Urban Planning Academics and Twitter: Who and what?

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ABSTRACT

Twitter has increasingly become a resource used by academics to share scholarship and opinions within professional networks. This paper presents a descriptive analysis of Twitter use by urban planning faculty, reporting characteristics of users, the topics posted, and indicators of Twitter influence among urban planning faculty as well as those interested in planning from outside academic circles. Approximately one-third of urban planning academics are active Twitter users, and as of yet, there have been no empirical analyses of how and why they use the social media platform. This analysis uses Twitter data from active accounts for urban planning faculty in the U.S. and Canada identified as being used for professional purposes for the period from March 2007 to April 2019. Considering how planning academics use Twitter lends insights on its usefulness for academic discussion and scholarly communications. The conclusion discusses the prospects for planning academics to better utilize Twitter to broaden and deepen their professional activities while noting particular concerns.

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INTRODUCTION

In the broadest sense, the business of universities is to generate knowledge. At the same time, institutional missions are continually evolving as the role of higher education is questioned and publicly debated (Roth 2014; Sörlin & Vessuri 2007). One common notion is that faculty concentrate on discovery through research, teaching, and outreach. These three areas are not mutually exclusive because research is intended to inform instruction and enhance outreach to the broader community. Service activities are sometimes viewed as opportunities for research as well. A faculty member's research efforts and emphasis are in large part determined by the promotion and tenure process at their institutions, which often prioritize research productivity and academic reputation (Weller, Dröge, & Puschmann 2011). While productivity and reputation are important, there is no agreement on metrics. Consequently, there is a continued reliance on outmoded means of evaluation, which undermine processes to identify meritorious performance and therefore knowledge generation in service to society (Schimanski & Alperin 2018). The emergence of social media has created new methods for academics to engage in research processes, generate new forms of collaboration, and communicate their scholarly outcomes. However, there is no evidence, as of yet, that social media activities have impacts on productivity (positive or negative) or have meaningful impacts on scholarly reputation. Nevertheless, these are likely motivations for participating on social media platforms such as Twitter.

This paper explores one such form of social media activity by urban planning academics. This study is the first to examine how Twitter is used by urban planning academics in the U.S. and Canada. Following a brief review of literature on academics' use of social media and Twitter, this paper examines who among urban planning academics is using Twitter and how they are using it. The analysis identifies prominent users, both academic and non-academic, to provide a glimpse of the planning Twitter microcosm. Based on the literature and descriptive analysis, the paper concludes by suggesting how social media (particularly Twitter) can better serve planning academics. It is very likely that social media (in some form) will endure and be an increasingly significant dimension of academic activities.

LITERATURE REVIEW

As with the internet, some scholars predicted a revolution of information sharing via social media with far-reaching benefits to society (Hilbert & Lopez 2011; Nie & Erbring 2002), while others warned of an increase in conformity through social influence (Bargh & McKenna 2004; Creeber & Martin 2008). Higher education has traditionally had limited communication channels with the general public, so social media represents a significant change, and perhaps an opportunity in this regard. Recent evidence points to the intersection of influence and persuasion on social media in propagating 'fake news' and other unreliable information (Allcott & Gentzkow 2017) along with trolling and inappropriate language common to online commentary (Schweitzer 2014). Nonetheless, social media has provided an added dimension of scholarly communication over the past decade, with academics being encouraged to develop their reputations to gain increased visibility in their respective fields. Not only are academics expected to publish, teach, and perform service and outreach, but now more than ever, they are urged to promote these activities both within and beyond their institutions, all with little training or institutional resources (Weller 2011).

There is a growing literature on how and why academics use social media platforms like Twitter. Analyses of whole academic disciplines are rare because data collection is difficult due to no standard user identification mechanisms to help match user names with accounts. Name disambiguation is a challenge for scholarly publications as well, where multiple people share the same first and last name. This likely explains why there are so few empirical analyses for whole disciplines and why most rely on sparse sampling (see Priem & Costello 2010; Thelwall et al. 2013). ORCID and ResearcherID represent efforts to address the challenge of author identification by establishing protocols that link authors, affiliations, and scholarly products. These are voluntary systems, and it is unclear how many academics are using them. Besides, there are relatively few studies about social media usage by academics due to slow adoption and somewhat low levels of social media usage by academics. This is likely to change with new generations of academics (i.e., digital natives) who are accustomed to digital communications. There is also a publication lag for articles to appear in peer-reviewed journals, which affects

the availability of recent evaluations as well. It can take a journal article a minimum of a year between the time of submission and when it appears in print or as a pre-print online version. Papers (such as this one) rely on snapshots of social media activity that reflect a specific timeframe. The following discusses some of the literature that provides a useful foundation with regards to how and why academics use Twitter.

Academics' use of Twitter falls into four general categories. These include communications (Carpenter & Krutka 2014), professional development (Carpenter & Krutka 2014), self-promotion through building a public profile (Hall 2014) and engaging in 'digital identity and impression management' (Veletsianos & Kimmons 2013: 44). Kassens-Noor (2012) and Carpenter and Krutka (2014) discuss the potential of Twitter for class instruction, but there remains little evidence or evaluation of these activities. Most of these connect with promotion and tenure criteria that emphasize external visibility not previously utilized by academics (Schimanski & Alperin 2018). It is clear that these uses of social media have little or no scholarly value in themselves, but they are increasingly becoming an extension of scholarly activities. Some universities, through their promotion and tenure guidelines, are placing value on faculty social media participation, primarily for university public relations (see Cabrera et al. 2017; Gruzd, Staves, & Wilk 2011; O'Meara 2016).

Other online platforms used by urban planning academics include LinkedIn, ResearchGate, Academia.edu, and Mendeley. LinkedIn's primary purposes are to promote public profiles and networking, with a different kind of 'social' compared to Twitter (Baruffaldi, DiMaio, & Landon 2017). Although LinkedIn is also used for information sharing, most of this communication is oriented to professional activities (Skeels & Grudin 2009). Other sites, such as ResearchGate, Academia.edu, Mendeley, and Social Science Research Network (SSRN), are primarily used to share publications with relatively limited accompanying social engagement. Both Google Scholar and Microsoft Academic are academic profile sites with search capabilities for publications and author metrics. These sites generally serve the least social function among those mentioned above but are increasingly becoming more widely used among academic disciplines (Martín-Martín, Orduña-Malea, & López-Cózar 2016).

The capabilities of Twitter to increase communications will likely continue to evolve across disciplines, platforms, and purposes. Of particular benefit to planning is to broaden and increase the volume of planning-related discourse. Megele (2014) and Gruzd, Wellman, and Takhteyar (2011) discuss the conversational and 'chat' dimensions of Twitter, as well as the virtual community-building (whether real or imagined). These conversations also combine 'real life' and virtual forums when Twitter is used in connection with academic conferences. These conversations can extend the reach of conferences in space and time, along with creating 'backchannel' communications (Li & Greenhow 2015; Weller, Dröge, & Puschmann 2011).

It is assumed that urban planning academics use Twitter in similar ways as other academics in the social sciences, but it is difficult to make direct comparisons because complete datasets like those used here are not available for other disciplines. Also, planning academics' use of Twitter cannot be compared to that of planning practitioners because of the significant differences in their professional roles and responsibilities. Urban planning practitioners use Twitter in planning activities such as gathering data about residents' perceptions, gathering geo-tagged data about location or movement patterns, and decision support (Hollander et al. 2016; Shelton et al. 2015). Applications that integrate social media and urban planning have the potential to grow if participation by planners and citizens increases. In this sense, Twitter can serve as a communications tool to facilitate public involvement activities (Lopez-Ornelas 2017). Several studies have focused on social media (Twitter particularly) to enhance participatory planning activities (see Evans-Cowley and Hollander 2010; Nummi 2019). The challenge remains to evaluate these efforts and assess the transferability to different places and circumstances.

METHODOLOGY

To examine Twitter usage by planning academics, data for this analysis were obtained from two primary sources. A list of urban planning faculty names from over 100 universities across the U.S. and Canada maintained by Sanchez (see Sanchez 2017) was searched on Twitter to find associated accounts. Accounts were then reviewed to determine if they were used for

professional or personal purposes. Accounts were assumed to be used for professional purposes if the user profile contained a professional title (e.g., professor), mentioned urban planning or an area of expertise (e.g., transportation, housing, environment), or mentioned an employer's name (i.e., university name or department). In some cases, accounts were included when these criteria were not met but the content of tweets was related to urban planning issues. In the case where someone had multiple accounts (such as a personal account and a professional account), the personal account would be excluded because it would not meet the criteria above. The proportion of planning academics using Twitter was in the range of 30% to 35%, which was similar to that found by Mohammadi et al. (2018) for academics in science-related disciplines.

A total of 323 Twitter accounts were identified from the list of 1,104 urban planning faculty. Lists of profiles, tweets, followers, and friends were obtained through the Global Event and Trend Archive Research (GETAR) project at Virginia Tech.[1] This included all account activity from March 2007 to April 2019. The first part of the analysis focused on general characteristics of faculty using Twitter, including the age of accounts, frequency of participation, and user-engagement levels. These types of characteristics were also considered relative to academic rank. In addition, the study examined the types of Twitter content being shared by planning academics, primarily by tweet topics. Content analysis of hashtags and text was used to identify the topics. It should be noted that tweets often include abbreviations, slang, and jargon, with abbreviations being commonly used due to the 140-character limit on tweets (Lee et al. 2011). Tweets can be original content or recirculated information that can include images, weblinks, hashtags, and mentions of other Twitter users. While the combination of these elements provides richness beyond that of natural language, assessing all of these types together is complex and the subject of ongoing research (Kireyev, Palen, & Anderson 2017).

The text analysis process used NVivo which discovered the most frequent unigrams and bigrams (single- and double-word combinations) to create the 34 topic labels shown in *Table 1*. The set of tweets was then labeled using each of these topics. This resulted in over 35,000 topics or themes that were associated with 95% of the tweets. A multi-label classification process resulted in 24,315 total unique combinations using the 34 individual labels.

Table 1 Topic labels.

Access	Food	Planning
Analysis	Future	Policy
Change	Geography	Real Estate
City	Government	Scholarship
Community	Health	Service
Data	Historic	Social
Design	Housing	Space
Development	Land	Sustainable
Economic	Legal	Technology
Education	Media	Transportation
Environment	Place	Urban
		Other

The next part of the analysis examined the network aspects of Twitter users. Network analysis characterizes users relative to their connections with other Twitter users. Users at the center of the network are assumed to have more influence because they have more extensive network connections or are connected to more nodes within a network (Williamson & Ruming 2016). Because Twitter data for this analysis were obtained at a single point in time, the results represent a snapshot of an otherwise dynamic set of relationships. Users continually add and remove followers and friends which means that patterns of activity change over time. Network statistics are used to understand the structure of these connections. Gephi, an open-source network analysis and visualization tool was used to analyze faculty connections.

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1   National Science Foundation projects IIS-1619028 and 1619371.

Relationships between users are not necessarily mutual but are based on whether someone is a follower or is being followed, thus creating a directed network. One account following another creates an 'in-degree' connection for the first (a follower). When an account follows another account, an 'out-degree' connection results. When users follow each other, both in- and out-degree connections result. Following or friending creates 'edges', or connections between users or nodes. The more times a user is followed, the higher their 'degree', or prominence in the network (see Riddell et al. 2017; Riquelme & González-Cantergiani 2016). Alongside degree, 'betweenness centrality' is another measure of node connectivity. This differs from 'degree centrality' because a node with a high level of connectivity may not have many edges but may serve as a bridge that otherwise connects dispersed nodes or clusters in the network. In the case of this analysis, nodes with high betweenness centrality are users who span or connect other users who are separated by areas of interest.

This descriptive analysis focused on the general characteristics of users who are urban planning faculty and the content they generated. The objective was to illustrate patterns among users as well as topics of interest.

RESULTS

As mentioned earlier, 323 of the 1,104 selected urban planning faculty had Twitter accounts. Of those with accounts, 20 had not yet tweeted, but all of them had followers and friends. The earliest planning faculty Twitter account was established in 2007, and it appears that adoption by planning faculty peaked in 2012, with 55 faculty joining that year, down to an estimated 10 to 15 who joined in 2019 (see *Figure 1*).[2]
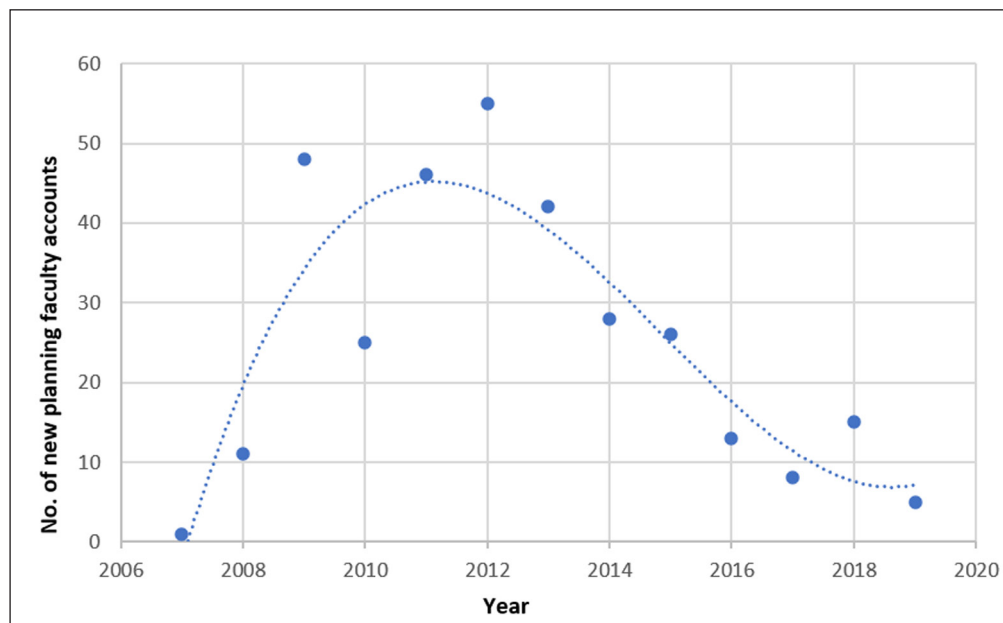

Figure 1 Year urban planning faculty joined Twitter.

Currently, the average academic urban planning Twitter user has been on the platform for 6.5 years, tweets an average of 20 times per month, and has over 1,000 followers and 465 friends (see *Table 2*). One account is an outlier with over 128,000 followers, which, when excluded from the sample, lowers the mean number of followers to 655 (median of 203). The account with the next highest number of followers has over 20,000, and only one other account has more than 10,000 followers. In terms of rank, faculty engagement on Twitter is relatively similar, with just over 100 assistant, associate, and full professors. On average, full professors tweet more often and have higher numbers of followers, irrespective of whether the outlier is included in the sample or not. In terms of influence, the followers-to-friends ratio is also highest for full professors, which would be expected because rank is somewhat based on scholarly reputation

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2   The earliest Twitter adopter among planning faculty was Alan Lew, who joined approximately one year after Jack Dorsey's first tweet of, 'Just setting up my twttr' ('Twttr' was the original name of Twitter) on March 21, 2006. Lew's first tweet was, "trying to stay awake and get some work done on my computer—I think I will take a nap" (3-24-07).

within the field (Yan, Zhang, & Bromfield 2018). A large number of followers usually indicates that a user is generating consistent, original, and quality content while not spending much time or attention on other accounts (Prada & Iglesias 2020).

TWITTER ENGAGEMENT

Tweet content can take multiple forms based on the user's objective. Twitter classifies individual tweets as "original", "quote", "reply", and "retweet". Original tweets are composed by the author using their content and may include web links, hashtags, or images. Quotes are tweets comprised of text from another user's tweet. Replies are tweets directed at other Twitter users, who are identified by their user name. Retweets are previously posted content that is then shared in a user's Twitter feed. Of the 258,872 tweets from urban planning faculty being analyzed here, nearly half were retweets, with 7 of 10 being retweets, quotes, and replies (see *Figure 2*). In other words, most of the urban planning faculty's Twitter activity was not original content. This compares to overall tweet characteristics being approximately 30% retweets, 20% replies, and the rest (original and quotes) representing 50% of the content. Retweeting volumes have increased significantly on Twitter over the past 10 years, increasing from about 20% to over 50%. The rate of replies has been gradually declining, from over 25% to just under 20% (Leetaru 2019).

Results from a Pew Research Center (2019) report show that 10% of all Twitter users create 80% of all tweets. On average, these top 10% tweet 138 times per month (median) compared to 3.3 for all planning faculty. The top 10% of accounts also have a median of 456 accounts followed, which compares to a median of 203 followers and a median of 179 friends for planning faculty (Wojcik & Hughes 2019). The differences between the mean and median levels indicate the degree of skewness in the data.

POSITION		N	MEAN	STD. DEV.	MEDIAN
All Professors	Account age (mos.)	323	78.1	32.4	81.1
	No. of Tweets	323	1,809.5	6,920.8	219.0
	No. of Followers	323	1,051.0	7,322.2	203.0
	No. of Friends	323	465.1	903.9	179.0
	Followers-to-friends ratio	319	3.2	11.8	1.0
	Tweets per month	323	20.4	69.8	3.3
Assistant Professor	Account age (mos.)	116	77.8	30.7	79.8
	No. of Tweets	116	1,299.9	3,117.2	298.5
	No. of Followers	116	405.7	549.9	238.0
	No. of Friends	116	491.9	767.1	284.5
	Followers-to-friends ratio	115	1.2	1.5	0.8
	Tweets per month	116	14.6	30.4	4.5
Associate Professor	Account age (mos.)	105	73.9	36.1	80.2
	No. of Tweets	105	1,493.8	4,313.0	267.0
	No. of Followers	105	642.8	2,081.5	204.0
	No. of Friends	105	435.4	786.6	191.0
	Followers-to-friends ratio	102	2.3	7.4	1.0
	Tweets per month	105	18.9	44.3	4.0
Professor	Account age (mos.)	102	83.0	29.9	84.5
	No. of Tweets	102	2,714.0	11,011.7	111.5
	No. of Followers	102	2,205.0	12,811.2	191.0
	No. of Friends	102	465.2	1,138.3	115.0
	Followers-to-friends ratio	102	6.5	19.1	1.4
	Tweets per month	102	28.5	111.2	1.7

Table 2 Descriptive statistics by academic rank.
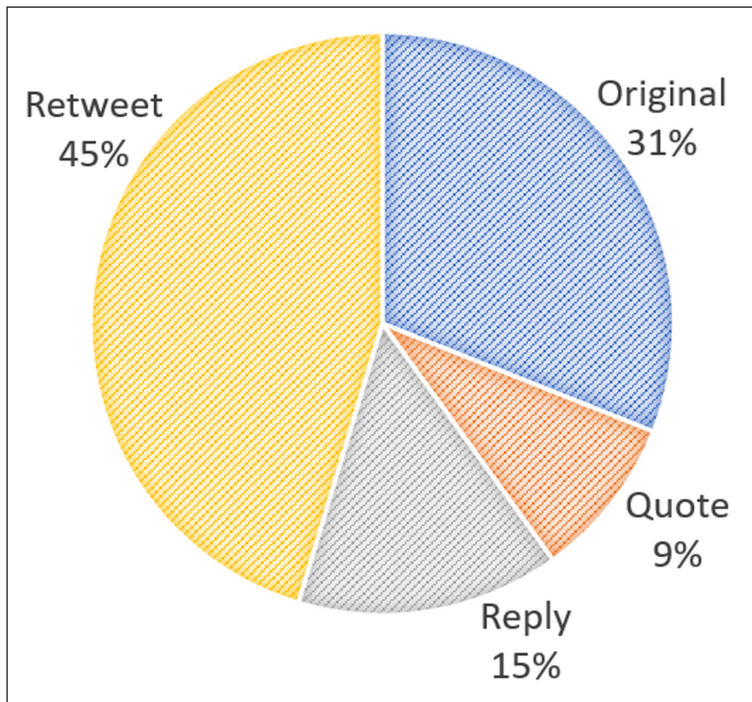
TWEET TOPICS

One way to identify tweet topics is by analyzing hashtags. Hashtags are assigned by users posting content and serve as keywords. Of the 258,872 total tweets, nearly 75% (192,693) lacked hashtags. Of the 66,179 tweets with hashtags, there were a total of 100,569 hashtags assigned (an average of 1.5 per tweet). Using hashtags is intended to identify relevant topics so that other Twitter users can locate conversations of potential interest. There were 27,354 unique hashtags used by planning academics, with 9,330 of those being used more than once. The most frequently used hashtags were #climatechange, followed by #planning, #cities, #urbanplanning, and #smartcities (see *Table 3*). It is interesting to note that Mohammadi et al.

HASHTAG	FREQUENCY	PERCENT
Climatechange	727	0.7
Planning	724	0.7
Cities	707	0.7
Urbanplanning	661	0.7
Smartcities	616	0.6
Technicity	526	0.5
Bigdata	482	0.5
Urban	442	0.4
Opendata	417	0.4
Climate	413	0.4
Data	410	0.4
Resilience	396	0.4
TRBam	374	0.4
Sustainability	347	0.3
Justsustainabilities	342	0.3
Housing	335	0.3
NYC	323	0.3
ASPA2019	310	0.3
Toronto	289	0.3
Gentrification	284	0.3

(2018) also found climate change as the most frequent Twitter topic among science-related disciplines. The hashtag frequencies are only for individual appearances and do not account for hashtags used in combination, so while #urbanplanning was the fourth most frequently used hashtag, #planning (724 appearances) and #urban (442 appearances) may have been used in combination with the same meaning. However, it is difficult to determine the user's intention when using single or combined hashtags. As a result, they are analyzed separately here.

The hashtags in *Table 3* appeared across a relatively small proportion of tweets, with none exceeding 1% and the top 20 representing less than 9% of all tweets. Of these 20 hashtags, 15 are planning-related topics, 2 are conferences, 2 are places, and 1 is an online class. These provide some evidence about topics of interest, but as was previously mentioned, many tweets did not include hashtags, so using these is less than ideal for characterizing overall themes. On the other hand, nearly all tweets contained text. The text within tweets was mined to extract frequently occurring terms. The most frequent label was "other", which captures most of the non-planning-related and personal tweets (see *Table 4*). These tweets contained none of the terms identified using text mining, which are shown in *Table 1*. The next most frequent labels were for 'place' (3.5%), 'social' (3.0%), 'scholarship' (2.3%), and 'economic' (2.0%), for a total of 28,110 tweets, or about 11%.

Table 4 Most frequent tweet topics (labels).

LABEL	FREQUENCY	PERCENT
Other	54,014	20.9
Place	9,066	3.5
Social	7,820	3.0
Scholarship	5,999	2.3
Economic	5,225	2.0
Education	4,893	1.9
Environment	4,752	1.8
Government	2,995	1.2
Place, Social	2,339	0.9
Planning	2,201	0.9
Environment, Scholarship	2,078	0.8
Environment, Place	2,028	0.8
City	1,776	0.7
Land	1,708	0.7
Transportation	1,498	0.6
Economic, Social	1,454	0.6
Housing	1,382	0.5
Urban	1,338	0.5
Economic, Place	1,323	0.5
Scholarship, Social	1,308	0.5

In terms of the overall frequency of individual labels, the top 20 represented most of those appearing in the multiple label categories listed in *Table 4*. The most frequent single term was 'place', followed by 'social', 'scholarship', 'economic', 'education', and 'environment'. As mentioned earlier, these terms represent clusters of related unigrams and bigrams analyzed during the text mining process. For instance, 'place' includes terms like United States, Canada, Toronto, California, and New York City. The label 'social' includes terms like people, women, kids, children, and family. Unlike hashtags, these labels represent groups of related terms.

MENTIONS

An analysis of user mentions in tweets can be an indicator of topics being discussed as well as potential influence. Whenever a user name (preceded by an @ symbol) is part of a tweet, it acknowledges a user or usually one of their tweets. We can assume that accounts that are mentioned frequently gain attention as a result of the content or frequency of their tweets. Examining the top 20 most frequently mentioned accounts indicates nine professors (seven from planning), seven organizations (planning or news), two planning programs, one planner (consultant), and one doctoral student (see *Table 5*). While @CityLab had the most mentions (1,549), these, while still noteworthy, represent only a very small fraction of the 328,568 total mentions.

HASHTAG	FREQUENCY	PERCENT
CityLab	1,549	0.5
drschweitzer	1,411	0.4
frankjamespopep	1,387	0.4
DarrickHamilton	1,195	0.4
nytimes	1,122	0.3
RYSURP	956	0.3
julianagyeman	861	0.3
USCPrice	830	0.3
FJPopper	814	0.2
SandyDarity	739	0.2
surlyurbanist	702	0.2
BrentToderian	695	0.2
NextCityOrg	683	0.2
planetizen	680	0.2
TheEconomist	678	0.2
ananyaUCLA	666	0.2
DanImmergluck	649	0.2
Rkeil	649	0.2
The_ACSP	620	0.2
APA_Planning	588	0.2

NETWORKS AND INFLUENCERS

In addition to topics of interest being shared on Twitter, this study also considered the network of users. The primary group of users is urban planning faculty; however, all of them are connected to followers and friends. Network analysis methods were used to examine how urban planning faculty were connected to other users. Overall, the 323 urban planning faculty with active Twitter accounts had a total of 336,822 followers. *Table 6* lists the top 10 non-faculty followers, which are the accounts from outside the group of 323 planning faculty. The followers are composed of three organizations, three outside professors/instructors, three students, and one academic planning publication.

Table 6 Top 10 non-faculty followers.

USER NAME	FREQUENCY
The_ACSP	92
Erualdo	65
soplacers	63
nlamontagne	62
WrayAJ	56

USER NAME	FREQUENCY
DanImmergluck	55
amariearbis	54
JPER7	53
huyenkle	52
UCBDisplacement	51

Planning faculty followed (i.e., friended) 148,310 other user accounts, some of which were other urban planning faculty. The list of the top 10 Twitter accounts being followed in comprised of six planning-related news or research organizations and one news organization, along with APA and ACSP (the professional organizations for planning professionals and planning academics, see *Table 7*).

FRIEND	FREQUENCY
Planetizen	150
CityLab	149
BarackObama	125
APA_Planning	108
NextCityOrg	107
Nytimes	107
The_ACSP	100
CitiesResearch	87
UrbanLandInst	87
Urbaninstitute	78

Table 7 Top 10 urban planning faculty Twitter friends.

The network analysis provided additional metrics to assess Twitter users' relative influence according to their position in the network. The Twitter data used here result in a directed network because following and friending imply a type and direction of connection for each faculty member. The number of followers is the 'in-degree', and the number of friends is the 'out-degree'. The 'weighted degree' incorporates ties that are shared between nodes or users. The top 10 users by weighted degree are shown in *Table 8*. These only include urban planning faculty because the full data of their followers and friends were not included. The original data were based on a single degree of separation between urban planning faculty and their followers and friends. Assuming an average of 100 unique followers and friends, this would mean more than an additional 33,600,000 users or nodes in the network.

LABEL	WEIGHTED DEGREE
DrBobBullard	27,782
DarrickHamilton	23,950
Drschweitzer	10,672
ananyaUCLA	10,151
FreeBlackTX	7,721
pittman17	7,015
Rkeil	6,738
Julianagyeman	6,612
Pjrplan	6,089
Tomwsanchez	5,269

Table 8 Top 10 network weighted degree.

Another network metric that indicates the relative level of influence is 'betweenness centrality'. While the number of total connections (degree) implies overall network connectivity, the location in the network relative to the connectedness of followers and friends indicates that nodes or users with high measures of betweenness centrality serve as hubs or bridges between regions and are critical to the flow of information. Betweenness centrality is calculated as the number of shortest paths between all nodes on the network of selected users ($337,000^2$ or 1.1×10^{11}). Given the vastness of the network, even the users with the highest betweenness centrality (above 5,000,000) are on the shortest path between only 0.006% of all Twitter users. This indicates a dispersed network without significant clustering or density generated by planning academics (see ***Table 9***). This is not surprising given the small numbers of planning academics.

LABEL	BETWEENNESS CENTRALITY
Drschweitzer	6,688,325
Tomwsanchez	6,662,607
DrBobBullard	5,848,058
DarrickHamilton	4,964,018
ananyaUCLA	3,930,584
pittman17	2,627,553
Cschively	2,510,091
AlexKarner	2,158,646
Rkeil	2,101,148
Rgoodspeed	2,073,364

Table 9 Top 10 network betweenness centrality.

SUMMARY

Urban planning is a small academic discipline with about 1,100 faculty and just over 100 academic programs in the U.S. and Canada. Of these 1,100, approximately one-third actively use Twitter. There are no other empirical analyses of disciplines allied with planning, such as public administration, urban studies, and public policy, so it is difficult to say how the patterns exhibited by planning faculty compare to other disciplines. Beyond the 323 urban planning faculty, the data suggest that over 300,000 other users are interested in what urban planning faculty share on the platform. It can be assumed that the Twitter network of these users extends beyond these 300,000 when considering additional followers and friends not accounted for in this analysis. An estimate is that in the range of 1,000,000 Twitter users are interested in urban-planning-related topics within two degrees of separation from the most popular accounts, like NextCity, Planetizen, CityLab, and APA.

The rate of Twitter adoption by urban planning academics has declined and appears to be approaching a plateau. The results show that about one-third of tweets from planning faculty have original content, with most of the tweets being recycled from other accounts. The results also show that hashtags are not a reliable way to track tweet topics because they are not used on a uniform basis. Of the tweets with hashtags, the popular themes were related to climate change, cities, planning, technology, and data. A more complete analysis of tweet content involved labeling topics through text analysis. The resulting set of planning-related themes was similar to that found by Sanchez and Afzalan (2017). Excluding personal topics, tweets about places, social dynamics, economy, and environment were most frequent, along with topics related to scholarship and education.

The core network for urban planning faculty using Twitter is small but, as noted earlier, becomes notably more extensive when considering second- and third-degree connections. The network analysis shows influential faculty as well as organizations who share information on planning-related topics. However, the focus on the connections of the 323 urban planning faculty, as opposed to a more complete network, represents a limitation of this study. On the other hand, non-academic accounts such as Planetizen (73,000 followers), CityLab (216,000 followers), APA (53,000 followers), and NextCity (114,000 followers) appear to be the most significant

influencers on urban-planning-related topics. This is somewhat expected because faculty tend to have narrowly defined areas of expertise, while these organizations share information on a broad range of topics frequently.

CONCLUSIONS

This paper began by broadly establishing the context for faculty use of social media platforms such as Twitter. So far, there is little or no evidence to suggest that Twitter posts represent significant contributions to research, teaching, or academic service activities. However, this is not to say that Twitter posts cannot support each of these three areas. The evidence indicates that urban planning faculty using Twitter are engaging in conversations about urban-planning-oriented scholarship and education. Drawing on some key characteristics of Twitter activities, the results suggest that they use the platform to exchange ideas and opinions with colleagues and non-professionals interested in planning topics.

The analysis reported here is limited by the nature of Twitter communications. The character limit on tweets makes context and motivation difficult to discern. This may be addressed by analyzing Twitter discussion threads (multiple connected tweets) rather than individual tweets. However, context is a lingering challenge for text mining techniques. Additionally, this study's narrow focus on the core group of planning faculty users could be expanded to include the full constellation of connections, tweets, and characteristics of all 337,000 users connected to urban planning faculty.

As noted earlier, the academic urban planning presence on Twitter is a small piece of the urban planning landscape. More prominent connections may occur through information sharing by organizations such as CityLab, NextCity, APA, and Planetizen. While speculative, this finding is worthy of further research to identify the degree to which Twitter facilitates planning academic and planning practitioner dialogue. Such interaction may be concentrated on other social media platforms such as Facebook. Facebook includes interest groups that engage academics and professionals, including those with interests focused on urban design, transportation, new urbanism, and the like. The activity across these platforms and other social media sites would also be an interesting topic of future research. Two particular concerns about academic uses of social media include: 1) the large volume of misinformation and incivility on these sites (see Oz, Zheng, & Chen 2018) and 2) the time cost and addictive properties of social media (see Donelan 2016). The first of these has received a significant amount of attention, whereas the expanding amount of professional time being used in off hours is uncompensated and the equivalent of overtime. The personal effects of these two issues represent important areas for future research that are associated with the personal and professional impacts of social media for academics.

The benefits of Twitter for planning faculty are potentially related to scholarly communications, network building, and expanding the classroom experience. Previous research has examined these applications for other academic disciplines, but none to date for urban planning. Along with the data examined in this analysis, more can be learned about personal expectations and experiences through additional data collection, such as survey research, directly from planning faculty.

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The author has no competing interests to declare.

REFERENCES

Allcott, H., & **Gentzkow, M.** (2017). Social media and fake news in the 2016 election. *Journal of Economic Perspectives*, *31*(2), 211–36. DOI: *https://doi.org/10.1257/jep.31.2.211*

Bargh, J. A., & **McKenna, K. Y.** (2004). The Internet and social life. *Annual Review of Psychology*, *55*, 573–590. DOI: *https://doi.org/10.1146/annurev.psych.55.090902.141922*

Baruffaldi, S. H., Di Maio, G., & **Landoni, P.** (2017). Determinants of Ph.D. holders' use of social networking sites: An analysis based on LinkedIn. *Research Policy*, *46*(4), 740–750. DOI: *https://doi.org/10.1016/j.respol.2017.01.014*

Cabrera, D., Vartabedian, B. S., Spinner, R. J., Jordan, B. L., Aase, L. A., & **Timimi, F. K.** (2017). More than likes and tweets: Creating social media portfolios for academic promotion and tenure. *Journal of Graduate Medical Education*, *9*(4), 421–425. DOI: *https://doi.org/10.4300/JGME-D-17-00171.1*

Carpenter, J. P., & **Krutka, D. G.** (2014). How and why educators use Twitter: A survey of the field. *Journal of Research on Technology in Education*, *46*(4), 414–434. DOI: *https://doi.org/10.1080/15391523.2014.925701*

Creeber, G., & **Martin, R.** (2008). *Digital Culture: Understanding New Media: Understanding New Media*. McGraw-Hill Education (UK).

Donelan, H. (2016). Social media for professional development and networking opportunities in academia. *Journal of Further and Higher Education*, *40*(5), 706–729. DOI: *https://doi.org/10.1080/0309877X.2015.1014321*

Evans-Cowley, J., & **Hollander, J.** (2010). The new generation of public participation: Internet-based participation tools. *Planning Practice & Research*, *25*(3), 397–408. DOI: *https://doi.org/10.1080/02697459.2010.503432*

Gruzd, A., Staves, K., & **Wilk, A.** (2011). Tenure and promotion in the age of online social media. *Proceedings of the American Society for Information Science and Technology*, *48*(1), 1–9. DOI: *https://doi.org/10.1002/meet.2011.14504801154*

Gruzd, A., Wellman, B., & **Takhteyev, Y.** (2011). Imagining Twitter as an imagined community. *American Behavioral Scientist*, *55*(10), 1294–1318. DOI: *https://doi.org/10.1177/0002764211409378*

Hall, N. (2014). The Kardashian index: A measure of discrepant social media profile for scientists. *Genome Biology*, *15*(7), 424. DOI: *https://doi.org/10.1186/s13059-014-0424-0*

Hilbert, M., & **López, P.** (2011). The world's technological capacity to store, communicate and compute information. *Science*, *332*(6025), 60–65. DOI: *https://doi.org/10.1126/science.1200970*

Hollander, J., Graves, E., Renski, H., Foster-Karim, C., Wiley, A., & **Das, D.** (2016). *Urban Social Listening: Potential and Pitfalls for Using Microblogging Data in Studying Cities*. London: Palgrave Macmillan. DOI: *https://doi.org/10.1057/978-1-137-59491-4*

Kassens-Noor, E. (2012). Twitter as a teaching practice to enhance active and informal learning in higher education: The case of sustainable tweets. *Active Learning in Higher Education*, *13*(1), 9–21. DOI: *https://doi.org/10.1177/1469787411429190*

Lee, K., Palsetia, D., Narayanan, R., Patwary, M. M. A., Agrawal, A., & **Choudhary, A.** (2011). December. Twitter trending topic classification. In *2011 IEEE 11th International Conference on Data Mining Workshops* (pp. 251–258). IEEE. DOI: *https://doi.org/10.1109/ICDMW.2011.171*

Leetaru, K. (2019). *Visualizing Seven Years Of Twitter's Evolution: 2012–2018*. Retrieved May 11, 2020 from *https://www.forbes.com/sites/kalevleetaru/2019/03/04/visualizing-seven-years-of-twitters-evolution-2012-2018/*

Li, J., & **Greenhow, C.** (2015). Scholars and social media: Tweeting in the conference backchannel for professional learning. *Educational Media International*, *52*(1), 1–14. DOI: *https://doi.org/10.1080/09523987.2015.1005426*

Martín-Martín, A., Orduña-Malea, E., & **Delgado López-Cózar, E.** (2016). The role of ego in academic profile services: Comparing Google Scholar, ResearchGate, Mendeley, and ResearcherID. *ResearchGate, Mendeley, and ResearcherID (March 4, 2016)*. DOI: *https://doi.org/10.31235/osf.io/nk7my*

Megele, C. (2014). Theorizing Twitter chat. *Journal of Perspectives in Applied Academic Practice*, *2*(2). DOI: *https://doi.org/10.14297/jpaap.v2i2.106*

Mohammadi, E., Thelwall, M., Kwasny, M., & **Holmes, K. L.** (2018). Academic information on Twitter: A user survey. *PloS one*, *13*(5). DOI: *https://doi.org/10.1371/journal.pone.0197265*

Nie, N. H., & **Erbring, L.** (2002). Internet and society: A preliminary report. *IT & Society*, *1*(1), 275–283.

Nummi, P. (2019). Social media data analysis in urban e-planning. In *Smart Cities and Smart Spaces: Concepts, Methodologies, Tools, and Applications* (pp. 636–651). IGI Global. DOI: *https://doi.org/10.4018/978-1-5225-7030-1.ch028*

O'Meara, K. (2016). How scholarship reconsidered disrupted the promotion and tenure system. Scholarship Reconsidered. *Priorities of the Professoriate*, 41–51.

Oz, M., Zheng, P., & **Chen, G. M.** (2018). Twitter versus Facebook: Comparing incivility, impoliteness, and deliberative attributes. *New Media & Society*, *20*(9), 3400–3419. DOI: *https://doi.org/10.1177/1461444817749516*

Prada, A., & **Iglesias, C. A.** (2020). Predicting reputation in the sharing economy with Twitter social data. *Applied Sciences, 10*(8), 2881. DOI: *https://doi.org/10.3390/app10082881*

Priem, J., & **Costello, K. L.** (2010). How and why scholars cite on Twitter. *Proceedings of the American Society for Information Science and Technology, 47*(1), 1–4. DOI: *https://doi.org/10.1002/meet.14504701201*

Riddell, J., Brown, A., Kovic, I., & **Jauregui, J.** (2017). Who are the most influential emergency physicians on Twitter? *Western Journal of Emergency Medicine, 18*(2), 281. DOI: *https://doi.org/10.5811/westjem.2016.11.31299*

Riquelme, F., & **González-Cantergiani, P.** (2016). Measuring user influence on Twitter: A survey. *Information Processing & Management, 52*(5), 949–975. DOI: *https://doi.org/10.1016/j.ipm.2016.04.003*

Roth, M. S. (2014). *Beyond the university: Why liberal education matters*. Yale University Press.

Sanchez, T. W. (2017). Faculty performance evaluation using citation analysis: An update. *Journal of Planning Education and Research, 37*(1), 83–94. DOI: *https://doi.org/10.1177/0739456X16633500*

Sanchez, T. W., & **Afzalan, N.** (2017). Mapping the knowledge domain of urban planning. In Sanchez, T. W. (Ed.) *Planning Knowledge and Research* (pp. 69–84). Routledge. DOI: *https://doi.org/10.4324/9781315308715-6*

Schimanski, L. A., & **Alperin, J. P.** (2018). The evaluation of scholarship in academic promotion and tenure processes: Past, present, and future. *F1000Research, 7*. DOI: *https://doi.org/10.12688/f1000research.16493.1*

Schweitzer, L. (2014). Planning and social media: A case study of public transit and stigma on Twitter. *Journal of the American Planning Association, 80*(3), 218–238. DOI: *https://doi.org/10.1080/01944363.2014.980439*

Shelton, T., Poorthuis, A., & **Zook, M.** (2015). Social media and the city: Rethinking urban socio-spatial inequality using user-generated geographic information. *Landscape and Urban Planning, 142*, 198–211. DOI: *https://doi.org/10.1016/j.landurbplan.2015.02.020*

Skeels, M. M., & **Grudin, J.** (2009). May. When social networks cross boundaries: A case study of workplace use of Facebook and LinkedIn. In *Proceedings of the ACM 2009 international conference on Supporting group work* (pp. 95–104). ACM. DOI: *https://doi.org/10.1145/1531674.1531689*

Sörlin, S., & **Vessuri, H.** (Eds.) (2007). *Knowledge society vs. knowledge economy: Knowledge, Power, and Politics*. Springer. DOI: *https://doi.org/10.1057/9780230603516*

Thelwall, M., Tsou, A., Weingart, S., Holmberg, K., & **Haustein, S.** (2013). Tweeting links to academic articles. *Cybermetrics: International Journal of Scientometrics, Informetrics and Bibliometrics, 17*, 1–8.

Veletsianos, G., & **Kimmons, R.** (2013). Scholars and faculty members' lived experiences in online social networks. *The Internet and Higher Education, 16*, 43–50. DOI: *https://doi.org/10.1016/j.iheduc.2012.01.004*

Weller, M. (2011). *The digital scholar: How technology is transforming scholarly practice*. A&C Black. DOI: *https://doi.org/10.5040/9781849666275*

Wojcik, S., & **Hughes, A.** (2019). Sizing up Twitter users. Retrieved May 12, 2020 from *https://www.pewresearch.org/internet/2019/04/24/sizing-up-twitter-users/*

Williamson, W., & **Ruming, K.** (2016). Using social network analysis to visualize the social-media networks of community groups: Two case studies from Sydney. *Journal of Urban Technology, 23*(3), 69–89. DOI: *https://doi.org/10.1080/10630732.2016.1197490*

Yan, W., Zhang, Y., & **Bromfield, W.** (2018). Analyzing the follower–followee ratio to determine user characteristics and institutional participation differences among research universities on ResearchGate. *Scientometrics, 115*(1), 299–316. DOI: *https://doi.org/10.1007/s11192-018-2637-6*