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Library marketing via social media: The relationships between Facebook content and user engagement in public libraries

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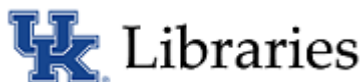
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Library marketing via social media

The relationships between Facebook content and user engagement in public libraries

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Abstract

Purpose – The purpose of this paper is twofold: to explore what kinds of social media content public libraries create to communicate with users online, and to examine the relationships between social media content types and corresponding levels of user engagement.

Design/methodology/approach – The sample comprises 4,637 Facebook posts collected from 151 public libraries across the USA. The authors identified ten types of Facebook posts based on the open coding, and calculated the degrees of user engagement for each type of Facebook post, represented by the numbers of likes, shares and comments. Also, The authors examined the effects of the inclusions of images or video clips on user engagement.

Findings – The authors observed that the most frequent type of post was related to announcing upcoming events held in libraries. This study also found that posts about community news or emotionally inspiring messages elicited much engagement from users. Posts having an image or images tend to receive more user engagement.

Practical implications – Based on the findings of this study, the authors discussed practical strategies for public libraries to effectively use social media to better facilitate user engagement.

Originality/value – This study is one of a few attempts that examine the relationships between the types of social media content and the degrees of user engagement in public library environments. Also, the authors have proposed a coding scheme useful to analyze social media content in the context of public libraries.

Keywords Online marketing, Social media, Public library, Social media marketing, User engagement

Paper type Research paper

Introduction

Social media has emerged as a popular marketing tool for public libraries; enabling them to reach out and communicate with users online. Carr and Hayes (2015, p. 50) define social media as “internet-based channels that allow users to opportunistically interact and selectively self-present, either in real-time or asynchronously, with both broad and narrow audiences who derive value from user-generated content and the perception of interaction with others.” Social media enables users to create their own profiles and make connections with others online, as well as allowing them to contribute and share content and commentary on online networks (Boyd and Ellison, 2007; Steiner, 2012). Social media, which is often equipped with various functions to share messages easily to a wider network of

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online users, can serve as a compelling marketing tool at a low cost. Social media enables libraries to efficiently promote their services, programming and events online to their communities, and eventually to create a sense of community amongst users (Charnigo and Barnett-Ellis, 2007; Hendrix *et al.*, 2009; De Rosa *et al.*, 2007).

Among different platforms of social media available nowadays, Facebook has become one of the most popular social media channels for public libraries, and it is likely that a large portion of library patrons already have a Facebook account (Dryden, 2014; Tomlin, 2014). According to the recent survey by Greenwood *et al.* (2016), Facebook continues to be the most popular social media platform, and nearly 79 percent of internet users in the USA use Facebook. Facebook is also one of the most heavily used social media platforms in library communities (Xie and Stevenson, 2014). The strength of Facebook as a marketing tool lies in that it allows users to connect with others by simply uploading posts, and to easily respond to others' posts through liking, sharing and commenting.

Recognizing the potential benefits of using social media in library marketing, researchers have investigated different aspects of social media use in public libraries. In particular, analyzing the content of social media has emerged as an important focus of research inquiry to offer insights that may help public librarians harness the effectiveness of social media marketing. Extant literature has identified various types of information posted on library social media based on content analysis (e.g. Chen *et al.*, 2012, Aharony, 2012). In addition, several researchers have explored the best practices for effective deployment and use of social media in public libraries (e.g. Cahill, 2011; Steiner, 2012; Tomlin, 2014). However, little is known about the relationships between social media content and user engagement in public library environments.

Given the utility of social media as an effective platform for community engagement, the primary objectives of this study are twofold: to examine how public librarians utilize social media (i.e. Facebook pages) to facilitate user engagement and identify social media content that drives high levels of user engagement. To that end, this study analyzes a total of 4,637 Facebook posts from public libraries. We construct a coding scheme tailored to the public library context in an attempt to better understand the unique nature of Facebook content generated by libraries. Using the coding scheme, we investigate which types of Facebook content are most or least frequently generated by public libraries. More importantly, we attempt to reveal the relationships between Facebook post types and user engagement. This study is one of a few that examine the patterns of user engagement for different types of Facebook posts in public libraries. Practical implications for effective social media use are discussed based on the findings of the study.

Literature review

As social media has emerged as a key channel to communicate with patrons, library science researchers have paid much attention to social media use in libraries. Prior literature has investigated different aspects of social media use in public libraries, such as social media content, perceptions of stakeholders and strategies for effective social media use.

There have been several efforts that researchers analyzed types of social media content created by libraries. For example, Chen *et al.* (2012) analyzed five months of social media data, including Facebook and Twitter, collected from both public libraries and academic libraries. From their analysis, four types of interactions in library social media were identified: knowledge sharing, information dissemination, communication and knowledge gathering. Facebook was effective in knowledge sharing while Twitter was an efficient tool to facilitate communication. They also found that academic library patrons were more likely to engage in social media to communicate with librarians, while public library patrons used social media more for knowledge sharing. As part of her study, Aharony (2010) conducted a comparative content analysis of tweets produced by 15 public and 15 academic libraries,

and indicated that the two types of libraries exhibit differences regarding the content of their tweets. For example, public libraries mainly use the platform to promote their events with more informal language. These studies focused on the comparison between public libraries and academic libraries. Researchers also tried to analyze the content of social media messages and categorize them to understand how social media is used in library environments. Al-Daihani and AlAwadhi (2015), by analyzing the content of tweets from 17 academic libraries, presented a framework classifying the tweets into four main categories: news and announcements, library collection, library services and technology, along with several sub-categories within them. Al-Daihani and AlAwadhi's (2015) categories served as a content analysis scheme in the analysis of Twitter messages in the academic library environment. Madge and Coserea (2014) analyzed three public library cases, and suggested that Facebook could be used as an intense marketing tool for advertisement of library services, as well as cultural and educational activities. They also emphasized the function of Facebook as a means of sharing diverse events in which people of all ages can engage. Aharony (2012) explored Facebook use in libraries, and defined its role as a tool for marketing activities. The study pointed out the limited use of advanced features and functions when libraries used Facebook; libraries used social media simply as a means to deliver news and information to their patrons, rather than as a venue for interactive, engaging discussion. AlKindi and Al-Suqri (2013) suggested a comprehensive scheme that categorizes types of social media content in libraries. They identified 11 types of content generated by public libraries on their Facebook walls, such as general news, announcements about new books, recommendations of books and other materials, announcements of workshops and programs. Shiri and Rathi (2013) explored the use of Twitter in a large public library system, focusing on the content of the tweets created by the library. They conducted a content analysis of tweets and identified in which ways Twitter was used. Their classification framework is one of the most comprehensive in the context of public library social media use. They created a scheme of categories for tweet messages, such as acknowledgment, advisory services, announcements, events, feedback seeking, informal conversation, information sharing, library operations and others. They also found that a significant number of tweets were related to information sharing, recommendations and advisory services.

Researchers have been interested in different perceptions of social media use in the context of public libraries. For example, based on the survey method, Cavanagh (2015) attempted to understand how libraries would perceive the use of social media in public libraries. The survey results reveal that potential benefits of using Twitter include closer relationships and communication between users and libraries as well as expansion of library services and audiences. Some researchers specifically focused on young adult patrons in this line of research. Phillips (2015) investigated the impact of social media on young adult library users, most of whom use social media on a daily basis. Her research surveyed the perceptions and attitudes of librarians toward social media use in libraries, and then explored the roles and responsibilities of librarians in relation to young adult patrons. She found that public librarians well perceived the importance of their professional responsibility to engage with young adults via social media. She also emphasized the role of librarians as the co-creators of social media content in collaboration with young adults rather than the sole creators of content. Kim (2015) assessed the quality of social media services in library environments based on the investigation of user perception. She proposed and empirically validated an instrument to assess library social media services by measuring user perception of different aspects of such services, such as efficiency, availability, fulfillment and privacy.

Prior literature has also contributed to practical marketing plans, strategies and guidelines for effective social media use in public libraries. In her case study of social media

use in a public library system, Cahill (2011) analyzed several successful cases of social media use, including word-of-mouth marketing, emergency information broadcast, community engagement and soliciting feedback. She further suggested best practices of social media use in public libraries, such as maintaining a friendly, informal tone, updating at least once a day, posting varied, timely, inclusive content, etc. Steiner (2012) suggested strategies for social media implementation and marketing in libraries, which comprehensively covered specific instructions for analyzing the current status of social media use in libraries, segmenting the audience, setting up the mission and vision, and best practices. Similarly, Tomlin (2014) produced guidelines for effective social media marketing for public libraries, which emphasized the importance of regular updating and monitoring. She also proposed specific ways to make Facebook posts more user-friendly, such as interactive messaging, different format of media use beyond text alone and polls. Alman and Swanson (2014) suggested that social media marketing should include specific plans about media types, content, monitoring and updating and assessment. Also, they noted that it was important to set up target users in advance and address customized messages to them. They recommended that libraries generate a wide variety of content, such as news about recent acquisitions, upcoming programs, community events, trivia, recommendations for books and others.

Previous researchers and practitioners have acknowledged the importance of user engagement in determining the relationships between service providers and users (Bowden, 2009; Brodie *et al.*, 2013; Gummerus *et al.*, 2012), and have conceptualized it in varying perspectives. For example, engagement is viewed as “a desirable – even essential – human response to computer-mediated activities” (Laurel, 1993, p. 112). Calder and Malthouse (2008) have viewed user engagement as the sum of motivational experiences users have with the media. According to Van Doorn *et al.*'s (2010) view, we can consider user engagement a behavioral manifestation that drives motivation to attach to the brand of the service provider beyond using the service. Cho *et al.* (2014) suggested that likes, shares and comments reflect different levels of engagement between an organization and the public on Facebook. That is, “like” is used as the lowest level of engagement to let users know that they enjoy Facebook posts without verbal expression, “share” enables the public to voluntarily deliver organizational messages to their own social media communities and “comment” is deemed to be the highest level of engagement because it requires the public to expend more time and effort in responding to organizational messages.

As shown in the literature review, prior studies have contributed to the understanding of different aspects of social media use in library environments. Particularly, researchers have tried to investigate social media content generated by public libraries and suggest strategies for effective social media use. In addition, there has been discussion on user engagement in the social media context in general. However, little research has been done to analyze the relationships between social media content and user engagement in the context of public libraries. In particular, there were few studies that conducted a quantitative analysis to examine user engagement patterns by social media content type. Several prior studies identified different types of social media content in library environments, but few of them further quantitatively looked into how user engagement patterns would differ by content type. To the best of our knowledge, this study is one of a few attempts that quantitatively analyzed the degrees of user engagement by Facebook post type in the public library context. In addition, we found that little attention has paid to sentiment or emotion analysis in public library social media research. In this study, we intend to advance our understanding of Facebook content created by public libraries based on the analysis of the relationships between content types and behavioral aspects of user engagement, including likes, shares and comments.

Research questions

This study explores types of Facebook posts and their associations with user engagement in public libraries. Three research questions guided the investigation:

RQ1. What types of content are posted on Facebook by public libraries?

RQ2. What are the relationships between post types and user engagement?

RQ3. What are the relationships between the inclusion of images/videos and user engagement?

Methodology

Sample and research variables. In this study, we collected data from Facebook “pages” of 151 public libraries. Users can subscribe to those library pages by clicking the “like” button to follow the page. For this study, 151 public libraries were randomly selected from a directory of public libraries listed in the IMLS Public Library Statistics (IMLS, 2017). We used a random number generation function and assigned a random number for each library in the library list. Then, we chose top 151 libraries after sorting the list by those numbers. Highlighted posts were collected from July to October of 2015 from each selected library. Facebook shows highlighted posts selectively on timelines when viewing old posts, while other posts become hidden over time. In total, 4,637 posts were collected from 151 library Pages.

For each post, the following information was collected: library name, posted text, posted date, the number of likes, the number of comments, the number of shares, the inclusion of images, the inclusion of video clips and others. A coding scheme consisting of ten categories was developed based on the open coding method (see Table I, Coding scheme). Then, the content of each post was manually coded into ten categories using content analysis.

In this study, user engagement is represented by the number of likes, comments and shares for each post. These variables can be used as signs of success on social media sites, showing users’ engagement and contribution (Alman and Swanson, 2014). The ways users engage with libraries’ social media include showing interest in the content (likes), providing feedback (comments), or sharing the content to others (shares). The number of likes, comments and shares has been used as a measure of user engagement on Facebook (Bonzanini, 2016). To control for the unwanted size effect, those user engagement indicators were standardized, including the number of likes, the number of comments and the number of shares. Larger libraries were likely to receive a higher amount of user engagement, as they had more followers on their pages. To represent a library size, we used both the population of the legal service area (PLSA) and the number of Facebook followers as of October 2015. IMLS provides nation-wide survey data of public libraries in the USA, and it includes the “PLSA.” PLSA refers to “the number of people in the geographic area for which a public library has been established to offer services and from which the library derives revenue, plus any areas served under contract for which the library is the primary service provider (IMLS-PLS, p. 6).” PLSA has been used in the library science field as an indicator to represent the size of libraries (Joo and Cahill, in press). In addition, the number of Facebook followers was taken into consideration. On Facebook, the number of followers implies the actual number of Facebook users who receive posting updates from the library. As shown in Figure 1, these two variables exhibit a typical Zipf’s law pattern. In this study, Lib_{size} was used to control for unwanted size effect in data analysis:

$$Lib_{size} = \log_{10}(PLSA) \times \log_{10}(\text{Follower}).$$

Data analysis. For data analysis, we adopted a mixed method: open coding and content analysis, descriptive statistics and inferential statistics. In this study, the unit of analysis is

Code	Category	Operational definition	Example
C1	Upcoming event announcement	A post about announcing an upcoming event or events	"The Teen Halloween Party is on Wednesday, October 28th from 6:00PM to 7:30PM. Register for it now at [...]"
C2	Completed event	A post about a completed past event	"We had a great time with Magician James Warren last night! He entertained young and old people with his wonderful magic! Thanks to all the people who came! Here are some pictures from last night!"
C3	Emotionally inspiring message	A post that contains a funny, humorous, or inspirational image or message	"Librarian humor! Question: How many librarians does it take to screw in a light bulb? Answer: 645.5 [...] Dewey Decimal Classification 645.5: Household furnishings – Lighting fixtures"
C4	General announcement about the library, excluding event announcement	Announcement about library services, instruction, location, job posting, or hours	"The Library is on Winter Hours! Monday through Thursday 10 to 8 Friday 10 to 6 and Saturday 12 to 6"
C5	Library clubs	A post about a library club, group, or organization	"Reminder that the Optimizers Non-Fiction Book Club meets tomorrow for a Pot Luck Discussion at 12:30 p.m. The Topic will be: Regaining Vital Health Through Nutrition [...]"
C6	Information about books, authors, or collections	A post about arrivals of new books, or introducing books, authors, or collections	"New Books/Movies Adult Fiction Alert – Patterson Long, Tall Christmas – Dailey Naked Greed – Woods Gray – James Adult Non-Fiction The Journey – Graham Inspirational It Had to Be You – Warren Juvenile [...]"
C7	Storytime/reading programming for children	A post about storytimes or reading programming for children	"It's time for a picnic at the library! Join us for Story Time Wednesday at 10:30 a.m. for good company and good stories. See you tomorrow at [...]"
C8	Community/ local news	A news or story about the community, region, or other local organization	"Governor Kate Brown has declared drought in 23 of Oregon's 36 counties. This widespread water shortage is due to record-breaking low snowpack levels, high temperatures, and significantly low stream flows in many parts of the state [...]"
C9	Profile/cover photo	A change of the library's Facebook Page profile or cover photo	"Wichita Public Library updated their cover photo"
C10	Other	All other posts that are not classified into the above categories (e.g. thank you messages, help wanted, fundraising, etc.)	"We would like to thank Bradley McCay for his kind donation to the Library"

Table I.
Coding
scheme – categories
of post types

an individual post as we analyzed the content type of each post. That is, the frequency analysis, descriptive analysis and inferential analysis were all conducted at the individual post level.

Open coding was employed for analysis, which is the part of the data analysis process concerning identifying, naming, categorizing and describing phenomena from unstructured text (Corbin and Strauss, 1990). As reviewed in the Literature Review section, prior studies contributed to the identification of categories for social media content in libraries.

However, there are relatively a small number of category frameworks tailored to the public library context. Shiri and Rathi (2013) suggested a comprehensive list of content categories, but those categories were derived from the analysis of Twitter messages, not Facebook. Thus, we decided to come up with a new set of categories, which specifically reflects Facebook content produced by public libraries. Ten categories were defined to classify all observed posts into specific content types, using open coding, as shown in Table I. Two coders who have expertise in advertising and social media marketing were recruited to conduct content analysis. Both coders took a series of courses related to marketing, social media and strategic communication. Also, both of them had years of experience in using Facebook, and were familiar with its interface and functionalities. In this study, we suggested several categories that were not identified in prior literature. First, we differentiated the event related posts into two groups; upcoming event announcements (C1) and completed events (C2). From the initial scanning of Facebook posts, we observed that users' response patterns would be different between C1 and C2. Second, this study attempted to identify messages that drive users' feeling or emotion by separately coding them. In the public library context, there was little discussion of emotion related messages. In the marketing field, it is considered an effective strategy to utilize social media content that inspires emotion (Dinesh, 2017). We wanted to see how such an emotion-inspiring post would work effectively in the context of public library social media. Third, we wanted to investigate storytime or children programming related posts separately (C7). Public libraries use a large portion of their resources for programing for children (Joo and Cahill, in press). We observed that libraries used social media to promote those children related services. The C7 category was defined to specifically investigate children related posts in Facebook, which are unique content in the public library context. Fourth, we further classified community news or local news as a distinct category (C8). From the initial observations, we found that public libraries often upload and share their local news via their Facebook page, and those posts were not perfectly fit with the other categories. Thus, we ended up with a distinct category dedicated to local/community news. Our initial observations also pointed out the frequent changes to Facebook profiles or cover photos (C9). Those infrequent post types that showed less than 0.5 percent of the sample, such as thank you messages or fundraising, had to be combined together as "Other (C10)." In this way, we made a coding scheme (Table I) that is specifically designed to content analyze Facebook content in public libraries.

Some posts were coded into multiple categories. For instance, posts about storytime or children's programming could be coded into the categories of "storytime (C7)" and "upcoming event announcement (C1)." For example, the case of "Don't forget to join us for Story Time at 10:30 this morning!" was coded into C1 and C7 as it was about an upcoming storytime event. Also, we observed multi-category coding cases in relation to library club activities.

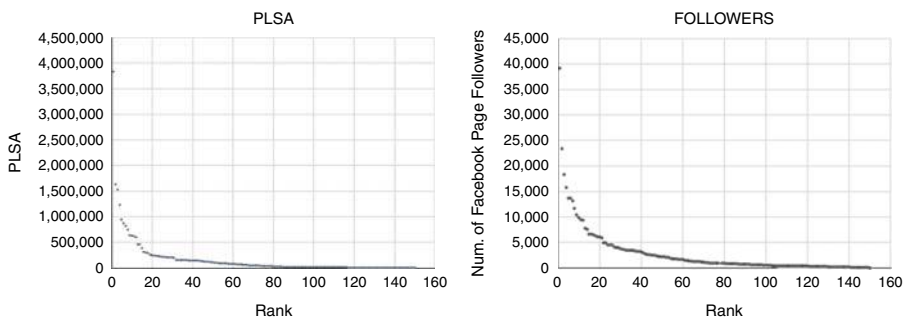


Figure 1.
Distributions of
PLSA and
Facebook followers

For example, the post, “The Family Book Club will discuss *The Lion, the Witch, and the Wardrobe* on July 25 at 10 AM, and *The Book Thief* will be the topic of a book discussion on August 6 at 5,” was categorized into C1 and C5, which was about the meeting announcement of a library book club. For checking inter-coder reliability, two coders independently coded randomly selected 287 posts from 10 libraries. The inter-coder reliability turned out to be adequate, $CR = 0.927$, according to Holsti’s (1969) index.

After the coding of all observed posts, we employed descriptive statistics to investigate the proportions of different types of posts, the proportions of multimedia-embedded posts and the degrees of user engagement for posts. In particular, *RQ1* was answered by analyzing the proportions of types of posts as well as the inclusion of images or videos. In addition, *RQ2* was answered by calculating the degrees of user engagement by post type. Third, to respond to *RQ3*, we conducted *t*-tests to examine whether the inclusion of multimedia (images or videos) would affect the degrees of user engagement. The dependent variables are the degrees of user engagement measured by the numbers of likes, shares and comments while the independent variables are the inclusion of an image(s) or a video(s). Here are specific hypotheses defined in relation to *RQ3*:

- H1.* There is a significant mean difference of the degree of likes between the image-embedded posts and the posts with no image.
- H2.* There is a significant mean difference of the degree of shares between the image-embedded posts and the posts with no image.
- H3.* There is a significant mean difference of the degree of comments between the image-embedded posts and the posts with no image.
- H4.* There is a significant mean difference of the degree of likes between the video-embedded posts and the posts with no video.
- H5.* There is a significant mean difference of the degree of shares between the video-embedded posts and the posts with no video.
- H6.* There is a significant mean difference of the degree of comments between the video-embedded posts and the posts with no video.

Results

Content types of Facebook posts

First, we analyzed types of posts uploaded on public library Facebook pages. Table II shows the frequency and percentage of each content type category. Not surprisingly, many of the

Category	Frequency	Percent
C1 – upcoming event	2,056	35.5
C2 – completed past event	735	12.7
C3 – emotionally inspirational post	686	11.9
C4 – general announcement	636	11.0
C5 – library club	492	8.5
C6 – books, authors, or collections	406	7.0
C7 – storytime	262	4.5
C8 – community news	153	2.6
C9 – profile update/cover photo	218	3.8
C10 – other	140	2.4
Total	5,784	100.0

Table II.
Frequency of
Facebook post
content types

posts were related to events hosted by libraries, which are C1 and C2. Posts announcing upcoming events (C1) were most frequently observed (2,056), accounting for 35.5 percent. Sharing past library events (C2) was ranked second (735), 12.7 percent. This indicates that public libraries widely utilize Facebook to announce their planned events or share the past events they completed. Public libraries also often upload emotionally inspiring posts (C3, 11.9 percent) as a way to get attention from their Facebook followers and potential users. Approximately 12 percent of the observed posts involved a funny image, humor, or an inspirational message. General announcements (C4) about the library, such as open hours, library services and library instruction, made up about 11 percent. In particular, many libraries posted any changes of open hours or holiday closings on Facebook. About 8.5 percent were related to library clubs (C5), such as book clubs, library-supporting groups and children's Lego clubs. Information about books, collections, or authors (C6) turned out to be around 7 percent, followed by storytime-related posts (C7, 4.5 percent), profile or cover photo updates (C9, 3.8 percent) and community news (C8, 2.6 percent). Approximately 2.4 percent of the observations were categorized as C10.

Use of images and videos

We calculated the proportion of posts that included an image(s) or a video clip(s). Table III presents the frequency of posts that contained an image or video clip. Interestingly, images were used most often in public library Facebook posts. We found that 3,924 out of all 4,637 posts included at least one image, accounting for 84.6 percent. Video clips were rarely used, showing only 3.2 percent.

Numbers of likes, comments and shares

Users engaged in libraries' Facebook activities by adding likes, leaving comments, or sharing posts. Table IV presents descriptive statistics about user engagement indicators, including likes, comments and shares, that library posts received. On average, each post received 10.44 likes, 0.6 comments and 1.93 shares. This reveals that patrons mostly engaged with the posts via likes, rather than comments or shares. Approximately 82 percent of the posts had at least one like. Relatively, the proportion of the posts that received comments (21.5 percent) or shares (26.2 percent) were small. The patterns of likes and shares were very similar, showing a Pearson r coefficient of 0.852 ($p < 0.01$). This implies that users who liked the posts tended to share them via their own Facebook accounts. We observed relatively lower correlations between likes and comments ($r = 0.472$; $p < 0.01$) and between comments and shares ($r = 0.345$; $p < 0.01$).

Table III.
Frequencies of posts
that include an image
or a video clip

	Image	Video clip
Included	3,924	149
Not included	713	4,488
Percent	84.6	3.2

Table IV.
Descriptive statistics
of user engagement
indicators

	Likes	Comments	Shares
Average per post	10.44	0.60	1.93
Standard deviation	43.74	2.14	17.54
Range	0–1,352	0–52	0–604
Proportion of posts that received at least one engagement	81.7	21.5	26.2

The post that received the most likes and shares, 1,352 likes and 604 shares, respectively, was about the Kansas City Royals' Major League Baseball World Series: "Taking it on the road! Fantastic game, Royals. #TaketheCrown #WorldSeries." As shown in this case, a post about a community's big event could draw lots of attention from patrons (Table V).

Interestingly, as shown in Figure 2, the numbers of likes, comments and shares exhibit typical Zipf's law patterns. All three measures showed similar patterns. This reveals that a smaller number of posts tend to get higher amounts of attention, while a larger number of posts receive little attention. In particular, the long tails in the comment or share distribution graphs indicate that lots of posts do not receive any comment or share at all.

Relationships between post content types and user engagement

We investigated the relationships between post types and user engagement measured by the numbers of likes, shares and comments. Larger libraries with more Facebook followers tended to receive more user engagement. We controlled for the size effect in this analysis by using the Lib_{size} (see the Methods section above). Therefore, the degrees of user engagement in Table VI indicate the values normalized by Lib_{size}. Using the normalized user engagement values, we analyzed which types of posts received more or less likes, comments, and shares from users. Table VI presents the mean values of three standardized user engagement indicators by post type.

	Likes	Comments	Shares
Likes	–	0.472**	0.852**
Comments	0.472**	–	0.345**
Shares	0.852**	0.345**	–

Notes: * $p < 0.05$; ** $p < 0.01$

Table V. Correlations among likes, comments and shares

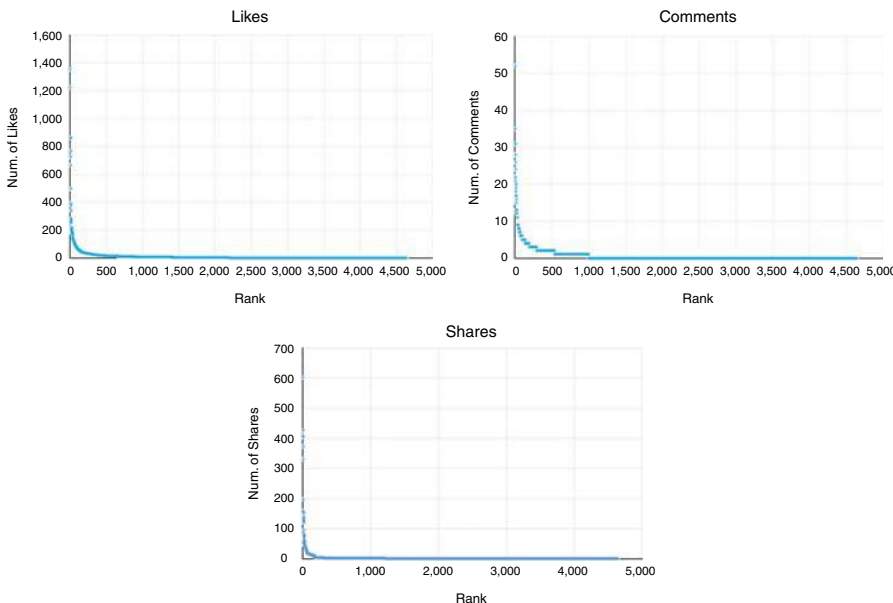


Figure 2. Patterns of the numbers of likes, comments and shares

Table VI.
User engagement by
post content type

		C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
Likes	Mean	0.360	0.618	0.916	0.520	0.689	0.407	0.326	2.751	0.749	1.016
	SD	1.041	0.845	1.898	1.094	1.453	0.898	0.584	9.212	1.356	2.369
	Rank	9	6	3	7	5	8	10	1	4	2
Comments	Mean	0.025	0.050	0.056	0.034	0.060	0.027	0.017	0.074	0.036	0.071
	SD	0.091	0.138	0.163	0.092	0.197	0.108	0.071	0.219	0.134	0.162
	Rank	9	5	4	7	3	8	10	1	6	2
Shares	Mean	0.061	0.041	0.160	0.071	0.072	0.045	0.037	0.936	0.028	0.248
	SD	0.236	0.165	0.753	0.277	0.352	0.220	0.084	4.057	0.108	0.869
	Rank	6	8	3	5	4	7	9	1	10	2

C8 was ranked first in all three user engagement indicators (likes $M=2.751$; comments $M=0.074$; shares $M=0.936$), and it was partially because of some extreme cases: local community events observed during the Major League Baseball postseason in 2015. For example, Kansas City–Kansas Public Library uploaded several posts related to their regional MLB franchise's games, and those posts received extremely high attention from users. Even after controlling for the library size, those numbers were extremely high and made C8 ranked as the most user engaged post type. The standard deviation values of likes, comments and shares of C8 were comparatively higher ($M=9.212$; $M=0.219$; $M=4.057$, respectively) than those of the other categories, which reveals the existence of such extreme cases. C10 ranked at 2nd for all three engagement indicators (likes $M=1.016$; comments $M=0.071$; shares $M=0.248$). The C10 category included many congratulations or thank you posts, which led users to join in those happy moments. Also, in the C10 category, posts regarding library fundraising activities earned a relatively high number of likes and shares. C3 was ranked at 3rd in likes ($M=0.916$) and shares ($M=0.160$), and at 4th in comments ($M=0.160$). C5 was ranked at 3rd in comments ($M=0.060$), 4th in shares ($M=0.072$) and 5th in likes ($M=0.689$). Those library club users tended to be more loyal to their library and associated clubs, so they were more likely to leave comments or share the posts about such clubs. Interestingly, C9 (profile/cover photo update) also received a relatively large number of likes, ranked at 4th ($M=0.749$). However, it was least shared ($M=0.028$). When looking into library event related posts (C1 and C2), C2 was likely to receive more attention than C1: C2 likes $M=0.618$, C2 comments $M=0.050$ and C2 shares $M=0.041$ vs C1 likes $M=0.360$, C1 comments $M=0.025$ and C1 shares $M=0.061$. It can be interpreted that users enjoyed seeing the activities or events that they or others participated in. By contrast, we observed that C1 ($M=0.061$) was more shared than C2 ($M=0.041$). That is, users were likely to share upcoming library programs to their Facebook friends to let them know of those interesting events. The study shows that C7 received least attention from users (likes $M=0.326$; comments $M=0.017$; shares $M=0.037$) (Figure 3).

Finally, we are interested in the impact of the inclusion of images or video clips on user engagement with public libraries on Facebook (RQ3). Table VII presents how user engagement patterns would differ by the inclusion of such multimedia items. We found that the inclusion of an image in a Facebook post increased user engagement. The t -test results indicate that users tended to extend more likes, comments and shares to those posts. $H1-H3$ are accepted. There were significant mean differences in user engagement degrees between the image-embedded posts (likes $M=0.672$; comments $M=0.042$; shares $M=0.116$) and the no-image posts (likes $M=0.284$; comments $M=0.020$; shares $M=0.033$) in all three types of engagement indicators at the α of 0.01: likes $t(4241.867)=9.169$, $p < 0.01$; comments $t(1728.382)=6.326$, $p < 0.01$; shares $t(4634.833)=5.245$. From this result, it can be inferred that users liked to see visually

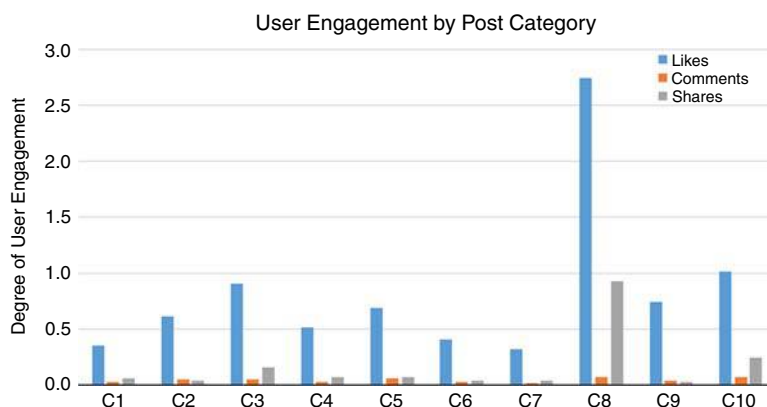


Figure 3. User engagement by post content type

	Engagement	Inclusion (group)	Mean	SD	<i>t</i> (df)	Sig.
Image	Likes	Included	0.674	2.291	9.169 (4,241.867)	<i>p</i> < 0.01**
		Not included	0.284	0.584		
	Comments	Included	0.042	0.137	6.326 (1,728.382)	<i>p</i> < 0.01**
		Not included	0.020	0.075		
	Shares	Included	0.116	0.912	5.245 (4,634.833)	<i>p</i> < 0.01**
		Not included	0.033	0.167		
Video clip	Likes	Included	0.650	0.982	0.432 (198.780)	0.666ns
		Not included	0.613	2.152		
	Comments	Included	0.040	0.083	0.203 (173.515)	0.839ns
		Not included	0.039	0.131		
	Shares	Included	0.092	0.336	-0.366 (217.925)	0.714ns
		Not included	0.104	0.854		

Table VII. Relationships between the inclusion of multimedia and user engagement

attractive posts rather than simple text posts. However, *H4–H6* were not accepted by the *t*-test results. That is, user engagement patterns were not significantly different when video clips were included in all three types of engagement indicators.

Discussion

This study explored what types of Facebook posts are created by public libraries, and examined the relationships between post types and user engagement. We identified ten types of Facebook posts, and calculated the degrees of user engagement for each type of post, represented by the numbers of likes, shares and comments. Also, we investigated the effects of post features, such as the inclusion of images and video clips, on user engagement.

The findings of this study affirm that the most common type of Facebook posts are concerned with library events, including upcoming library events (35.5 percent) or past library events (12.7 percent), which make up almost half of the observed posts. This shows that social media serves as an important channel to spread library events broadly to patron communities online. In addition, we observed various types of Facebook posts, ranging from funny images, inspirational messages, general announcements, announcements about books and collections, community news, among others. Diversifying social media content can expand the role of social media in public libraries beyond distribution of library events. Libraries need to market various services, programs, events happening at the library, collections, staff expertise and more (Dryden, 2014). To cover such diverse content in

library social media, it is necessary that several staff from different departments work together to upload various stories and messages on social media in public libraries. Tomlin (2014) suggests that multiple content creators from several departments can add diversity to social media posts.

In addition, this study examined the relationships between post types and user engagement with the Facebook pages of public libraries. Not surprisingly, clicking on the like button turned out to be the most common method for users to explicitly engage with the Facebook post, as it is relatively easier than sharing the post or leaving a comment. Interestingly, posts about community news were more likely to receive likes, comments and shares from users. This implies that expanding the scope of social media content to local community issues can be an effective way for public libraries to draw attention from community residents. In particular, public libraries can take advantage of big community events or news as a boon to connect themselves to community populations. We also observed that acknowledgment messages, such as thank you notes or congratulations, and fundraising messages received much engagement. This finding implies that people are likely to involve themselves in those emotionally positive messages, as well as spread fundraising messages to others to make them more visible in the online space. In addition, the results also indicate that Facebook posts containing funny images, short jokes, or inspirational messages were likely to receive much attention from users. Social media posts that inspire emotion, such as humor or inspirational content, are considered an effective method to create a connection with viewers and to drive much engagement (Dinesh, 2017). This study empirically affirms that content inspiring emotion can also be useful to raise engagement in the context of public library social media.

When looking into event related posts, past event posts tended to get more engagement than those announcing upcoming events. We can infer that those who attended an event might want to see photos of the event they participated in and consequently to react to those posts. Past event posts could also offer a glimpse of what the event was like to those who would be potentially interested in that kind of event in the library. Thus, uploading posts about finished events can be an effective strategy for public libraries to facilitate interactions with current and potential users. In particular, pictures of a great turnout at a library's event can indicate the role the library plays in the community (Alman and Swanson, 2014). In addition, libraries need to exert more effort to create interactive messages that lead to more user engagement when announcing events. Librarians can ask for opinions or comments about the events they plan to hold to invite users to engage with their posts (Steiner, 2012).

Posts about general announcements (C4), books/collections/authors (C6), or storytimes (C7) yielded comparatively smaller engagement from users. The C4 category posts include library open hours, introduction to general services, location information and others. These general announcements are usually one-way, factual bits of information that elicit few responses from users. The C6 category includes many posts about new arrivals. Many of those new arrival messages are routine updates on library books and collections. Posts about storytimes are limitedly targeted to parents of young children, and most of those posts are announcements of regular weekly storytimes. Although these three types of posts receive a relatively small amount of user engagement, it is important that these messages be shared with the user community. Facebook should serve as one of the main channels to announce library services and news as well as updates on books/collections. Also, storytimes are one of the key services provided by public libraries (Joo and Cahill, in press), and it is necessary to continuously promote children's services via library social media.

The results of the study found that posts containing an image or images received more user engagement. Use of different forms of media, including pictures, can make Facebook posts more user-friendly and lead to user engagement (Tomlin, 2014). We found that public libraries already have actively used image-embedded content. The findings of this study show that almost 85 percent of the observed posts created by public libraries

included at least one image. Those images include various types, such as a flier, a picture taken at a library event, or an image shared from another source. Pictures of library events or activities can indicate what kinds of services and programming the library offers to their patrons and the community. In addition, it is important to regularly update the profile or cover photo. For instance, we found that a profile update or cover photo update was one of the post types that received higher numbers of likes from users. Some libraries changed their cover photos on a regular basis to reflect seasons, holidays, or special events. Those posts with new cover photos draw user attention. Also, updating cover photos can remind users that the library continues to update their Facebook pages. However, there was no significant effect of the inclusion of video clips on user engagement. In Facebook, video is presented sound off by default, and users usually do not turn on sound when seeing posts with video (Patel, 2016), which makes video materials less interactive. In addition, watching a video takes time and requires more effort than viewing an image. This might be part of the reason why there was no significant effect of video content on user engagement.

In addition, the contribution of this study lies in that it employed a quantitative approach to investigate the relationships between the content type and user engagement in public library Facebook practice. This study also analyzed a relatively large sample, i.e., 151 libraries and 4,637 posts, compared with prior studies (e.g. Chen *et al.*, 2012; Aharony, 2010; AlKindi and Al-Suqri, 2013; Shiri and Rathi, 2013). While previous studies focused on the understanding of social media content generated by libraries, this study tried to further examine the relationships between content and user engagement quantitatively. Most of prior relevant studies worked with relatively small samples and analyzed cases qualitatively (e.g. Chen *et al.*, 2012; Madge and Coserea, 2014; etc.). The coding data were derived from the analysis of larger Facebook post observations, and we came up with a comprehensive set of categories tailored to Facebook use in public library contexts. For example, we divided the event related posts into two types, one as upcoming events and the other completed events. Also, this study identified the categories of storytimes, local/community news, and profiles/cover photos separately. The categorization framework suggested in this study can be useful to understand the nature of Facebook use in public libraries.

Conclusion

Facebook has been widely adopted as a communication tool to interact with patrons in public libraries. We identified different types of Facebook posts created by public libraries, and further investigated the relationships between post types and user engagement. We observed that around half of Facebook posts were directly related to library events. Also, we found that posts about community news or emotionally inspiring messages drove much engagement from users. The findings of this study yield insight into effective social media use in public libraries. The contribution of this study lies in that it defined ten different categories of post types in public library environments and examined user engagement patterns for those types.

This study has several limitations to be acknowledged. First, the sample size, 4,637 posts from 151 libraries, might not be enough to represent social media use in public libraries in the entire USA. Also, the data covers only four months of a year, mostly the summer and fall seasons. There might be different patterns of content types in other seasons. Additionally, the collected data covers only the cases of the USA. Obviously, there might be different patterns of social media content and use in different regions of the world. Second, the present study did not consider library level factors such as staff and resources dedicated to social media services. Third, as we rely on descriptive statistics and basic inferential statistics, the implications might not be particularly novel. Finally, this study did not look into other social media venues, such as Twitter, YouTube and Pinterest. These limitations illustrate future research that enlarges a sample size to better represent public libraries, and completely covers

different seasons and months in a year. Also, the future study will incorporate library level factors, especially resources relevant to social media services, to have an extended understanding of social media use in public libraries. More importantly, social media use on other types of platforms, including Twitter and Pinterest, will be investigated and compared to survey similarities and differences among different platforms of social media. As a way to better understand the underlying motivations of user engagement, a survey method can supplement this line of research. The future research can adopt a user survey to explore the nature of engagement from the analysis of library patrons' perceptions.

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