

Grassroots Professional Development: How Teachers Use Twitter

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Abstract

In an exploratory study, we used survey, interviews and content analysis techniques to understand how educators appropriate Twitter and other social media in their practice. We report on teachers' use of Twitter, structural features of their on and offline professional networks, and the institutional policies that shape their appropriation of social media for professional use. Most importantly, our analysis suggests teachers on Twitter tend to be eager adopters of technologies and well positioned to broker information as bridges between members of their local communities of practice and other networks of educators. Based on these findings, we discuss teachers on Twitter as participants in grassroots professional development efforts and the potential for them to be powerful fomenters and enactors of reform in educational communities.

Introduction: Social Media in Teachers' Professional Lives

The role of social media in organizing social reform efforts has become an enticing area of inquiry. In 2011, revolutions in the Middle East, rioting and civil disobedience in London, and the Occupy Wall Street movement all inspired researchers, policy makers, and citizens to scrutinize how social media can support and suppress collective action. These dramatic events compel us to critically examine the role of technologies in social systems, but upheaval is not the only context in which social media play a role in enabling people to spread ideas, find like-minded peers, and mobilize for social change. It makes sense to examine how social media are used in relatively stable social systems by people who see everyday opportunities to effect positive change: for example, teachers.

In an exploratory study, we used survey, interviews and content analysis techniques to understand how teachers are using Twitter in their practice. We wanted to understand

how everyday technologies might become "educational technologies" in the hands of innovative teachers.

Interviews, surveys and content analysis of tweets suggested that, as a professional development tool, Twitter is a forum for teachers to not only talk about their classroom practice and share practical information and news, but also to find like-minded educators and give voice to their ideological commitments. Teachers we spoke to described themselves as early adopters and technology evangelists who used Twitter as a way of importing new ideas into their local communities of practice from distant peers. We argue that this "bridging" activity not only helps teachers generate social capital that can help them succeed in their careers, but that it is the kind of social substrate that is necessary for education reform efforts to take root as like-minded individuals strengthen one another's ability to effect change. Social scientists have observed that collective action is reliant on people's ability to generate support networks that help them accomplish common goals (Granovetter 1973; Putnam 2000). Our findings suggest that teachers on Twitter are doing just that.

Social Network Sites and Grassroots Professional Development

Teachers participate in professional development to "develop, implement, and share practices, knowledge, and values that address the needs of all students" (Schlager, Fusco et al. 2004) — in other words, to get better at being teachers. Beyond interacting with one's local cohort of teachers and administrators, professional development can involve engagement with far-flung networks of education professionals who exchange ideas about their shared practices and values. These interactions amplify a teacher's ability to question ineffective routines, engage in reflective dialogue, and examine new perspectives on teaching and learning (Kruse and Louis 1993; Little 2002).

One way to examine the benefits that participation in a distributed network of peers brings is through the lens of social capital. The term "social capital" calls to attention

the value of social relationships. The benefits that a given individual derives from her social network depends both on how she is positioned within it (Burt 2005) and on the needs of the individual herself (Ellison, Steinfield et al. 2007). A 2004 study on the diffusion of innovation in six schools found that manifestations of social capital, such as access to expertise and social pressure, were at least as important as perceived value in determining the adoption of new technology (Frank, Zhao et al. 2004). In a 2009 study, researchers investigated efforts to reform literacy instruction in two schools and found that the structure of professional interactions among teachers helped account for the distribution of access to resources and expertise, which in turn related to the level of change observed (Penuel, Riel et al. 2009). By virtue of his position within a network of social relationships, a teacher can gain access to new resources and expertise (Portes 1998).

An individual's ability to make productive use of her networks has been transformed in foundational ways as people use the Internet to forge and maintain connections (Wellman, Quan-Haase et al. 2003). Researchers have developed many web-based systems that facilitate networking and communication in service of teachers' professional development. Most of these projects enable communication and sharing of resources related to professional development online. Web-based technologies such as email, discussion boards, and chat rooms have been used to augment local communities and build spaces for new ones to form. Projects have targeted education professionals in general (Schlager, Fusco et al. 2004), as well as more specific users such as an interdisciplinary group of professors within a university (Koku and Wellman 2004). A number of projects have focused on teachers who might otherwise be isolated from one another, including beginning teachers (Schuck 2003; Herrington, Herrington et al. 2006) (McLoughlin, Brady et al. 2007), mathematics and science teachers sharing inquiry-based pedagogical practices (Barab, Schatz et al. 2004), and reform-minded physics instructors (Ruopp 2011).

These projects involve purposeful environments and activities carefully tailored to support learning and professional development. Today, teachers can appropriate tools from other areas of life to serve educational ends. Wikis, blogs, microblogging tools like Twitter, and social network sites are familiar features of everyday life for teachers and students alike that can be adapted for classroom use and professional development. We set out to understand

Q. How are common communication media like Twitter being appropriated in educational contexts by teachers?

Q. What kind of impact do teachers who appropriate such technologies perceive on their teaching practices and educational organizations?

Q. How do the organizational contexts in which they work shape teachers' efforts to reappropriate social media for classroom work?

Methods

To understand the practices of teachers who use Twitter, we gathered three complementary datasets. First, we used Twitter itself to recruit participants for an open, web-based survey of educators who tweet; second, we conducted telephone interviews with eight of the survey respondents; and third, we analyzed the content of 2000 tweets from educators and education-related hashtags to better understand what kind of content teachers pass and are exposed to on Twitter.

Survey

To explore educators' practices, we began with an open survey of teachers who use Twitter. We do not claim the respondents to be representative of all teachers who use Twitter, only that it is a sample of educators who are knowledgeable about and have experience with the service. To recruit participants, the first author broadcast a link to the survey on her own Twitter account, using the hashtags *#edchat* and *#edtech*, which are frequented by educators. In addition, the link was retweeted by some individuals with tens of thousands of followers each and retweeted again by some of their followers. It is not possible to provide a response rate as this was a general call for participation directed at all teachers on Twitter and passed through tens of thousands of users' streams but we have no knowledge of how many of them were teachers or how many actually saw the link. Out of 1549 clicks, 69 individuals began the survey and of those, 37 completed it.

All (completed) survey respondents were educators. Of these, 78% had been using Twitter for at least a year. 78% (not an identical subset) likewise reported that they either run Twitter continuously or check it several times a day. All grades from kindergarten through twelfth were represented, as well as one college instructor, one high school teacher who also teaches college classes and a technology coordinator who provides instruction to both teachers and students. High school educators were slightly better represented than primary school, 63% taught at public schools, 62% had earned Master's degrees and the average years of teaching experience was 13.5 years with wide variability (std dev 9.5). Network size was also diverse; one respondent had a following of nearly 6500 people (over 4x higher than the next largest). With that individual removed, number of followers ranged from 5 to 1500 with an average of 334 followers (std dev 412) and exhibited a long-tail distribution in which half of all respondents had fewer than 200 followers and three

quarters had fewer than 400 (see Figure 1). See Table 1 for further demographic breakdown of survey and interview respondents.

Table 1: Description of Survey and Interview Respondents (Totals often exceed 100% because some teachers fell into multiple categories, for example, by teaching grades K-8.)

		Survey Respondents	Interviewees
	Male/Female	24%/76%	25%/75%
School Type	Public	64% (23)	50% (4)
	Private	30% (11)	40% (3)
	Charter	6% (2)	10% (1)
Grades Taught	K-5	35% (13)	38% (3)
	6-8	38% (14)	38% (3)
	9-12	51% (19)	38% (3)
	College	5% (2)	10% (1)
Topics Taught	Technology/CS	27% (10)	25% (2)
	Science/Math	38 (14)	50% (4)
	Language	38% (14)	50% (4)
	Social Studies	27% (10)	38% (3)
	Arts/Music	16% (6)	0
Months on Twitter	< 1	5% (2)	0
	1-12	16% (6)	0
	13-24	38% (14)	25% (2)
	> 24	41% (15)	74% (6)
	Avg. # Followers	334 <i>StDv</i> 412	363 <i>StDv</i> 449
	Avg. # Followed	254 <i>StDv</i> 254	269 <i>StDv</i> 247

32% of survey respondents noted that they maintain multiple Twitter accounts; of these, 75% said their multiple accounts included a personal account for friends, family or other social groups and 25% described their use of multiple accounts as strictly professional. Respondents with multiple accounts were instructed to answer survey questions about their use of professional accounts.

Interviews

Eight survey respondents agreed to a telephone interview. Interviews lasted between 30 and 60 minutes and were recorded and transcribed. We used the software TAMSA Analyzer to identify clusters of conceptually related interview content. This thematic analysis (Braun and Clarke 2006) was used to fill in details of teachers' practices that were outlined by the survey and provide a conceptual starting point for content analysis of Twitter data as described in the next section. Our approach shares the epistemological commitments of grounded theory (Glaser and Strauss 1967) in that interview data were "mined" for conceptual patterns in order to build an understanding of Twitter as a professional tool from teachers' own experiences and interpretations; however, the analysis stopped short of grounded theory building. We

did not continue collecting data using theoretically informed samples, which limits the potential for robust theoretical propositions to arise from the interview data.

Interviewees were asked to provide rich descriptions of activities they noted in the survey, to reflect on how social media and Twitter in particular interacts with their practice, and to describe how it plays a role in communication with colleagues, students and parents. They were also asked to recount their introduction to Twitter, explain the context in which they learned to use it, and how their use has changed over time.

Content Analysis

To triangulate findings from surveys and interviews, we assembled a dataset of 2000 education-related tweets using Twitter's search API and hand coded them to identify emergent patterns. We analyzed them with the goal of inferring from the kinds of messages that educators pass on Twitter what roles it plays in their professional lives. Our method for developing a codebook more closely resembled grounded theory than our approach to analyzing interview data in that multiple datasets were used to refine concepts; however, we sought to describe education-related content, not to develop theoretical explanations.

Test datasets were collected to develop codes and train coders. We used data from the #edchat conversation space to develop categories appropriate for education-related messages. First, two researchers independently examined a set of 100 tweets and created codes to classify them. Both researchers were aware of four basic themes that had emerged from analysis of interview data: professional development, classroom exercises, policy, and Internet safety; these themes undoubtedly (and intentionally) influenced the initial categories. We compared and discussed these codes and collaboratively constructed a codebook based on commonly identified affinity clusters. Because each coder brings a different set of assumptions and experiences to the coding exercise, code development is a critical step in the analysis of text as it provides an opportunity for researchers to articulate and discuss their assumptions as they co-construct an analytical framework.

Once the initial coding scheme was constructed, the researchers conducted three iterations of independent coding on fresh datasets using 50 tweets per iteration to test their agreement. The codebook was not radically changed during these subsequent iterations; rather, the meaning of existing codes was clarified (Table 2). By the third iteration coders reached agreement on 88.3% of observations (Cohen's kappa coefficient .82).¹

¹ These numbers do not include the coding of retweets, since these are trivial to identify. With retweets included, coders agreed on 93% of observations, Cohen's kappa coefficient .89.

Table 2: Codebook developed from education related tweets

	Code	Examples
In	Information	
InA	Resources	links to tools; rubrics; assignments
InB	Education related ideas	links to stories; news
Ph	Philosophy	
PhA	General Inspirational	“Achievement follows interest.”
PhB	Concrete Advice	“Greet your students every morning with respect and happiness to see them.”
Po	Policy	local, national, and global educational policies and laws; educational reform
Me	Personal	status/jokes
Ev	Events	conference livetweets; announcements
Ne	Networking/Self promotion	introductions or links to own work
R	Request	requesting responses or action
RR	Response to Request	

Finally, we used the search API to collect 800 tweets with the hashtag #edchat, which is used to share general education-related content, and an additional 800 using #mathchat, which is used to share mathematics education-specific content. In order to obtain a sample of tweets from educators that were not specifically designated as education related, we collected an additional 400 tweets by identifying the top four contributors in each of the two datasets and gathering their most recent 50 tweets. All of these Twitter users self-identified as educators on their profile pages. These data were collected at least two weeks after the initial datasets, so there is no overlap.

Each segment of the 2000-tweet dataset was then coded by one of the researchers. Although most tweets were assigned only one code, some received multiple codes, in particular in the case of retweets, requests and responses. Because retweets are each authored by different individuals, which changes the context slightly for each appearance of the message, and because they act as a natural “weight” for ideas that resonate with educators, retweeted messages were included in category counts.

Four Findings

Together these data and analyses yielded four sets of findings. The first reveals the impact of Twitter on teachers’ positions within their professional networks. The second is a description of education-related messages passed on Twitter and what teachers do with that information. The third finding describes teachers’ views

about how to best serve their students’ needs and their concerns about social media in schools. Finally, we characterize how organizational culture and policies affect teachers’ efforts to appropriate tools like Twitter for pedagogic use and professional development.

Finding 1: Tweeting Teachers’ Perceived Networks and Audiences

To better understand educators’ networks on Twitter, survey respondents were asked to describe who they tweet for, who follows them, and whom they follow. For example, they were asked how many other educators they know of at their school who use Twitter, and, if > 0, how many of these teachers they follow, and how many they believe follow them. This question was repeated with the categories, “educators at other schools,” “students,” and “parents of students.” All respondents reported that they both follow and are followed by large numbers of teachers outside their school, but reported few connections to teachers in their local educational communities. Students were also more present in teachers’ reported networks than their local professional colleagues (See Table 3).

Table 3: Survey Respondents’ Perceived Networks on Twitter

	Avg. number followed (<i>std dev</i>)	Avg. number followed by (<i>std dev</i>)
Local Teachers	2.6 (3.1)	3.7 (6.6)
Distant Teachers	171.8 (319.0)	277.4 (857.1)
Students	7.9 (19.1)	8.4 (18.0)
Parents	0.6 (1.9)	0.8 (2.5)

The potential for connections to outside teachers is greater than local ones in any given school, simply because there are more of them, so the above finding is not surprising. Coupled with interviews, however, the numerical description of teachers’ perceived networks begins to portray a rich picture of teachers on Twitter as network bridges whose connections to broader professional networks gives them access to resources and positions them to act as information brokers. Several teachers reported that Twitter allowed them to both forge connections with and maintain ties with individuals they either met initially or later at professional development conferences, which boosted their external connections. Teachers described these networks as sources of resources and inspiration for new practices. Moreover, because of their perception of its value, many interviewees reported that they actively work to increase the presence of their local peers in social media channels:

I know of only one other teacher at my school that has a Twitter account. And that’s something that I would like to be able to share with staff at a staff

development on how to use Twitter as a personal learning network. Because that's where I feel I've gotten such great ideas. – T7

It's still at a point where "isn't that cute?" If a problem comes up then one of the first things I do is tweet it out and they're like "oh, that's nice, Mary." [laughs] Until I get an answer back and then they're like whoa, that's cool. – T5

The links are just priceless, stuff I wouldn't find otherwise. And then I turn around and send it to my teachers - "I found this on Twitter, try this math site, this smart board tool." So my teachers themselves aren't on Twitter too much in school, but I'm sharing... I let them know I'm getting it from Twitter, though. – T3

In the classroom I don't see any teachers using it. I've convinced a few people that it's a valuable place to at least follow people and get information. – T8

Many teachers described tweeting colleagues as outstanding peers and often drew distinctions between teachers who "get" educational technologies and are on Twitter and other teachers who don't. "Teachers on Twitter are not representative of my colleagues at large," explained one interviewee, "they are the exceptional ones. They are the ones who are civic-minded, reflective." Said another of conferences: "I've been able to connect with other teachers that are more tech savvy and on the Twitter radar" (T7).

We can infer from educators' self-described networks combined with their descriptions of their position within those networks that these educators act as bridges between members of their local communities of practice and other networks of educators via Twitter. The recurrent theme of evangelizing the value of Twitter to local peers suggests that teachers on Twitter are reform minded, open to change, and interested in restructuring their local communities environment to include web-based and social media tools. None of our interviewees or survey respondents suggested preserving their position as information brokers as a means of personal gain.

Finding 2: What Tweeting Teachers Hear and What They Do With That Information

Interesting how Twitter has become a place for teachers to discuss those broader education issues... I think the future of education is going to be affected by this discussion. – T6

Beyond knowing who teachers connect with on Twitter, we were interested in understanding what kind of messages they encounter there and how it affects their practice.

First, what do teachers hear about and talk about on Twitter? The characterization of teachers on Twitter as bridges to new networks and resources is reflected in

teacher perceptions of information they find via Twitter connections. The teachers we interviewed and surveyed viewed Twitter as a source of new ideas and a way of keeping abreast of educational technologies in particular:

I can go on Twitter and in whatever amount of time I want to spend, other educators around the world are pointing out to me what I should be reading. – T5

I would say that primarily what's changed [with Twitter use] is my exposure to different tools that are out there. It's given me more different ways to get at different things. – T6

It's almost like it self-generates learning opportunities. – T4

The best thing about Twitter is that it can be incredible serendipitous learning. If you follow smart people and engage with them, there's no telling what you can learn. – S23

Content analysis of Twitter content likewise reflected a heavy bias toward resource and information sharing. As can be seen in Figure 2, resource sharing was the most frequent kind of message seen in education-related conversation spaces (64% of posts tagged mathchat and 54% of those tagged #edchat were coded as resource sharing). boyd et al (2010) found that only 41% of tweets that include hashtags also include a URL. This suggests that education-related hashtags are more heavily used as resource sharing venues than the average hashtag on Twitter. Only about 25% of tweets from educators' accounts included resources. The lower incidence of resource sharing in educators' accounts is partly due to the fact that retweets by several individuals inflate the frequency count of tagged resources but only appears once in any given individual's tweetstream. These numbers are consistent with boyd et. al's finding that approximately 22% of tweets include a link (boyd, Golder et al. 2010).

Nearly 30% of tweets from educators' accounts involved responses to others. Responses to others include responses that were specifically addressed to an individual (i.e. "@user I reduce the grade each day it's late.") as well as retweets that include an answer to a question (i.e. "I reduce the grade each day it's late. RT @user: How do you deal with late assignments?") boyd et. al similarly found that that 36% of all tweets include a specific addressee ("@user") (boyd, Golder et al. 2010). We also found that requests for action or information comprised approximately 20% of edchat posts and 10% of educator posts. Requesting information and responding to others suggests that teachers don't just broadcast resources but also engage in discussions.

Namaan et. al. (2010) used methods similar to ours to describe the content of a random sample of tweets. They identified two modes of participation on Twitter,

“meforming” and “informing.” By their account, most Twitter users (80%) are “meformers” who often include personal information and status updates in their posts. In contrast, only 2.5% of tweets from educator accounts contained personal updates or information (Figure 1).

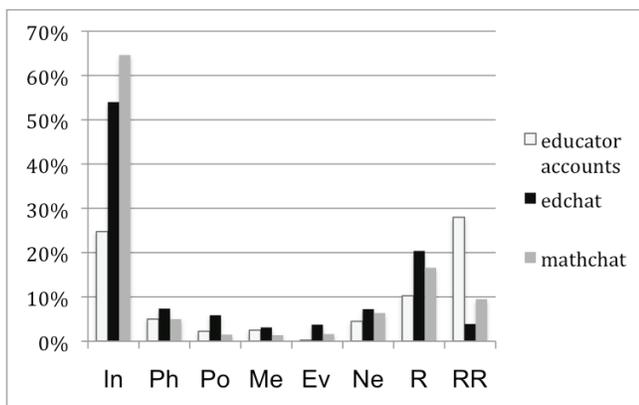


Figure 1: Percentage of tweets that were coded with each of the categories in the codebook: Information, Philosophy, Policy, Personal, Events, Networking, Requests, and Responses to Requests.

Although some educators maintained separate accounts for personal use, it is worth noting that the theme of personal sharing on Twitter being useless or a misconception about Twitter came up several times in interviews. Said one teacher, “some parents freaked out and flat out said, my child will not be doing something as silly as Twitter. It’s like, ok. That’s fine because, you know, most people think it’s like, to tell people you’re going to the bathroom or, most people think of social and unprofessional use of it” (T2). Concluded another, “if I find somebody that all they do is talk about what they’re doing now or what they’re having for supper I probably won’t follow them any longer” (T8). It is interesting to note that several teachers described initial exploration of Twitter for personal communication that evolved into use as a professional tool because of its value. Teachers appear to be using Twitter professionally not as a venue for “meforming” their professional identities but “informing” their networks and view it as an important academic tool for their students and peers

What do teachers do with all this information? In interviews, they described not only the potential for these connections and resources to change educational practice, but concrete ways their own professional lives and classrooms had been affected by their Twitter use.

It [Twitter] started to really give me things to think about and push at my teaching practice ...sometimes it kind of helps to have somebody encouraging you to

keep pushing those boundaries of what’s kind of expected, what’s normal. – T6

Beyond its impact on their professional development, teachers related anecdotes about using Twitter (or in some cases, the closed educational tool, Twiducate) for fieldtrip and filmstrip backchannels, sharing information with parents, facilitating discussions between students and far away experts, and helping students keep up-to-date on current events. Moreover, many reported Twitter as a source for discovering such practices in the first place.

Finding 3: Privacy, Safety and Internet Literacies

A recurrent theme in interviews was the publicness of sites like Twitter or Facebook and teachers’ hesitation to put their younger students out there on the web. Even teachers who were excited about the possibility of social media expanding their classrooms and creating new audiences for students’ work were concerned about modeling appropriate behavior and about creating comfortable spaces for their students to learn.

They’re still at the point where things like Twitter feel dangerous to them rather than sort of safe places to be. Which is probably ok, given that I teach 13 year olds. –T5

Twitter and Facebook are great social networking tools, but I don’t know how I feel about 5th graders in that kind of public forum. I think there are great alternatives – Twiducate and Edmodo, which is like Facebook but just for your class. – T7

When they raised privacy or safety concerns, most teachers used language that suggested students need to learn appropriate behaviors to secure their personal information and to assess the information they encounter. Only one educator, the technology officer for a small parochial school, focused on the threat of predation and used language associated with danger and protection:

Our kids should not be out there on the Web totally live until they’re adults. You know, the predatory tendencies of our society. That’s my problem with Twitter is that it’s totally public. – T1

For others, particularly high school teachers whose students are approaching adulthood, publicness was an answer, not a problem:

All my kids develop a webpage about the topic they’re studying in [my class] and that webpage is open for the world. And I think this is because we don’t train the kids younger, I always find that the kids don’t even think about what they’re putting up out there... kids don’t think enough when they put things up on Facebook. It’s not open enough to the world. –T8

[Students] would post a link to their blog and it was kind of nice because sometimes their blog articles would get picked up by companies they had mentioned or some other outside person decided to go ahead and retweet them. So they started learning about the real world – and I guess that was one of the things I appreciated about it as a teacher was seeing the kids talk to an outside audience. – T2

By supervising his students' forays onto the public web, T8 believed he could help them identify dangers and help them act more responsibly. T2 identified interactions with outsiders as a source of motivation rather than a source of danger. Most often, teachers described the classroom as a place for modeling the use of social media and helping their students practice skills that would help them be productive online collaborators:

Even though they are only sharing it with people who are actually sitting in the classroom with them, they're getting that sense of how do I put my best thinking forward. So that when they get to the next step when they might be collaborating with someone on the other side of town or the other side of the world, they'll have that experience. – T5

Finding 4: Policies and Barriers

Finally, in most interviews and some survey responses, school policies about social media use arose naturally from discussions of practice. Internet policies and local attitudes toward technologies were often viewed as barriers and sometimes evoked frustration.

Social sites are not allowed in my district in school for teachers nor students. In fact, the restrictions on websites that we have often prohibit accessing even many informational and what would be helpful sites. It can be pretty frustrating at times. – S28

Said another whose school adopted a more open policy:

It's not about protecting them from the tool but letting them work with the tool to help them figure out how to best express their own learning and grow with it. So it's a pretty open policy and really we only block things when we know there's a really negative effect. – T5

With the exception of T1, teachers' attitudes toward social media in the classroom indicated they view Twitter, blogs, wikis and other such tools as online resources. Many teachers raised issues of creating good policies and educating administrators as though they considered it to be a part of their job, sometimes using language that reflected ideological solidarity.

One of the successes we've had here at school is convincing our administration that whether it's Twitter, Facebook, chat, whatever, to just have a blind

policy that says we're going to block it doesn't work. Kids find their way around it. And then the only people that think it isn't open are the teachers. – T8

Discussion

The four sets of findings described above tell facets of the same story. The first section is about the structure of educators' social networks. Through Twitter, teachers forge and maintain professional ties outside their local schools and, in doing so, become conduits for new practices and ideas to move in and out of their local communities. The second section talks about the kinds of content that are being passed around. Although Twitter is often used as a venue for sharing details of one's personal thoughts and daily activities, teachers are using Twitter as a place to share resources and to make and respond to others' requests for information. They described finding ideas on Twitter for improving their practice and using social media in creative ways with their students. The third section reflects these tweeting teachers' attitudes toward using social media in schools. Most do not describe the Internet as a danger, but as a resource and hold progressive views with respect to students getting online in schools and using social media as a regular part of educational activities. The final section on policies demonstrates why teachers on Twitter may be motivated to participate in reform efforts. High school teachers in particular expressed frustration with policies that prohibit them from offering the kind of guidance and learning experiences they believe their students need with social media.

By borrowing concepts like bridging and social capital from social network theory, our interpretive framework casts the above story of grassroots professional development as a foundation for education reform. Despite the apparent emphasis on the networked individual as the beneficiary of social connections such as those cultivated by tweeting teachers, Putnam observes that social capital, unlike many forms of capital, is a social good (Putnam 1993). It is precisely the strength of many individuals' ties to one another that sustains civic engagement and enables collective action. In his landmark discussion of the "strength of weak ties," Granovetter speculated that individuals who bridge network clusters may be necessary for effective collective action because they allow emergent leaders to build extensive networks of trust (1973). In the absence of such bridges, fragmented networks suppress collective action. Although we lack detailed network data that would allow us to test this proposition with tweeting teachers and educational reform activities, qualitative analysis of their perceived networks and self-described information sharing practices suggests that Twitter acts as a bridging mechanism among largely isolated/fragmented educator networks. Our findings portray teachers on

Twitter as progressive thinkers who are in a position to build the trust and support networks necessary to strengthen leadership in educational communities and increase the effectiveness of reform efforts that serve their shared interests in appropriating social media for the classroom.

One limitation of this study lies in the sampling techniques. Because we were interested in assembling descriptive evidence of how teachers appropriate social media for educational ends, we used education hashtags to broadcast the call for participation, which means our respondents were likely to be using Twitter heavily for professional purposes. This was our intended sampling strategy; however, it gives us little leverage for understanding *how common* Twitter adoption is among teachers or how representative our sample is of the tweeting teacher population. Still, this sampling bias does not invalidate the finding that these teachers who are using Twitter heavily for professional development purposes are engaging in practices that position them well for leadership within the education community. Finally, we did not collect detailed data on social ties, either in surveys or using automated methods, that would allow us to generate graphs to visualize the structure of teachers' social networks. We rely here on their self-reported aggregate tie data. Addressing any of these limitations would make for interesting follow up studies to assess the character of educators' Twitter use and test our interpretations.

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