Social Media Analytics in Education

What Is It, How Is It Useful, and What Does It Tell Us About How Schools Are Discussed in Social Media?

DICK M. CARPENTER II
JENIFER WALSH ROBERTSON
MICHELE E. JOHNSON
SCOTT BLUM

ABSTRACT: This study measured the salience of, sentiment of, and topics about schools in social media. Based on a mixed-methods approach, results indicated that school districts do not appear to be discussed often or widely, but the small numbers of people who communicate about districts do so repeatedly, positively, and in concentration. Larger and wealthier districts are more salient in social media and discussed more positively. The topics in social media about education fall within eight general themes. Sources of social media include school districts, news media, and nondistrict. The most dominant type was YouTube, while the least prevalent were Facebook and Twitter.

It has long been recognized that a significant part of educational leadership is communication, certainly with school personnel but also with the larger community (Cattermole & Robinson, 1985; Flannery, 1983; Kelly, 2009; Kernan-Schloss & Plattner, 1998; Marcuse, 1980; Nebgen,
Traditionally, leaders communicate with constituents through newsletters, faxes, the media (i.e., newspapers and television), town hall meetings, e-mail, and, in recent years, websites. The common characteristic in such forms of communication is direction—they are all predominantly one way, from leader to constituents.

In the past, such communication patterns may have been functionally adequate. Conversations among parents and other stakeholders occurred at the grocery store, before or after the occasional school-related meeting, around the swimming pool in the summer, at a sporting event, or during some other public affair. A leader’s presence at or participation in some of these conversations enabled him to (a) measure public perceptions, moods, or opinions, which could be used in decision making, and to (b) exert some amount of “message control.” To the extent that leaders wanted more information about constituent opinion, they could always implement an annual survey of patrons.

According to some school communication experts (Porterfield & Carnes, 2012), these patterns of communication are no longer adequate. With the advent of social media, important conversations about schools are occurring on neighborhood digital bulletin boards, on web and Twitter sites, in blogs, on Facebook, even on YouTube. As Porterfield and Carnes describe,

schools and school leaders who are not participants in the new media are missing out on what the community is saying about their children’s education. The consequences for schools not being part of the conversation can be dire. They are the same consequences that a school leader might have suffered a decade ago for never being available to meet with parent or parent groups, not responding to parents’ requests, or not maintaining relationships with civic leaders. The superintendent or principal is marked as nonresponsive, and the school loses community support or becomes the object of intensive media scrutiny. Sometimes, a principal gets moved or a superintendent’s contract is not renewed because he or she is perceived to be “not present.” The difference today is that the groundswell of discontent grows a whole lot faster and can spread a whole lot further. (pp. 118-119)

Clearly, Porterfield and Carnes assert that educational leaders for too long have focused on one-way information and controlling messages and equivocated on the role of social media in education.

Indeed, for Porterfield and Carnes (2012) and others (Butler, 2010; Gonzales, Vodicka, & White, 2011), the debate about social media and schools has already passed school leaders by. Social media is firmly entrenched, and it is just a matter of time before educational leaders are compelled to adapt and adopt. But survey results reveal that compulsion is not yet widely felt. As Porterfield and Carnes report, a member survey conducted by the American Association of School Administrators revealed that fewer than 20% of school leaders make regular use of social media channels. Thirty percent of respondents maintained a blog, but only about 10% posted on it regularly. Moreover, superintendents in focus group said that they wanted nothing to do with social media, citing possible dangers associated with it.

A recent school district’s decision in Texas seems to confirm that sentiment. After maintaining an active district Facebook page, the district closed the page, announcing

Mansfield Independent School District will no longer host district or campus-level Facebook pages. The open nature of the Facebook commenting feature continues to cause regular disruption and place the district as a liable participant in issues related to sharing of private student information, defamation of employees, and other abusive online behavior. (Escovedo, 2011, para. 2)

Of course, closing a district-sponsored page does not stop other conversations that may be transpiring about schools in other social media venues. Although some social media sites can be set not to allow the addition of content by non-account holders (Escovedo, 2011), using social media to communicate to, rather than with, constituents—as some authors describe (Butler, 2010; Gonzales et al., 2011)—puts leaders back into a mode of one-way communication, just with newer technology. To the extent that their schools are discussed in social media, how can leaders know what is said about their schools in social media in a way that provides
them valuable feedback for decision making and the opportunity to be responsive at the speed of new media.

We qualify this with “to the extent” because to date, little is actually known about the extent to which schools are the topic of conversation in social media. The assertions and recommendations of social media enthusiasts for education are often long on anecdotes about how parents use social media to force change in their schools but short on an empirical substantiation. Thus, this study represents, to our knowledge, the first of its type. We attempt to measure the following: the presence, or salience, of schools in social media; the sentiment of those discussions using social media analytics—a tool that educational leaders can use to take the pulse of public perceptions and opinions about their own organizations; and the topics about schools present in social media.

Results indicate that school districts do not appear to be discussed often or widely by different people, but the small numbers of people who communicate about districts do so repeatedly and in concentration. The substance of that communication appears to be generally, although not overwhelmingly, positive. Larger and wealthier districts are more salient in social media and discussed more positively in the communication. The topics addressed in social media about education vary widely but fall within eight general themes: operations, people, community and outreach, secondary, politics and policy, controversy, performance, and safety. The most prevalent theme is people and the least is performance. Sources of social media include school districts, news media, and nondistrict, and the types of social media in which education is discussed include a dozen or more platforms. The most dominant type in these results was YouTube; among the least prevalent were Facebook and Twitter.

**Literature Review**

The fact that social networks are pervasive in our society is not in doubt to anyone paying attention to digital and print media, using the Internet, or even shopping in a physical store location. Social networks are not just becoming a part of our culture—they are our culture. A metric about Facebook use illustrates the growing ubiquity of social media: The year 2010 saw 400 million active Facebook users; by 2012, the number had more than doubled to 845 million (Kavanaugh et al., 2012). As is often the case with technology adoption, user rates are greater among younger people: 73% of teenagers engage in social networking (Neiger et al., 2012). But adult user rates are not much less, at 65% (Aquino, 2012). As never before, societies and organizations are more connected, and they are finding that they have to be more responsive to the emergence of this new collective empowerment (Schultz, 2009). Clearly, social media is ubiquitous in modern life, but what that means for educational leaders is somewhat less obvious.

While the precise definition of the term social media is somewhat dependent on the context, several aspects are universally understood. In general, social media is shorthand for a set of online tools designed for and centered on social interaction. It is commonly thought of as a conglomeration of web-based technologies and services, such as blogs, microblogs (i.e., Twitter), social sharing services (e.g., YouTube, Flickr, StumbleUpon, Last.fm), text messaging, discussion forums, collaborative editing tools (e.g., wikis), virtual worlds (e.g., Second Life), and social networking services (e.g., Facebook, MySpace; Hansen, Smith, & Shneiderman, 2011; Palen, 2008). These tools vary dramatically in their purposes and approaches, but they share an emphasis on enabling users to communicate, interact (Landsbergen, 2010), and share information in an online environment (Yates & Paquette, 2011). Thus, social media is in a very literal sense a user-driven activity unique from previous mass communication channels.

At least three dimensions define the role of users: Users are suppliers of content; users support the distribution of content and service; and users select, filter, and consume relevant content and services (Ahlgvist, Back, Heinonen, & Halonen, 2010). These roles include a variety of activities,
including content creation, social interaction (Abrahams, Jiao, Wang, & Fan, 2012), communication over actual or virtual distance (Landsbergen, 2010), and open exchange of information (Yates & Paquette, 2011). Facilitation of these roles can be accomplished via one-way transmission to an online community in which large groups of users with common interests or activities communicate and share resources (Huffaker, 2010).

The reasons for participating in social media interaction are likely as varied as the number of participants, but several recurring themes occur among users and consumers. “One of the arguments made about the value of social media [Facebook, Twitter, Blogs] is that they are user-directed. People sign up for the information themselves, self-select to receive it, and an organization can push messages to interested individuals” (Kent, Carr, Husted, & Pop. 2011, p. 538). Another is the ability to use social media for decision making. Joly (2010) asserts, “It’s time to stop making decisions based on hunches, guesses, or opinions and switch to a more data-driven approach” (p. 30), where data generated by social media can be used by leaders for decision making. From the end-user perspective, social media enables ordinary people to influence many areas of public life and sway other people’s opinions (Auer, 2011).

As social media becomes even more prevalent and as retailers, government agencies, and nonprofit organizations continue to support and encourage its use, it will grow increasingly more important for leaders—including those in the education sector—to examine how best to implement an effective social media strategy. This will include not only how to broadcast information to users but also how to use social media as an input to gather data for leadership decision making. An increasingly common way of doing so is through social media analytics.

**Social Media Analytics**

Social media analytics can provide valuable information to leaders regarding their customers or constituents through the management of data produced and accumulated in social media. These tools provide quantitative data that interested parties (companies, governments, health officials, educators) can use to monitor the public conversation and take action if needed (Chaudhary, Subramanian, Sinha, & Bhattacharyya, 2012). Analytics can be used to “collect, monitor, analyze, summarize, and visualize social media data” (Zeng, Chen, Lusch, and Li, 2010, pg. 14). Simply put, analytics tools help turn social media data into meaningful information.

**Importance for Leaders**

Leaders can use this information to make better decisions (Johnson, 2012). “Social media is the canary in the coal mine. It provides early warning of issues that can become major problems if they are not detected quickly” (Lamont, 2013, p. 9). Social media analytics are important to leaders because they can help organizations understand significant events, trends, and decisions (Auer, 2011) and monitor their “brand” to engage with their constituents more proactively and effectively (Aquino, 2012). In particular, leaders can listen to and potentially engage people through social media who would not communicate through more traditional means (Chia, 2011; Kavanaugh et al., 2012). This is as true for school leaders as it is for those of other types of organizations. In fact, among Blakeslee’s (2012) recommendations for social media use by districts, the first is to listen to what is being said about the school and district to be aware of conversations that are occurring. Often, however, the overwhelming amount of information produced by social media presents challenges in filtering useful information from the junk (Auer, 2011), which is why analytics can be useful.

**How is it Done?**

The available social media analytics tools have grown from ad hoc methods used by companies for many years to monitor their Internet presence to sophisticated listening platforms that can intercept and act on communication events.
These techniques, from the ad hoc to the sophisticated, are
known as web analytics. In web analytics, organizations
gather data on how many times a web page is displayed,
how much data are sent over web servers, the use of RSS
feeds to monitor sites and newfeeds that are critical to busi-
ness operations, or what customers are doing online before
and after they visit a specific site (Aquino, 2012; Karpinski,
2009). Although social media analytics does some of that, it
differs in that it focuses heavily on text mining.

Text mining comprises a process in which trends or pat-
terns are uncovered in unstructured text data—that is, text
files, HTML files, chat messages, e-mails, and various forms
of social media communication (Barbier & Liu, 2011; Bollen
& Mao, 2011). These techniques can help explain patterns
and trends that emerge (He, Zha, & Li, in press). One of
the most common methods is natural language processing.
According to Breur (2011) computerized natural language
processing methods “analyze the structure and content of
words” (p. 101). Natural language processing is able to ex-
amine grammar and how the words relate to one another
through the use of language taxonomies and predictive algo-
rithms, and because it is completed on computers, vast
amounts of data can be analyzed at one time. One of the
most popular forms of social media analytics is sentiment
analysis.

Sentiment Analysis

Sentiment analysis involves the assessment of emotion or
mood with respect to the text data being analyzed. It analyzes
sentiments expressed in social media content to measure
the ambient or general sentiment (Lamont, 2013). Kennedy
(2012) further explains that “the analysis includes the use
of natural language processing (NLP) to analyze word use, word
order, and word combination to . . . classify sentiments, often
into the categories of positive, negative, or neutral” (p. 435).
Sentiment analysis is performed by academics, politicians,
media organizations, and charities to provide detailed infor-
mation about public opinion and feeling (Lamont, 2013). It is
outside the scope of this study to discuss natural language
processing in great detail, but Vohra and Teraiya (2013) pro-
vide a more comprehensive discussion for those interested.

All of this automated text mining and analysis comes with
a price, however. One of the largest is evolving taxonomies.
For example, slang words and “dirty” text (typographical/
grammatical errors) are difficult to interpret. Moreover, Abra-
hams and colleagues (2012) found that sentiment analysis
can sometimes lead to an incorrect interpretation of word
usage because of a failure to take context into consideration.
These challenges are being addressed, however, by social
media analytics entrepreneurs who now offer analytics ser-
dices to organizations and industries, often using human
coders for interpretation. To improve the analytics process,
these companies are monitoring the data, processes, and
feedback in near real time to address immediate challenges
and improve the process.

Research on Social Media Analytics

Despite its ubiquity, social media is a relatively new phe-

omenon and social media analytics even more so. This
means that the empirical literature on social media analy-
sis is comparatively nascent. One of the most prevalent
topics in research on social media analytics is how it is
used in business. According to Rappaport (2010), analy-
tics is used as a “listening solution” to help guide strategic
decision making and communication. By listening through
analytics, companies can discern what people are saying,
why they are communicating, what is popular (or not), and
the like. For example, Kwok and Yu (2013), in their analy-
sis of 982 Facebook posts about 12 top restaurant chains,
used content-based message popularity to determine words
that were indicative of popular posts. He and colleagues
(in press) likewise performed text mining of Facebook and
Twitter posts for the three largest pizza chains in the United
States. Twitter data analysis resulted in identification of
five themes—ordering and delivering, quality, feedback on
customer’s purchase decisions, casual socialization tweets.
and marketing tweets—and Facebook analysis resulted in six prevalent themes: posting of pictures, questions of consumers, contest and game information, company and community activity, appreciation posts, and promotional posts. In an example of sentiment analysis, Nel, Bisschoff, and Bisschoff (2012) used seven metrics from Socialmention.com, a free online social media analytics tool, to analyze perceptions of six winery brands.

Social media analytics can also be used to facilitate problem detection for problem solving. In research related to the health care industry, for example, analytics were used to monitor drug-related adverse events (Bian, Topaloglu, & Yu, 2011) and to categorize themes related to dental pain (Heavilin, Gerbert, Page, & Gibbs, 2011). In research on the automobile industry, Abrahams and colleagues (2012) used analytics text mining to identify performance and safety defects.

Business applications are not the only context present in the research on social media analytics. There are also a few works on the use of social media analytics by government (Landsbergen, 2010). For example, in collaboration with the county government in Arlington, Virginia, Kavanaugh and colleagues (2012) conducted a 6-month exploratory study of the use of social media by government. Results indicated some use of social media analytics to monitor public opinion before and after large public events, but the analytics was not as systematic or advanced as in business settings. Just across the Potomac River from Arlington, however, District of Columbia government officials paid a company to perform social media analytics using data from Twitter, Facebook, and other online message boards as well as the government’s own website (Portlock, 2012). Data were used to evaluate the performance of city bureaucracies. According to Portlock, the limited number of such examples of governments using analytics demonstrates how the field of analyzing social media for them is still in its infancy. Many cities interact with constituents through social media, but few use it to collect information, and an even smaller number use it in a more analytical way (Portlock, 2012).

The research on social media analytics in education is even sparser—there appears to be none. Instead, the literature on social media and K–12 education is overwhelmingly dominated by prescriptions and recommendations. In particular, authors call for educational leaders to increase their use of social media as a way to communicate more effectively and efficiently with constituents (Blakeslee, 2012; Butler, 2010; Gonzales et al., 2011; Kelly, 2009; Portefield & Carnes, 2012). Although occasional references are made to listening to parents and patrons through social media (Blakeslee, 2012), no articles discuss analytics in education, either to make recommendations for practice or to study the use of in any way. According to Kennedy (2012), this is not entirely surprising—social media analytics, particularly sentiment analysis, is a sufficiently recent phenomenon, meaning that few relevant studies appear in any academic discipline. This makes the present study particularly timely.

**Method**

This study was guided by four research questions.

**Research Question 1:** What is the salience of school districts in social media?

**Research Question 2:** What is the sentiment toward school districts in social media?

**Research Question 3:** Are there significant differences in the salience and sentiment among school districts based on district demographics?

**Research Question 4:** How are school districts discussed in social media?

**Sample**

The unit of analysis for this study was school districts. The sample comprised 100 school districts randomly chosen
(as a simple random sample) from the population list of districts in the Common Core of Data, maintained by the National Center for Education Statistics (http://www.nces.ed.gov/ccd). As described on its website, the Common Core of Data annually collects fiscal and non-fiscal data about all public schools, public school districts and state education agencies in the United States. The data are supplied by state education agency officials and include information that describes schools and school districts, including name, address, and phone number; descriptive information about students and staff, including demographics; and fiscal data, including revenues and current expenditures. (para. 1)

In building our sample from this source, “nontraditional” districts, such as Boards of Cooperative Educational Services, were excluded from the sample. Upon implementation of the study, the latest school year for which the list of districts was available was 2010–2011. Table 1 includes descriptive statistics for the sample.

On average, the sample districts served almost 5,500 students. Demographically, the student bodies were primarily White, with a small percentage classified as English-language learner. More than 40%, however, qualified for the free and reduced-price lunch program. Of the adult populations living in those districts, 14% were senior citizens, and almost a quarter held at least a bachelor’s degree. The median family income was almost 850,000.

Table 1. Descriptive Statistics for Independent Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage minority</td>
<td>0.26</td>
<td>0.28</td>
<td>0.06</td>
<td>1.00</td>
</tr>
<tr>
<td>Percentage FRL</td>
<td>0.43</td>
<td>0.24</td>
<td>0.00</td>
<td>0.95</td>
</tr>
<tr>
<td>Percentage ELL</td>
<td>0.03</td>
<td>0.06</td>
<td>0.00</td>
<td>0.37</td>
</tr>
<tr>
<td>Percentage senior citizens</td>
<td>0.14</td>
<td>0.05</td>
<td>0.03</td>
<td>0.30</td>
</tr>
<tr>
<td>Percentage bachelor’s degree</td>
<td>0.24</td>
<td>0.16</td>
<td>0.03</td>
<td>0.62</td>
</tr>
<tr>
<td>Total enrollment</td>
<td>5,489.69</td>
<td>19,383.39</td>
<td>5</td>
<td>176,006</td>
</tr>
<tr>
<td>Median income</td>
<td>45,461.26</td>
<td>19,116.58</td>
<td>16,163</td>
<td>126,363</td>
</tr>
</tbody>
</table>

Table Notes: FRL = free and reduced-price lunch; ELL = English-language learner.

Data and Variables

Two sources of data were used in this study—Socialmention.com and the aforementioned Common Core of Data. Socialmention.com is a social media search and analysis platform that aggregates user-generated content from a number of different but important social media platforms into a single stream of information (Nel et al., 2012). Note that Socialmention.com and similar sites (social-searcher.com, howsocialable.com, and addictomatic.com) differ from platforms such as Hootsuite in that the latter enables users to monitor specific sites and manage their own social networks, while the former collect data from a wider range of sites. In so doing, Socialmention.com allows the user to easily track and measure the content and volume of social media across the web’s social media landscape in real time. Several recent studies have used or referred to Socialmention.com as a source for social media data (Bugbin, 2011; Kennedy, 2012; Kouloumpis, Wilson, & Moore, 2011; Maynard & Funk, 2012; Nel et al., 2012; Panl, Patra, & De, 2012). For the present study, variables and their definitions, as drawn from Socialmention.com, include the following:

Strength: the likelihood that a name or brand is being discussed in social media; calculated by the number of times that the searched phrase is mentioned within the last 24 hours, divided by the number of total possible mentions.

Sentiment: the ratio of generally positive mentions to the number of generally negative mentions.

Passion: a measure of the likelihood that individuals talking about a name or brand in social media will do so repeatedly—a small number of individuals talking about a brand repeatedly will give a high passion score; a large number of individuals talking about a brand but only infrequently per individual will give a low passion score.

Reach: A measure of the range of influence; a ratio of the number of unique individuals talking about a name or
brand as a percentage of the number of total possible mentions.

Unique authors: an indicator or the number of authors messaging about a name or brand; measured by the number of unique authors messaging about a brand within a particular period.

Number of mentions: a simple count of the number of social media mentions about a given topic.

Each variable was used as a dependent variable in the regressions described here.

Variables from the Common Core of Data were used as independent variables:

- Total student enrollment
- Percentage of students who are racial/ethnic minority
- Percentage of students who qualify for free and reduced-price lunch
- Percentage of students who are classified as English language learners
- Percentage of district population that is senior citizens
- Educational attainment of the district population, coded as the percentage of the population with at least a bachelor's degree
- Income of the district population, coded as median family income

These variables were included in the analysis based on prior literature indicating that the use of social media may differ according to demographic characteristics (Auer, 2011; Chou, Hunt, Beckford, Moser, & Hesse, 2009).

All data were screened for normality. For the dependent variables, strength, sentiment, reach, and number of unique authors all showed departures from the normality assumption. For the independent variables, analysis showed that enrollment number and percentage English-language learner departed significantly from normal. Therefore, a transformation of the raw data to the natural log of the values was used to achieve normality. Due to the nature of data collection, there were no missing data values.

Analysis

This study used a mixed-methods approach to answer the research questions (Creswell & Clark, 2011).

Quantitative

The quantitative analysis used descriptive statistics (frequencies, means, and standard deviations) to answer Research Questions 1 and 2. If the salience and sentiment of school districts are high, we expect the means and frequencies associated with the Socialmention.com variables to be large. To answer Research Question 3, we used fixed-effects ordinary least squares regression to analyze the relationship between the Common Core of Data variables (independent variables) and the six variables drawn from Socialmention.com (dependent variables). Specifically, the six regressions (one for each dependent variable) took the following form:

\[ Y = \beta_0 + \beta_1\text{[enrollment]} + \beta_2\text{[percentage minority]} + \beta_3\text{[percentage free and reduced-price lunch]} + \beta_4\text{[percentage English-language learner]} + \beta_5\text{[percentage senior citizens]} + \beta_6\text{[educational level]} + \beta_7\text{[income]} + \epsilon \]

with state fixed effects. In each regression, multicollinearity was tested but none detected.

Qualitative

The social media searches occurred September 2013. Search results for Socialmention.com include the social media upon which the sentiment and other metrics are based, such as Facebook postings, Tweets, YouTube videos, blog entries, and the like. The search for the sample of districts created a list of 1,505 “mentions,” after culling out clearly irrelevant mentions (discussed later in greater
We analyzed the substance of this social media communication using inductive coding (Merriam, 1998; Patton, 1990). Each social media communication (or mention) was assigned a code based on its content. This produced a list of 39 codes. The codes were then aggregated into eight larger themes to answer Research Question 4. Table 2 includes the eight themes and a definition of each.

Because multiple raters were used to code the qualitative data, an interrater reliability analysis was completed. A sample of the total list of mentions was coded by all four authors for the purpose of checking consistency. Cohen's kappa (Cohen, 1960) was used to analyze the consistency of coding, given the nominal scale of measurement. The mean coefficient kappa indicated .61 (p = .000), which is considered substantial agreement (Landis & Koch, 1977).

The coding of the data focused primarily on topics in the communications, but we also paid attention to the source of the social media and the type of social media for each mention. Source of social media was identified as district generated (e.g., a promotional video), news media (both legacy and new media), or nonnews media, nondistrict (typically something generated by a parent or student). Frequencies and percentages for each of these are described in the results.

<table>
<thead>
<tr>
<th>Theme</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operations</td>
<td>The business, technology, infrastructure, and programs within a district</td>
</tr>
<tr>
<td>People</td>
<td>The people within a district, including students and staff</td>
</tr>
<tr>
<td>Community/outreach</td>
<td>Incidents and initiatives where the district interfaces with the community</td>
</tr>
<tr>
<td>Secondary</td>
<td>The district is referenced in social media only secondarily</td>
</tr>
<tr>
<td>Politics and policy</td>
<td>The politics and policymaking of school districts</td>
</tr>
<tr>
<td>Controversy</td>
<td>The district is involved in controversy or litigation</td>
</tr>
<tr>
<td>Performance</td>
<td>The performance of the district is featured or discussed</td>
</tr>
<tr>
<td>Safety</td>
<td>Safety of district students and/or staff</td>
</tr>
</tbody>
</table>

The results are organized by research question.

Research Question 1

What is the salience of school districts in social media?
The first measure of salience is simply how many mentions, on average, are generated for each district. As Table 3 indicates, the mean number of mentions per district was approximately 30. Thirty-eight of the districts had no social media mentions at all. Eleven districts had more than 100 mentions each. While more than 100 may sound like a large number, that is tempered by the fact that these social media mentions could be weeks or even months old. Although we gathered data in September 2013, mentions were not only from that month. To put a mean of 30 in perspective, consider some comparisons. A search on the topic of “back-to-school shopping” yielded almost 200 mentions. A search on a random term such as “jet stream” produced more than 300 mentions. There is no “standard” number of mentions, of course, but a comparison like this provides a general relative indication of salience. Any given school district appears likely to be less salient in social media than, for example, back-to-school shopping or a term randomly chosen, at least as measured by the total number of mentions.

Additional metrics in Table 3 also indicate the salience of the sample districts in social media. The mean strength of the

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strength</td>
<td>0.13</td>
<td>0.54</td>
<td>4</td>
</tr>
<tr>
<td>Sentiment</td>
<td>5.47</td>
<td>12.63</td>
<td>76</td>
</tr>
<tr>
<td>Perisun</td>
<td>0.15</td>
<td>0.26</td>
<td>1</td>
</tr>
<tr>
<td>Reach</td>
<td>0.04</td>
<td>0.06</td>
<td>0.22</td>
</tr>
<tr>
<td>No. of unique authors</td>
<td>8.16</td>
<td>15.67</td>
<td>84</td>
</tr>
<tr>
<td>No. of mentions</td>
<td>30.10</td>
<td>48.61</td>
<td>214</td>
</tr>
</tbody>
</table>

Note: For each variable, minimum = 0.
mentions was .13. As a reminder, strength is the likelihood that a name or brand is being discussed in social media. It is calculated by the number of times that the searched phrase is mentioned within the last 24 hours, divided by the number of total possible mentions. Therefore, unlike number of mentions, strength limits the mentions to a specific time span. Here, the salience seems somewhat stronger than the number of mentions. By comparison, “back-to-school shopping” resulted in a strength score of .18, and “jet stream” produced .20.

The passion score measures the intensity with which individuals talk about a topic. A small number of individuals talking about a topic repeatedly will give a high passion score. For the sample districts, the passion score was .15, compared to .13 for “back-to-school shopping” and .15 for “jet stream.” Reach measures range of influence. It is a ratio of the number of unique individuals talking about a name or brand as a percentage of the number of total possible mentions. Here, the sample districts produced a score of .04, decidedly smaller than .37 for “back-to-school shopping” and .48 for “jet stream.” Finally, the number of unique authors (the number of people messaging about a topic) was a little more than eight for the sample districts. “Back-to-school shopping” saw 147 unique authors, and “jet stream” realized 215.

Therefore, by some metrics, school districts appear to be comparatively salient in social media but on others, not as much. The number of mentions, reach, and unique authors saw districts as not particularly salient, but when measured by strength and passion, districts seem more salient. Put differently, school districts may not be discussed often or widely by different people, but the small numbers of people who talk about districts do so repeatedly and in concentration.

Research Question 2

What is the sentiment toward school districts in social media? Sentiment measures the ratio of generally positive mentions to the number of generally negative mentions (excluding neutral mentions). It indicates how authors feel about the topic being discussed in the social media. For the districts in the sample, the sentiment score was almost 5.5—that is, 5.5 more positive mentions than negative mentions. By comparison, “back-to-school shopping” saw a score of 7, and “jet stream” yielded a score of 6. Comparatively speaking, then, authors felt as positive about school districts as they did about back-to-school shopping and the jet stream. To put it into even a timelier context, a search on the term “Obamacare”—prior to the rollout of the Affordable Care Act website—produced a sentiment score of 4. Thus, school districts are seen more positively than Obamacare but less so compared to back-to-school shopping and a random term such as “jet stream.”

Research Question 3

Are there significant differences in salience and sentiment among school districts based on district demographics? The means reported in Table 3 provide a general understanding of the salience and sentiment of districts in social media, but as indicated in Table 4, there are some differences in sentiment and salience based on school district characteristics. Specifically, there are significant differences in five of the six measures of sentiment and salience based on the size and wealth of school districts. Larger school districts and districts with greater median household income report greater numbers in their sentiment, passion, reach, unique authors, and number of mentions. The strength metric showed no differences based on district size or wealth. Conversely, districts with greater percentages of students qualifying for free and reduced-price lunch had significantly lower levels of sentiment, reach, unique authors, and number of mentions. Almost all the remaining district characteristics appeared unrelated to sentiment and salience, except one. The percentage of district residents with a bachelor’s degree was a significant predictor of reach, where districts with a greater percentage of bachelor degree holders saw greater ratios of
individuals communicating about them. In general, then, larger and wealthier districts are viewed more positively and discussed more often in social media, but sentiment and silence appear unrelated to the racial/ethnic composition of a district, the percentage of senior citizens in its constituency, or the educational levels of its patrons.

Research Question 4

How are school districts discussed in social media? This question was examined by the aforementioned qualitative analyses. We begin first by discussing the topics in the mentions, followed by the types of social media in which school districts are mentioned and the sources of social media about school districts.

Topics

As defined in the Method section, eight themes were identified in the sample of 1,505 mentions: people (37%), community and outreach (23%), operations (16%), politics and policy (9%), secondary (7%), safety (5%), controversy (2%), and performance (1%). Each of these is described in greater detail.

People: In our sample, this theme had the highest number of social media mentions. It included mentions of staff and student deaths, comments related to district personnel (negative, neutral, and positive), and student performance. The last topic dominated this theme, consisting of 74% of all people mentions. Ninety-one percent of those student performances were YouTube videos of sports, band, orchestra, dance, music, theatrical performances, competitions, talent shows, a poetry reading, and a science fair. Nonperformance media about students tended to be positive, such as a story about students who had created an Iphone application.

School personnel were also mentioned in the form of teacher retirements and awards or other employee honors. A small number of social media about people addressed
the deaths of staff or students, teacher firings, or illegal or otherwise negative actions by district employees. Such mentions included superintendents facing charges of wrongdoing, grand jury indictments, a press conference announcing results from an investigation of district finances, and even a school bus driver who committed a hit-and-run with his bus.

Community and outreach. This theme was related to items of interest to the district community—for example, district announcements and events, mentions that promote positive aspects of the district, job postings, news of community partnerships, or district leader public relations. District promotional materials accounted for 26% of the mentions in this theme, with leaders involved in public relations at 15%, job postings at 14%, and social media highlighting different ways that the districts receive support from or partner with businesses or community organizations, also at 14%, such as the signing of a new lease for a Boys and Girls Club or a local business helping provide students in need with school clothing. The remaining mentions included a potpourri of topics, including the hiring of new teachers and staff members, grants awarded to districts, back-to-school nights, canned food drives, stories about school alumni, video of board members or superintendents touring schools, and the introduction of a new superintendent.

Almost two-thirds of the district promotional material appeared to be professionally or semiprofessionally produced videos highlighting positive aspects of the district, while most of the rest were photographs uploaded to Flickr, a web-based photo and video management tool that enables users to share content with others. The videos were essentially district advertisements involving six districts, while the Flickr photographs within this theme came from just one district in California.

Operations. The social media most often present in the operations theme focused on nonacademic programs, such as a summer enrichment program in a North Carolina school. Social media about school finances also featured prominently, including professional news stories and amateur videos of school board budget meetings, results of union nego-

tiations, presentations on how to obtain funding, district employee salary discussions, job cuts, and taxation issues. Some social media discussed district infrastructure, with topics ranging from the announcement of a new heating and air-conditioning system to major school building construction to landscaping projects.

A small number focused on academic programs, such as a news story posting about Common Core standards in a Michigan school district, videos of STEM projects (science, technology, engineering, math), science simulations, and reading programs. Remaining items in operations included basic information about schools, typically consisting of pictures of schools or a feature of the buildings or scenery; parent programs, such as parent-teacher meetings or parent involvement programs; and, finally, technology such as flipped classrooms, eLearning, mobile learning, how-to videos, and general technology postings.

Politics and policy. This theme was dominated (42%) by news stories about district policy decisions. As was often the case in other themes, many of the politics and policy mentions were linked to the same news story. For example, six of the policy decision mentions were FriendFeed links to news stories about a district paying for same-sex benefits for domestic partners of district employees. FriendFeed is a social media aggregator that enables users to “feed” social media to others in their network. Similarly, 10 mentions were linked to the same article in North Carolina related to district policy decisions regarding social media. However, although the topic itself is duplicated, each mention is posted by a different source. The presence of the different mentions on the same topic provides an indication of the usage of social media in a given district on a particular topic. Other policy decisions included districts considering school closures and privatizing food services.

Mentions about politics also featured prominently in this theme and included items such as commercials for school board candidates, news stories about school board candidates or redistricting, pictures of a governor’s visit to a
school, and various appeals to the public for school district or school board requests, such as bond or mill levy elections. Last, board meetings appeared in the politics and policy mentions, often with links to video or news stories of board meetings on various policy topics.

Secondary. Sometimes, a mention in our sample referenced a school district secondarily. For example, one news story described a ring of thieves caught stealing metal parts from ramps for handicapped students at a specific school, and another news story mentioned a district as a polling location for an upcoming election. Another segment of this theme was related to pictures of school busses and school bus manufacturers’ advertisements. These types of secondary mentions composed 47% of the theme. Real estate advertisements made up another large segment, consisting of 46% of the theme.

Safety. Topics related to violence dominated this theme. Examples included news stories about a student expelled for assaulting a teacher, a news story about a student who shot another student during a fire drill, and schools on lockdown following neighborhood gunfire. Social media mentions related to these violent activities accounted for 48% of the mentions in this theme. School and school district plans for improving school safety accounted for 15%—for example, installing metal detectors, a speech given about bullying, no-weapons contracts for students and parents, or a student-tracking system. Health-related mentions, such as flu epidemics, odors in school buildings, and one mention of finding a bed bug in school, composed another 15%, while criminal mentions accounted for 11% (police searches for bank robbers, burglars, or suspicious persons), with drug-related mentions at 8%.

Controversy. This theme included mentions about disagreements within or related to a school district. For example, some social media focused on districts involved in litigation, such as a district that would not allow girls to try out for football. Of the 29 controversy mentions, 13 linked to this one story. Other litigation mentions addressed vari-

ous lawsuits where the district was either the defendant (i.e., violating First Amendment rights) or the plaintiff (i.e., suing a local business for overcharging). Nonlitigation controversy included teachers unions and school district disagreements, topics related to book banning, and the rights of whistle-blowers.

Performance. This theme had the smallest number of mentions in the sample at only 1%. Most of the mentions were related to academic achievement, student dropout rates, district ratings, and district test scores, while a few of the mentions were related to annual reports and student truancy.

Types and Sources

The 1,505 mentions distributed across these eight themes appeared in 12 types of social media: YouTube (52.4%), Flickr (14.5%), FriendFeed (13.6%), Ask (or Moreover.com, 10.3%), Yahoo News (2.5%), Photobucket (2.1%), newspaper (2%), Facebook (0.9%), Twitter (0.5%), Topix (0.5%), Wiki answers (0.4%), and television news (0.3%). As these percentages indicate, YouTube dominated the types of social media generated about or by school districts. Mentions created by news media also featured prominently among social media types, although unlike videos found on a central site, news media stories were shared through several channels, such as Ask/Moreover.com (a news aggregator offering news feeds to users), FriendFeed, and Yahoo News, and directly from the news sources. Noticeably absent were Facebook and Twitter (1.4% combined), two of the most ubiquitous forms of social media in general use. This is particularly striking when compared to the searches mentioned earlier—“back-to-school shopping” and “jet stream.” Twitter and Facebook constituted 50% of the mentions for the former term and 4% of the latter.

As for sources of social media, the eight themes (and 12 types) appeared in three broad sources: district created (35% of mentions), news media (29%), and nonnews media, non-district created (36%). District-created social media included
anything generated by district employees as part of their work. Mentions created by news media included any type of media, both “traditional” and “new” media. Nondistrict sources included all others not covered in the other two categories. Communications created by parents and students dominated this category, but businesses and nonprofits also created social media about the respective school districts.

**District.** Beginning with district-created social media, YouTube videos represented the majority (87%) of district mentions, and these videos tended mostly to feature students in performances or teachers or other staff winning awards or special recognition of some type. In addition to YouTube videos, the other types of district-generated social media included FriendFeed (7%) and Flickr (6%). Noticeably absent or almost absent were some of the more generally popular social media types, such as Facebook and Twitter. Among the district-generated mentions in the sample, only two were from Facebook. In both cases, the Facebook postings were announcements, one about picture day and another with a band newsletter. None of the district mentions came from Twitter.

**News media.** The second source, news media, saw a greater diversity in the type of social media that shared news stories, including Moreover.com (often accessed through Ask.com), FriendFeed, Topix (a news aggregator), Yahoo News, YouTube, and the news sites directly, such as a newspaper or television station. Of these, Moreover.com offered the most mentions (35%). After Moreover.com, FriendFeed had 29% of the mentions, followed by YouTube (17%), Yahoo News (8%), Topix (2%), and the news media directly (7%). As with district-generated social media, Facebook and Twitter were rarely present among news media mentions. Only three tweets were generated among the news media mentions, and all were on the same story—healthful food options in a district. Likewise, only three Facebook posts were generated—one on third-grade exit exams, one on technology in schools, and one on a drug search at a high school.

**Nondistrict.** Turning to nondistrict social media, two types dominated the mentions in our sample—YouTube (48%) and Flickr (34%). Among YouTube videos, those that featured people associated with the districts—either students or staff—were most prevalent. Pictures posted to Flickr were diverse in topic, ranging from district leaders visiting a community event to school district buildings, a school music therapy program, and a funeral for a school employee. A closely related type of social media was Photobucket (6%), which functions similarly to Flickr. Pictures on Photobucket featured musical instruments donated to a school, a community event for homeless students within the district, and student artwork. Less prominent but still present was FriendFeed (8%), followed by Facebook posts, Twitter, and WikiAnswers (a wiki-based website where users can submit and answer questions).

Table 5 provides cross tabulations of source by type of social media. For mentions created by districts and nondistrict, nonmedia sources, YouTube represented the type

<table>
<thead>
<tr>
<th>Sources</th>
<th>District</th>
<th>News Media</th>
<th>Nondistrict</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facebook, Twitter, WikiAnswers, etc.</td>
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<td>2</td>
<td>4</td>
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<td>FriendFeed</td>
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<td>29</td>
<td>8</td>
</tr>
<tr>
<td>Moreover</td>
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<td>35</td>
<td>0</td>
</tr>
<tr>
<td>News sources directly</td>
<td>0</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Photobucket</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Topix</td>
<td>0</td>
<td>2</td>
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</tr>
<tr>
<td>Yahoo News</td>
<td>0</td>
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</tr>
<tr>
<td>YouTube</td>
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<td><strong>Themes</strong></td>
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</tr>
<tr>
<td>Controversy</td>
<td>0</td>
<td>6</td>
<td>1</td>
</tr>
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</tr>
<tr>
<td>Secondary</td>
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<td>3</td>
<td>16</td>
</tr>
</tbody>
</table>
of social media most often used. For nondistrict, Flickr was also popular. For news stories, the distribution was largely split between FriendFeed and Moreover.com. The latter is not surprising, given it is a news aggregator. For news media, YouTube follows a distant third in use. Across all three sources, the more ubiquitous types of social media—Facebook and Twitter—rarely generated social media about education, at least the types of mentions accessible by the public or captured by the analytics site used here.

As to the distribution of themes/topics, social media focused on people represented the greatest percentage for all three sources but not equally so. District-generated social media were dedicated conclusively to people—often student performances—but the percentage was markedly smaller among nondistrict sources, and in the news media, it was barely a plurality. In fact, for news media, mentions were distributed almost evenly across five of the eight themes. This leads to some notable contrasts, where news media mentions more often focused on politics and policy and school safety compared to nondistrict and district mentions. Also notable was the lack of attention among all three sources paid to district performance, a striking finding given the perpetual focus on school performance in traditional media (Bidwell, 2013), political speeches (Baker, 2013), and think tank reports (Loveless, 2013), among others.

**DISCUSSION**

This study sought to measure the presence, or salience, of schools in social media: the sentiment of those discussions using social media analytics; and the topics about schools present in social media. In so doing, the purpose was to examine how leaders might know how their schools are discussed in social media to provide feedback for decision making and to be responsive to school district constituents. To date, little is actually known—in a systematic fashion—about how and to what extent schools are the topics of conversation in social media.

Results indicated that school districts do not appear to be discussed often or widely by different people, but the small numbers of people who communicate about districts do so repeatedly and in concentration. When they do, the substance of the communication appears to be generally, although not overwhelmingly, positive. Larger and wealthier districts are more salient in social media and discussed more positively in the communication. The topics addressed in social media about education vary widely but fall within eight general themes: operations, people, community and outreach, secondary, politics and policy, controversy, performance, and safety. The most prevalent theme is people and the least is performance. Sources of social media include school districts, news media, and nondistrict, each producing about equivalent amounts of social media. Finally, the types of social media in which education is discussed include a dozen or more platforms, but the most dominant type in these results was YouTube. Among the least prevalent were Facebook and Twitter, despite their ubiquity in general social media use.

In some ways, these findings seem to temper the enthusiastic recommendations by Blakeslee (2012) and others (Butler, 2010; Gonzales et al., 2011; Kelly, 2009; Porterfield & Carnes, 2012) that school leaders dedicate greater effort to using social media as a "listening device." The average number of social media mentions lagged behind comparison terms such as "back-to-school shopping" and the random phrase "jet stream." Even districts with the greatest number of mentions barely exceeded the first of those comparison terms and fell short of the second. Moreover, greater than a third of the sample had no social media mentions at all, and another 25% had fewer than 10 mentions.

Not all the measures indicated low salience, however. Metrics such as strength and passion indicated that those who create social media about schools do so repeatedly and in bursts of activity; there just are not many of them. This is logical, given that of all the people active on social media, the percentage of those directly affected by schools is likely small. Moreover, the routine activities of an average school
or district simply do not lend themselves to sustained social media traffic. Indeed, the results reported herein demonstrate that salience is strongly related to district size. Thus, the utility and even necessity of monitoring social media may be more relevant for leaders in larger districts than in smaller ones.

A second way that these findings seem to differ from those of prior authors who have written on social media, education, and communications is in the sentiment present in social media. Anecdotes abound about the effects of negative social media for schools and districts (Nathanson, 2013; Schilling, 2013; Wang, 2013), but the ratio of positive to negative social media in this sample indicates that the former outnumbered the latter. Moreover, the qualitative analysis of the social media mentions found themes that would primarily capture negative social media—controversy, safety, and school and district performance—were only a small percentage of the overall sample. Instead, social media tended to focus more on people in school districts—students and staff—and much of that on students. A substantive portion of that content was either neutral—such as student performances in music, drama, and sports—or positive.

This is likely why such a great percentage of the social media in the sample was YouTube videos, which are useful ways to share the accomplishments of students but not necessarily the most effective ways to check the pulse of district parents and patrons. If school leaders are interested in better understanding what people in their districts are talking about, news media—both legacy and new—still may be one of the most efficient ways of doing so; social media now just makes it easier to do so than in the past, with platforms such as Moreover.com. FriendFeed also can prove useful, as users send others in their networks news stories about their districts. Tracking what people share with others can be revealing to leaders.

One of the important findings from our research is something that we did not set out to study—the utility of sentiment analysis tools. It stands to reason that if school leaders put into practice the recommendations that they use social media as a “listening device,” they will need some systematic tool for doing so. One option is to hire a company to perform social media analytics (Aguinio, 2012), but the costs associated with these services are typically substantial. Another option is to use free tools, such as Socialmention.com, and perform the sentiment analysis internally. These tools are easy to use, but we discovered that they have limitations worth noting. First, the tools are not comprehensive. This became apparent when comparing the search results produced by Socialmention.com with other analytics sites, such as social-searcher.com, howsociable.com, and addictomatic.com. Although some of the search results were the same, a nontrivial number were not. As noted, our sample included few Facebook and Twitter posts. Yet, searches on other analytics sites produced more and sometimes many more. Conversely, other tools included no YouTube videos, for example, while Socialmention.com included many. Thus, for those interested in pursuing social media sentiment analysis through free sites, it would be wise to use more than one tool.

A second limitation is “noisy data.” This phenomenon has been noted by others, but to date, the focus has been on difficulties associated with syntax and grammar, word usage, slang, and other complications germane to automatic text processing (Kennedy, 2012; Maynard & Funk, 2012). What we discovered was different, perhaps more basic: irrelevant content. Socialmention.com enables users to download Excel spreadsheets with a detailed list of all the mentions created by a search. We used these lists for the qualitative analysis. We discovered in the process that the lists sometimes (not always and in random fashion) included social media mentions that were not related to the respective districts in any discernible way. A follow-up e-mail to the manager of Socialmention.com confirmed that these apparently irrelevant inclusions figured into the sentiment metrics listed earlier. While we could exclude them in our qualitative analysis, we were not able to drop them for the quantitative analysis and reanalyze, given the proprietary algorithms in the software. For districts or leaders interested in using free analytics sites, this means that the metrics should be viewed with some caution and confirmed by inspecting the lists of mentions created from a search and using multiple tools.
For practical purposes, the "noise" and the differences between analytics sites are a limitation, but they also present opportunities for further research. Specifically, studies on the differences among sites such as Socialmention.com, social-searcher.com, howsocitable.com, addictomatic.com, and others could prove valuable for potential users and for social media and analytics scholars interested in understanding the implications of different search and analysis assumptions and algorithms. Such research could focus on the sentiment metrics produced and why different types of social media appear in different search results.

Further research could also examine the return on investment in regularly performing social media sentiment analysis. As described earlier, prevailing wisdom suggests that leaders cannot ignore social media and so need to create and monitor their "brand" in social media communications. Such efforts come with monetary and opportunity costs, however. As with any type of investment, the cost should be weighed against the benefit to determine its utility. Our results suggest that leaders in small districts may find the costs of social media analytics outpace the benefits, but even in larger districts, leaders would benefit from examining or having access to systematic cost-benefit research on social media analytics to ensure that conventional wisdom is not technology enthusiasm prevailing over resource reality.

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