily "follow" other users on Twitter.

On average, the 400 US public libraries on Twitter were followed by 1,587 Twitter users, but the libraries themselves were following an average of 554 users, or about one-third the number of users who followed them. The library that followed the largest number of Twitter users had 9,512 followers and was in turn following 7,709 users. However, about 30 percent of the libraries ($n = 119$) followed fewer than 100 other Twitter users, and seven libraries did not follow any other Twitter users. The thirty libraries that followed ten or fewer other Twitter users averaged 290 followers, and twenty-four of these thirty libraries had more than 100 followers. The library with the largest follower audience among these thirty libraries had 780 followers but did not follow any other Twitter users. In contrast, about 11 percent of all public libraries in this study ($n = 43$) followed larger numbers of other users on Twitter than the size of the Twitter audience following them.

In the library literature, engaging in reciprocity by "following back" one's followers is a commonly suggested strategy for increasing social site audiences (Solomon 2011, 33). We used correlation analysis with Spearman's rho to determine whether a relationship existed between the libraries following other Twitter users and the size of the library's own audience of followers. Results found a statistically significant strong positive association between the size of the library's audience of Twitter followers and the number of Twitter users the library was following ($r_s = .69$, $n = 400$, $p < .001$).

Authority and Influence

A challenging aspect of assessing libraries in a social space is the question of what measures can be used in gauging authority and influence. A Twitter feature often mentioned in the context of assessing authority or influence is

Twitter lists. Twitter users can create lists of users that they especially wish to track, beyond just following them. An implication suggested by the act of placing a user on a particular list is the perception of influence or authority—the notion that the person placed on a list, beyond being merely someone to be followed, is particularly valued for their contributions on Twitter, perhaps for occupying a special area of expertise. On average, libraries appeared on ninety-one Twitter lists, and the “most-listed” social library in this study appeared on 768 Twitter lists. Six libraries did not appear on any Twitter lists.

Since appearances on Twitter lists have been considered suggestive of influence and authority, we used a Spearman’s correlation analysis to examine relationships between a library’s total number of appearances on Twitter lists and other aspects of the library’s Twitter activity—for example, whether the library’s total number of followers, total number of tweets, total number of other Twitter users followed, or date of joining Twitter might be associated with the total number of appearances on Twitter lists. We found significant correlations for all of these possible relationships, but with variations in the strength and direction of the relationships. The strongest positive relationship was a very strong association between the number of library followers and the library’s appearances on Twitter lists ($r_s = .95$, $n = 400$, $p < .001$). Total tweets had a strong positive relationship with appearance on Twitter lists ($r_s = .65$, $n = 400$, $p < .001$), and there was also a strong positive relationship between the number of other Twitter users that a library was following and library appearances on Twitter lists ($r_s = .629$, $n = 400$, $p < .001$). The year that the library launched in Twitter, on the other hand, was strongly negatively correlated with appearances on Twitter lists ($r_s = -.62$, $n = 400$, $p < .001$), which favours those libraries launching earlier in Twitter.

Efforts to assess who is “influential” in the social sphere have become a matter of both keen interest and competition, and third party developers have leveraged Twitter’s features in creating proprietary algorithms for influence measurement tools such as PeerIndex, a third party proprietary influence assessment tool that has been widely used in calculating social influence scores for Twitter users. To further explore how libraries are assessed for influence on the social Web, we used PeerIndex to obtain “influence scores” for the 400 US public libraries in this study.

Since the algorithms involved are proprietary, full details of how PeerIndex scores are calculated are not publicly available. However, PeerIndex has been used in prior Twitter research studies (Quercia et al. 2012; Nguyen and Zheng 2013), and researchers such as Jose del Campo-Avila, Natalia Moreno-Vergara, and Monica Trella-Lopez (2013, 438–39) listed PeerIndex’s key metrics, including user’s authority and topic resonance, as an indicator of the subjects on which a user was influential and audience response to all postings; user’s activity in the amount of postings about topics; and user’s “realness” in terms of activities, in indicating whether the Twitter user was a real person rather than an automated feed or “spambot” since some Twitter users actually have been found to be computer programs designed to automatically tweet or retweet content. To

Table 3: Libraries by populations served and PeerIndex score ranking

Libraries by populations served	PeerIndex score rankings			Total
	Power users 50–79	Active users 30–49	Casual users <30	
> = 100,000	32	110	31	173
< = 99,999	1	121	105	227
Total	33	231	136	400

examine the PeerIndex influence scores of social libraries, we used a set of four groupings reflecting the “influence bands” (Sawers, 2014) into which PeerIndex score rankings are organized: less than 30 for casual users; 30–49 for active users; 50–79 for power users; and 80 or higher for celebrities (see table 3).

Libraries by Populations Served and PeerIndex Score Rankings

None of the libraries in this study achieved a “celebrity” influence score of over eighty or higher on PeerIndex, but thirty-three libraries scored in the “power user” range of between fifty and seventy-nine. When we grouped the libraries by size into two groups reflecting libraries that served populations of fewer than 100,000 and libraries serving populations equalling 100,000 or higher, we found that the most influential libraries according to PeerIndex scores primarily were concentrated among the libraries serving larger populations, though not exclusively—one of the smaller libraries had also successfully achieved a Power User PeerIndex influence ranking, and many smaller libraries were ranked at the next highest level of “active users.”

When we examined the year that the library joined Twitter in connection with PeerIndex scores, it was evident that all of the libraries achieving “power user” status had been early Twitter adopters. All “power user” libraries earning PeerIndex influence scores of fifty or above had launched their Twitter social sites before 2011. Further, the “casual users” with the lowest scores (below thirty) included all of the libraries in the study that had joined Twitter most recently, in 2013 and 2014 (see table 4).

Table 4: Date of joining Twitter and PeerIndex score rankings

	PeerIndex Rank			Total
	Power users 50–79	Active users 30–49	Casual users <30	
2007	1	10	1	12
2008	13	35	1	49
2009	15	135	58	208
2010	4	34	24	62
2011	0	11	26	37
2012	0	6	15	21
2013	0	0	10	10
2014	0	0	1	1
Total	33	231	136	400

Libraries by Date Joined and PeerIndex Score Rankings

In using Spearman's rho correlation coefficients to explore the relationships between PeerIndex scores for the libraries and other library activities on Twitter, our study found significant and very strong significant positive correlations for PeerIndex scores associated with the library's followers ($r_s = .936$, $n = 400$, $p < .001$) and for PeerIndex scores associated with the library's appearances on Twitter lists ($r_s = .912$, $n = 400$, $p < .001$) as well as a strong positive correlation for PeerIndex scores with the total tweets by the library ($r_s = .664$, $n = 400$, $p < .001$). However, the PeerIndex score had only a moderate positive correlation with the size of the library's population service area ($r_s = .572$, $n = 400$, $p < .001$) and a moderate negative correlation with the library's year of launching in Twitter ($r_s = -.486$, $n = 400$, $p < .001$) (see table 5).

Discussion and Conclusions

This study explored the new key metrics emerging for assessing social libraries on Twitter in terms of visibility and self-representation, reciprocity, audience, activity, and influence. In the area of visibility, we found that libraries often failed to completely utilize the available space in their Twitter social profile biography fields. Other Twitter research has suggested that highly followed Twitter profiles typically include a filled-out biography (Zarella 2013). Our results found that 6 percent of the libraries left their biography fields entirely blank, and although the biography field allows 160 characters of space, only 47 percent of the social libraries typed 100 characters or more into their Twitter text biographies.

We looked at the behaviour of reciprocity on Twitter in examining whether social libraries chose to reciprocate being followed on Twitter with a willingness to follow other Twitter users. Results from calculating Spearman's rho correlation coefficients indicated that a significant strong positive relationship between reciprocity in following behaviour and audience—that is, the extent to which the social library was followed on Twitter showed a strong and significant correlation with the extent to which the library followed other users on Twitter ($r_s = .694$, $n = 400$, $p < .001$.) It should be noted that since the social reciprocity behaviour of following back other users is voluntary rather than required, researchers have observed low levels of reciprocity on Twitter in that most Twitter users do not follow the same people who are following them (Kwak et al. 2010).

Automatically extending a courtesy of following back other users can also be disincentivized because large-scale reciprocal following “clutters” one's Twitter feed with many potentially unwanted messages, thus rendering the feed less useful as an information-gathering tool. Further, among younger users on Twitter, status issues may come into play in discouraging reciprocal following. Laura Horn (2013, 60) quotes a comment from a teenager about Twitter that “*if you follow more people than follow you, you aren't cool.*”

In examining the library's perceived influence and authority within the social space, as reflected in users placing the library on Twitter lists, we found a significant and very strong positive correlation between libraries being placed on

Table 5: Correlations

Spearman's rho		Total tweets	Population size	Joined	Followers	Following	Lists	Biography	PeerIndex
Total tweets	Correlation coefficient	1.000	.440**	-.388**	.672**	.576**	.653**	.140**	.664**
	Sig. (two-tailed)	—	.000	.000	.000	.000	.000	.005	.000
	N	400	400	400	400	400	400	400	400
Population size	Correlation coefficient	.440**	1.000	-.142**	.567**	.378**	.477**	.121*	.572**
	Sig. (two-tailed)	.000	—	.005	.000	.000	.000	.016	.000
	N	400	400	400	400	400	400	400	400
Joined	Correlation coefficient	-.388**	-.142**	1.000	-.525**	-.257**	-.620**	.105*	-.486**
	Sig. (two-tailed)	.000	.005	—	.000	.000	.000	.035	.000
	N	400	400	400	400	400	400	400	400
Followers	Correlation coefficient	.672**	.567**	-.525**	1.000	.694**	.952**	.131**	.936**
	Sig. (two-tailed)	.000	.000	.000	—	.000	.000	.009	.000
	N	400	400	400	400	400	400	400	400
Following	Correlation coefficient	.576**	.378**	-.257**	.694**	1.000	.629**	.180**	.649**
	Sig. (two-tailed)	.000	.000	.000	.000	—	.000	.000	.000
	N	400	400	400	400	400	400	400	400
Lists	Correlation coefficient	.653**	.477**	-.620**	.952**	.629**	1.000	.097	.912**
	Sig. (two-tailed)	.000	.000	.000	.000	.000	—	.054	.000
	N	400	400	400	400	400	400	400	400
Biography	Correlation coefficient	.140**	.121*	.105*	.131**	.180**	.097	1.000	.140**
	Sig. (two-tailed)	.005	.016	.035	.009	.000	.054	—	.005
	N	400	400	400	400	400	400	400	400
PeerIndex	Correlation coefficient	.664**	.572**	-.486**	.936**	.649**	.912**	.140**	1.000
	Sig. (two-tailed)	.000	.000	.000	.000	.000	.000	.005	—
	N	400	400	400	400	400	400	400	400

Notes:

* Correlation is significant at the 0.05 level (two-tailed).

** Correlation is significant at the 0.01 level (two-tailed).

lists and the total number of library Twitter followers—that is, there appears to be a very strong relationship between the social library attracting followers on Twitter and appearing on lists created by Twitter users ($rs = .952$, $n = 400$, $p < .001$). Tweeting activity also showed a significant strong positive relationship with Twitter listings since higher numbers of total tweets for social libraries correlated strongly with more appearances on Twitter lists ($rs = .653$, $n = 400$, $p < .001$).

Results of this study provide insights into the new realities for libraries in social space in self-presentation, visibility, activity, and influence and the new ways that libraries are establishing their presence and interacting with users in Web 2.0 settings. The findings also highlight challenges for libraries in establishing evidence-based best practices for creating social sites and engaging with users in ways that will best strengthen their connections and interactions with users in social spaces.

References

- Aharony, Noa. 2010. "Twitter Use in Libraries: An Exploratory Analysis." *Journal of Web Librarianship* 4 (4): 333–50. <http://dx.doi.org/10.5120/ijais14-451115>.
- boyd, danah. 2009. "Some Thoughts on Twitter vs. Facebook Status Updates." *Apophenia*. http://www.zephoria.org/thoughts/archives/2009/10/25/some_thoughts_o-3.html (accessed 24 August 2015).
- Cahill, Kay. 2011. "Going Social at Vancouver Public Library: What the Virtual Branch Did Next." *Program: Electronic Library and Information Systems* 45 (3): 259–78. <http://dx.doi.org/10.1108/00330331111151584>.
- Crawford, Walt. 2014. *Successful Social Networking in Public Libraries*. Chicago: ALA Editions.
- del Bosque, Darcy, Sam A. Leif, and Susie Skarl. 2012. "Libraries Atwitter: Trends in Academic Library Tweeting." *Reference Services Review* 40 (2): 199–213. <http://dx.doi.org/10.1108/00907321211228246>.
- del Campo-Ávila, Jose, Natalia Moreno-Vergara, and Monica Trella-Lopez. 2013. "Bridging the Gap between the Least and the Most Influential Twitter Users." *Procedia Computer Science* 19: 437–44. <http://dx.doi.org/10.1016/j.procs.2013.06.059>.
- Fichter, Darlene, and Jeff Wisniewski. 2008. "Social Media Metrics: Making the Case for Making the Effort." *Online (Bergheim)* 32 (6): 54–57.
- Fields, Erin. 2010. "A Unique Twitter Use for Reference Services." *Library Hi Tech News* 27 (6/7): 14–15. <http://dx.doi.org/10.1108/07419051011095863>.
- Filgo, Ellen Hampton. 2011. "# Hashtag Librarian: Embedding Myself into a Class via Twitter and Blogs." *Computers in Libraries* 31 (6): 78–80.
- Forrestal, Valerie. 2011. "Making Twitter Work: A Guide for the Uninitiated, the Skeptical, and the Pragmatic." *Reference Librarian* 52 (1/2): 146–51. <http://dx.doi.org/10.1080/02763877.2011.527607>.
- Horn, Laura. 2013. "Beyond the Teen Space: Reaching Teens through Social Media." In *Using Social Media in Libraries: Best Practices*, eds. Charles Harmon and Michael Messina, 53–64. Plymouth, UK: Scarecrow Press.
- Kwak, Haewoon, Changhyun Lee, Hosung Park, and Sue Moon. 2010. "What Is Twitter, a Social Network or a News Media?" *Proceedings of the Nineteenth International Conference on World Wide Web*, Raleigh, NC, 591–600. <http://dx.doi.org/10.1145/1772690.1772751>.

- Lietzau, Zeth. 2009. *U.S. Public Libraries and the Use of Web Technologies (Closer Look Report)*. Denver, CO: Colorado State Library, Library Research Service. http://www.lrs.org/documents/closer_look/WebTech_2008_Closer_Look.pdf (accessed 24 August 2015).
- Lietzau, Zeth, and Jamie Helgren. 2011. *U.S. Public Libraries and the Use of Web Technologies, 2010. (Closer Look Report)*. Denver, CO: Colorado State Library, Library Research Service. http://www.webjunction.org/content/dam/WebJunction/Documents/webjunction/WebTech2010_CloserLookReport_FinalRev.pdf (accessed 24 August 2015).
- Madden, Mary, Amanda Lenhart, Maeve Duggan, Sandra Cortesi, and Urs Gasser. 2013. "Teens and Technology." *Pew Research Center's Internet and American Life Project*, 13 March. <http://www.pewinternet.org/2013/03/13/teens-and-technology-2013/> (accessed 24 August 2015).
- Mon, Lorri, and Abigail Phillips. 2015. "The Social Library in the Virtual Branch: Serving Adults and Teens in Social Spaces." *Advances in Librarianship* 39: 241–68. <http://dx.doi.org/10.1108/S0065-283020150000039016>.
- Mon, Lorri, and Ebrahim Randeree. 2009. "On the Boundaries of Reference Services: Questioning and Library 2.0." *Journal of Education for Library and Information Science* 50 (3): 164–75.
- Mukaka, Mavuto. 2012. "A Guide to Appropriate Use of Correlation Coefficient in Medical Research." *Malawi Medical Journal* 24 (3): 69–71.
- Nguyen, Huy, and Rong Zheng. 2013. "A Data-Driven Study of Influences in Twitter Communities." <http://arxiv.org/pdf/1307.4264.pdf> (accessed 24 August 2015).
- Petit, Joan. 2011. "Twitter and Facebook for User Collection Requests." *Collection Management* 36 (4): 253–58. <http://dx.doi.org/10.1080/01462679.2011.605830>.
- Pew Research Center. 2014. "Teens Fact Sheet." <http://www.pewinternet.org/fact-sheets/teens-fact-sheet/> (accessed 24 August 2015).
- Polese, Leticia. 2012. "SocialBro.PeerIndex, SocialBro's New Influence Criteria." <http://blog.peerindex.com/peerindex-socialbros-new-influence-criteria/> (accessed 24 August 2015).
- Quercia, Daniele, Jonathan Ellis, Licia Capra, and Jon Crowcroft. 2012. "Tracking Gross Community Happiness from Tweets." *Proceedings of the CSCW 2012*, Seattle, Washington, 11–15 February. 965–68. <http://128.232.0.20/research/srg/netos/papers/p965-quercia.pdf> (accessed 24 August 2015).
- Rodzvilla, John. 2010. "New Title Tweets: Using Twitter and Microsoft Excel to Broadcast New Title Lists." *Computers in Libraries* 30 (5): 26–30.
- Sawers, Paul. 2014. "With PiQ, PeerIndex Wants to Help Marketers Make Sense of Twitter." *The Next Web*. <http://thenextweb.com/socialmedia/2014/04/16/piq-peerindexs-new-dashboard-helps-marketers-make-sense-twitter/> (accessed 24 August 2015).
- Sewell, Robin R. 2013. "Who Is Following Us? Data Mining a Library's Twitter Followers." *Library Hi Tech* 31 (1): 160–70. <http://dx.doi.org/10.1108/07378831311303994>.
- Smith, Aaron. 2014. "African Americans and Technology Use: A Demographic Portrait." <http://www.pewinternet.org/2014/01/06/african-americans-and-technology-use/> (accessed 24 August 2015).
- Solomon, L. 2011. *Doing Social Media So It Matters: A Librarian's Guide*. Chicago, IL: American Library Association.
- Stuart, David. 2010. "What Are Libraries Doing on Twitter?" *Online (Bergheim)* 34 (1): 45–47.

- Swan, Deanne W., Justin Grimes, Timothy Owens, Kim A. Miller, J. Andrea Arroyo, Terry Craig, Suzanne Dorinski, Michael Freeman, Natasha Isaac, Patricia O'Shea. 2013. *Data File Documentation: Public Libraries Survey: Fiscal Year 2011 (IMLS-2013-PLS-02)*. Washington, DC: Institute of Museum and Library Services. http://www.ims.gov/assets/1/AssetManager/fy2011_pls_data_file_documentation.pdf. (accessed 24 August 2015).
- Wanucha, Meghan, and Linda Hofschire. 2013. *U.S. Public Libraries and the Use of Web Technologies, 2012 (Closer Look Report)*. Denver, CO: Colorado State Library, Library Research Service. http://www.lrs.org/wp-content/uploads/2013/11/WebTech2012_CloserLook.pdf (accessed 24 August 2015).
- Zarella, Dan. 2013. *The Science of Marketing: When to Tweet, What to Post, How to Blog, and Other Proven Strategies*. Hoboken: John Wiley and Sons.