Educational Leadership in the Twitterverse: Social Media, Social Networks, and the New Social Continuum

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Leadership is one of the most examined concepts in the literature, and while the study of social networks is also gaining interest, the intersection between leadership and online social networks has received limited attention. The key notion underlying most leadership research is that the behaviors or attributes of a leader matter for a variety of outcomes. While offering valuable insights, this dominant view of leadership behavior and attributes underestimates the impact of social networks. Scholars are increasingly recognizing the importance of social processes involved in leading. Leadership has often been conceptualized as a process of influence toward an outcome. Social relationships through networks may provide leaders with the necessary infrastructure to access resources in achieving outcomes. Leadership from a network perspective emphasizes the interdependence reflected by a network of ties, which may ultimately moderate, influence, or determine the activity and movement of practices and knowledge.

We live in an increasingly connected and interconnected world with the production and dissemination of meaning mediated not only by professional media—such as news media (CNN, Fox, etc.) and newspapers
Social media exemplifies the extraordinary capacity of people to generate, spread, and exchange ideas, information, and opinions through interpersonal, collective communication within a massive socially networked system. Social media can be organized into multiple general categories: platforms of social networking (Facebook, LinkedIn), microblogging (Twitter, Weibo), photography (Flickr, Instagram, Pinterest), video (YouTube, Vimeo, MetaCafe), social news (Meneame, Digg, Reddit), direct streaming (Livecast, Ustream), social gaming (World of Craft), bookmarking (Delicious, StumbleUpon), blogs (Wordpress, Blogger), and so on. Social media has become a source of large-scale “big data” that is constantly being produced and offers opportunities and challenges to researchers and users alike. It is not so much the “bigness” of the data that presents new opportunities, but that the data reflect a much larger interconnected and complex social system that requires new tools for analysis.

Despite the growth in the social media space (Perrin, 2015), our knowledge about this area and its relationship to educational practice is growing but limited (Greenhow & Askari, 2017; Greenhow, Cho, Dennen, & Fishman, 2019, this yearbook). Previous work with social networks and social media suggests a process of influence and opportunities for professional exchanges (Del Fresno, Daly, & Segado Sánchez-Cabezudo, 2016). Individuals in online communities may interact with others who share similar interests, or ask questions or share answers to inquiries (Wellman, 2004). Educators in these virtual spaces also share resources, discuss current instructional challenges, and share new opportunities and materials (Hu, Torphy, & Opperman, 2019, this yearbook; Hu, Torphy, Opperman,
Jansen, & Lo, 2018). Social media is increasingly a source of information and resources for educators and has the potential to be instrumental in changing the ways in which teachers approach their teaching and shape beliefs (National Council of Supervisors of Mathematics, 2015). Teachers will often access social media sites such as Twitter and Pinterest, for example, as specific spaces to explore and find instructional resources (Opfer, Kaufman, & Thompson, 2016) and to address specific instructional needs. However, despite a growing body of work in the teacher space, we lack an empirical base for educational leaders. In fact, we know very little about the spaces where educational leaders may visit the practices, tools, and resources within their virtual networks, and who the influential actors and communities are. It is this gap in our knowledge that animates this chapter and our subsequent work.

EDUCATIONAL LEADERSHIP

Educational leadership is a broad topic and can incorporate individuals who hold formal positions in the education system, such as school and district administrators, but it can also take the form of teachers on special assignment, grade-level and department chairs, and other teacher leaders. In addition, a set of individuals also play more “informal” leadership roles, such as those sought for advice or input or who are highly active in other types of communities, such as virtual networks. For our work, we are bounding the population of “educational leaders” in two ways. The first is the universe of individuals who are interacting around key leadership hashtags on Twitter that we have identified. This bounding reflects a way to explore the leadership space in the broadest sense and goes beyond title and position. The second group of educational leaders are those who occupy formal positions (school and district administrators) and whom we will examine at a greater level of precision.

We focus on educational leaders both broadly and narrowly conceptualized because these individuals are typically instrumental to the functioning of systems, districts, and schools. They are often setting direction, framing efforts, and influencing opinions (Leithwood & Riehl, 2003). Moreover, these individuals are often responsible for leading the implementation of change and creating positive working and learning environments for systems, districts, and schools to meet objectives (Bryk & Schneider, 2002; Holme & Rangel, 2012; Tschannen-Moran, 2014). From our vantage point, it is not just their actions in physical locations, such as schools, but in wider social networks that may play integral roles in shaping decisions, moving important resources, and supporting their ability to enact reforms (Finnigan & Daly, 2010; Penuel, Frank, & Krause, 2010). We argue that
networks in a broad sense (both online and offline) are important spaces to understanding how the work of leadership gets done. In meeting this goal, we argue for the importance of attending to the social side of educational leadership. In making our case, we first provide a general overview of a social network approach, the role of the “social” in educational leadership, and an example of a pilot test in a education-related space with teachers, which sets up the presentation of early results from our first foray into the educational leader virtual space.

SOCIAL NETWORK THEORY AND PERSPECTIVE

Traditional social science research focuses on individuals as autonomous units separate from relationships and contexts (Wasserman & Faust, 1994). It approaches research and analysis by examining the traits and attributes of individual actors (Borgatti & Ofem, 2010; Wasserman & Faust, 1994). Social network theory instead focuses on the relationships between actors and “takes into account the web of relationships in which actors are embedded that both constrain and provide opportunities” (Borgatti & Ofem, 2010, p.18). This approach allows us to explore and analyze the power of relationships—both face-to-face and virtual—in education spaces. In social network theory, networks consist of people or actors who are connected by relationships or ties to one another. Additionally, different types of ties serve distinct purposes: bonding and bridging ties. Bonding ties are those that form groups within networks and are generally thought of as strong ties, whereas bridging ties (also known as brokerage ties) are relations that connect discrete or sparsely connected groups and are often understood as weak ties. Both types of ties offer different information flows and resource allocation, discussed more later.

A core tenet of social network theory is the idea that an actor’s structural position in the network determines information flows and outcomes for that actor (Borgatti & Ofem, 2010). People with more ties are considered to have a more central position in the network. Actors who have more out-going ties (or out-degree centrality) and in-coming ties (in-degree centrality) are more central to the network structure and those with lower in-degree and out-degree centrality tend to be more peripheral to the network. People who connect disparate groups (or brokers) also wield structurally important positions in the network because they are crucial for information flow and serve as connectors between groups. Having a base understanding of network theory sets the stage for the larger argument we make about the role of the “social work” in educational leadership explored later.
EDUCATIONAL LEADERSHIP AND SOCIAL SPACE

Leadership is one of the most examined concepts in the social science literature. While the study of social networks in educational leadership has also gained interest in recent years (e.g., Daly & Finnigan, 2010; Pitts & Spillane, 2009), the intersection between leadership and social networks in both virtual and face-to-face spaces has received limited attention. The key notion underlying most leadership research is that the behaviors or attributes of a leader matter for a variety of outcomes. While offering valuable insights into the role of an individual leader in enhancing outcomes, this dominant view of leadership behaviors and attributes may underestimate the social setting and networks in which leaders are embedded.

Scholars who examine leadership are increasingly recognizing the importance of social processes and relational linkages involved in leading (Daly, 2010). Leadership in its broadest sense has often been conceptualized as a process of influence toward an outcome. Social relationships through networks, therefore, may provide leaders with the necessary infrastructure to exert social influence in achieving individual and organizational goals, such as implementing reforms or improving student outcomes (Liou, Daly, Brown, & Del Fresno, 2015). A social network perspective places leadership directly in the role of a social undertaking. Leadership from a network perspective emphasizes the interdependence of action that is reflected by a network of social ties that ultimately moderates, influences, and even determines the direction, speed, and depth of a planned activity and movement of resources such as practices, tools, knowledge, and information.

Often resources—such as information, practices, expertise, or innovation—that reside in a system are a result of building human capital, which comprises the knowledge, skills, and abilities of individuals within a school system, for instance (Becker, 1964). In addition, the resources that stem from human capital can also be derived from the social relationships among organizational members. Social capital is concerned with the resources that exist in relations between individuals. In essence, social capital theorists argue that it is the ties between individuals that create a social network structure, which in turn, supports or constrains the distribution of resources (Lin, 2001). Connections and access, or a lack thereof, to available resources (such as expertise) situate leaders in social structural positions that enable more or less influence, access, and ability to move resources.

The transfer of resources in any educational system may be influenced by the quantity and quality of ties between leaders. The content of the network (i.e., what flows between actors) defines the purpose of the network.
and, in turn, the resulting structure. For example, the social structure of a work-related principal expertise network may differ significantly from the structure of a more normative social network, such as friendship. In both examples, resources flow through ties (the first being expertise, and the second, friendship), but the overall structure of the network may look quite different. A number of studies have indicated that educational leaders who have ties across systems—for example, school districts—often measured by quantity (how frequently the interaction occurs) or quality (how “strong” the interaction is) have been found to be able to better transfer tacit, nonroutine, or complex knowledge, facilitate joint problem solving, and stimulate the development of coordinated and innovative solutions and high-quality approaches that may be associated with better outcomes (Daly, Liou, & Brown, 2016). In contrast, through weak ties (e.g., weak social connections like acquaintances), a leader may find opportunities to broker or connect actors to provide access to nonredundant and novel information, practices, or tools.

As mentioned earlier, bonding and bridging are two specific types of ties that provide a principal with access to useful resources. The term bonding ties generally refers to those ties between actors within a network that directly connect actors and, as such, form close-knit groups. Bonding ties typically occur within an actor’s own network and tend to be stronger and more frequent. Bridging ties (or brokerage ties) are those relations between actors, groups, and organizations that are not well connected. Bridging ties span “structural holes,” or those areas of a network that are not connected and, as such, provide access to novel information (Burt, 2005). Both types of ties—bonding for the transfer of complex information and bridging for nonredundant, novel information—have been shown to facilitate different types of action in meeting outcomes.

EDUCATIONAL LEADERSHIP AND SOCIAL STRUCTURE

A leader’s position in the social network structure has been shown to be consequential, because network position may provide better access to and monitoring of resources such as tools and practices (Daly & Finnigan, 2010). Networks serve administrators in moving resources not only toward them but also out to others. Network scholars have suggested that the network in which a principal is situated can provide, filter, and distort information coming in, but simultaneously, the network also directs and concentrates information about the principal out to the system (Daly, 2012). Therefore, the social network in which an educational leader is embedded both diffuses resources in and disperses information out about that leader.
A key determinant of the structural advantage of a leader’s position in a social system is individual centrality in the network. Different types of centrality can be inferred from a leader’s structural position relative to others in a social network. We will discuss two types of centrality that are mostly used to determine the positional advantages of actors in network scholarship: degree centrality and betweenness centrality.

A leader’s total degree centrality is defined in terms of the relative number of connections that leader has to others in the network and reflects the total number of individuals who seek out that person and whom that person seeks out for a specific relationship—for instance, advice. The more a leader is sought (being sought for a resource like “advice” reflects a type of “popularity” in the network) in the network, the higher that person’s in-degree centrality. Higher in-degree centrality indicates that the leader is more centrally positioned in the network and, as such, has disproportionate influence on what flows within a system. This places a highly central leader in a more “dominant” role than other leaders within that network. Alternatively, seeking resources such as friendship is referred to as out-degree centrality. Those individuals who engage in relatively higher seeking behaviors are also considered central and potentially influential.

Highly central leaders have increased influence over the network in which they are situated because of access to multiple resources and the potential to create new linkages, which may further enhance their access to resources (Borgatti, 2005). Having more relationships increases a leader’s opportunities to access diverse, novel resources such as expertise, tools, and practices, and amass those resources. Those leaders who are less central may receive fewer resources and do not have as many opportunities to benefit from the resources held by those in more central positions (Daly, 2012). Moreover, less central leaders usually receive or access only the resources deemed necessary by those in centralized positions, thus restricting their perspective of the overall organization. This idea suggests that central individuals are situated to wield more social influence than are their less connected peers.

By occupying a more central position, a leader may be considered a key influencer or opinion leader because this individual is more often sought for resources (practices, expertise, knowledge, information, etc.) and has easier access to ideas, knowledge, and/or support from a social network (Liou & Daly, 2018). This access to diverse resources provides a central leader or his or her organization with the possibility to guide, control, and even broker the flow of information and resources within a network and, as such, may have disproportionate influence over the system. A leader may use the power and status attained through occupying a central position to direct certain knowledge and information and potentially “block”
the flow of resources, making it important to identify these key influencers and opinion leaders because these roles may have important consequential effects on diffusion of resources in a social system.

Another often-used type of centrality in leadership studies is betweenness centrality. Betweenness centrality refers to an actor’s potential to “broker” relationships, in effect controlling the flow of resources between two otherwise disconnected actors (Daly, Finnigan, Jordan, Moolenaar, & Jing, 2014). Betweenness is assessed as the number of times an actor is positioned “in between” two people in the network who are themselves disconnected. Actors with high betweenness are often perceived by others as being in positions of social power because they bridge otherwise disconnected parts of the networks. Educational leaders with high betweenness may benefit a network by connecting disconnected groups, or cliques, but also have a very strategic, influential, and potentially disruptive position because they can “choose” whether to diffuse resources between disconnected (groups of) individuals. High betweenness has also been conceptualized as representing a position of “power” given the individual’s ability to control the flow and content of resources (Burt, 2005). However, this network position of power may potentially negatively affect the distribution of information, knowledge, and innovation, given their role of gatekeeper in diffusing information. In this investment, we are interested in multiple forms of influence and identifying key influencers.

Network studies have demonstrated that a leader’s network centrality is related to important outcomes. For example, a leader’s centrality in external and internal expertise networks has been associated with objective measures of group performance, effectiveness, and reputation (Mehra, Dixon, Brass, & Robertson, 2006). Recent research explored the role of a principal’s social network position in relation to transformational leadership behavior and innovative climates in organizations. Findings indicated that the more often a principal was sought for advice, the more the organization was characterized by an innovative climate (Moolenaar, Daly, & Sleegers, 2010). Related work also suggests that leadership is often distributed across multiple actors, and informal leaders play important and expanding roles in meeting outcomes (Spillane & Kim, 2012). The balance of this early work suggests that educational leadership is often distributed across formal and informal leaders and as such may enhance the flow of information, knowledge, expertise, and practices. Leadership distributed through a network may also support the formation of communities of practice and as such facilitate organizational processes and outcomes at the organizational, individual, and student levels. However, given our slowly growing knowledge in this space, we have a very limited empirical base on which to draw, particularly as we look at both online and
offline networks and how they intersect around the work of educational leaders. To better understand the potential of this space, we undertook a pilot study of teachers in order to test out what has previously been explored around networks and educators and to hone our analytic approach for our interest in examining educational leadership.

PREVIOUS PROOF OF CONCEPT WORK

In this section, we offer some preliminary propositions that arose out of our 18-month pilot work in Twitter examining a large virtual teacher network (Teacher2Teacher) comprising approximately 40,000 unique actors (Daly & Del Fresno, 2019). This work is under review, but we share it here because our primary goal in the Teacher2Teacher work was to test out our analytic approach, specialized technology, and to explore the degree to which work in this space reflects a viable undertaking. We chose Twitter as a vehicle for this work because Twitter is a global and free online social media platform where users write short messages with limited characters, known as tweets, which are sent to all who have opted to receive the tweets of the writer (followers). When posting a tweet (via the Web, text, computer, tablet, or a smartphone), it is possible to add more than text; you can also include images, links, and hashtags (a word or phrase prefixed by the symbol # that turns them into metadata). Currently, Twitter is the fastest, simplest, and cheapest social media platform where there is a flow of all types of information, news, ideas, events, rumors, multimedia, and so on, created by users and moved quickly. This combines to make Twitter a privileged field for research because it is a type of “central nervous system” of the Internet and lends itself to research related to social network structure (Del Fresno, 2014).

Applying social network theory to our pilot work suggested eight general propositions that we will continue to explore both in the ongoing teacher work and in our new educational leadership study. We offer these eight propositions as a way to ground our work and illustrate some potential rich areas of exploration.

1. The virtual world can be socially mapped and measured to provide insights and action. This idea is perhaps both the most obvious and important. Virtual networks are not just massive chaotic systems with individuals randomly engaging (although there is some of this happening); there is some underlying social structure that emerges over time or at a single time point and can be measured through metrics and visualized. The network perspective offers a multilevel view from an entire network, to subcommunities, to individual actors. From this work, we have seen the rise and fall of a variety of key influencers, the development of communities and subcommunities,
an increasing level of social activity, and a diverse and significant amount of content flowing between actors.

2. **Content, practices, and ideas flow through social media.** The argument guiding our work is that social media provides the “backbone” for the Internet as a place for all types of media, links, ideas, opinions, and tools to be moved in a network. Social media in general, and Twitter in particular, is accelerating and making teacher networks increasingly dense as educators seek communities to address problems of practice and share insights, materials, and tools. We saw evidence of content, practices, and ideas flowing from actor to actor within the network through a social infrastructure supported by social media. Because Twitter represents the intersection of media and medium, it has provided an excellent field work “site” for research, communication, and interaction.

3. **Virtual networks are dynamic, grow, and evolve over time.** The teacher network was dynamic and attracted new actors over time. The volume of the network expanded, as did the number of actors, and provided a deep, rich, and varied community. A “community” is a set of actors who interact more with each other than with other actors outside their group. We noted changes in structures and the development of subcommunities during the course of our pilot study. These subcommunities were distinct communities, with their members tending to interact more with each other than with other community members. It is important to note that we did not take an a priori approach to identifying communities; we “observed” the social behavior (Twitter activity) of actors in the network and let that guide the determination of what constituted a community, as opposed to imposing our organizing strategy on the data. Communities arose organically and were not necessarily formally organized from external sources, such as on-ground organizations. Although there were some consistent key actors, we also saw the rise of other influencers and the decline of others who were key at one point and became less so over time.

4. **Move toward more inclusivity and interconnectivity stemming from a central core.** Although we did identify unique communities, we also noted that over time, there was a movement from isolated actors and communities to a more interconnected set of communities. It appeared that the teacher network provided a bonding, bridging, and attracting function because it provided a central core with which actors and communities were able to connect. In essence,
although there were communities aligned to distinct school districts, for instance, these divisions were less clear over time, with more interconnections between communities being created. The growing nature of the communities provided opportunities for engagement and empowerment, and reduced the isolated action of small cliques or groups. The central core of the network expanded as a number of new hashtags were added over time.

5. **Networks evolve and become more robust with targeted focus.** Social network approaches and methods enabled us to identify key influencers—that is, people who are central to the network and/or have control over the flow information or messaging. Better understanding the lay of the virtual land may enable networks to be more efficient in launching and supporting communication campaigns or the movement of relevant resources through networks. Given limited resources available to influence network growth, knowing how, when, and with whom to deploy resources is key in making the highest impact and scaling practices and information of interest.

6. **Influence goes beyond number of followers, and influence roles differ.** We were able to identify key influencers in the teacher network from four different perspectives—Transceivers (high indegree), Transmitters (high out-degree), Transcenders (high in- and out-degree), and Traders (high betweenness/brokering). These influencers differ from more traditional influence models that others put forth, such as attending to the number of followers, which is a narrowly focused way of defining influence. Influencers in this work were identified by “observing” their activity in a social space, meaning incoming and outgoing ties with others. This type of approach is not reliant on self-report or the gathering of followers, but is based on observation and measurement over time. In fact, it was rarely the case that those who had the largest number of followers were also influencers in a social network sense. In other words, network measures can provide different insights that may complement existing measures of influence. Moreover, we were also able to drill down into specific roles (particularly around brokers) to identify and profile different types of bridging actors within the large category of brokering and offer a more nuanced delineation of influencers.

7. **Online and offline spaces interact and intersect.** One of the more interesting findings that came out of this teacher work suggested that individual educators within school districts were interacting in virtual space. This suggests that online and on-ground worlds
interacted, creating an educational social continuum where the movement between online and offline is much more fluid than may have been considered.

8. **Not all hashtags are equal and obvious.** Although we started out with a key set of hashtags and search terms, the number of identified hashtags of interest grew significantly over time to include a large pool. This finding indicated that there was a much broader set of interactions than we first realized and that we were capturing an increasingly growing and interconnected data pool. Moreover, although the key hashtags we identified did show up in the analysis, others that were not previously noted ended up being highly active and, as such, a good source of information. This is one of the most important findings in this work; there is much in the social media and network space that remains hidden in plain sight, and our ability to “predict” the size of the network or even the most key and active features such as hashtags may not be as accurate as we first believed. Our decisions as researchers studying the space may not be as effective as we had hoped. Casting a wider net on the network may enable us to better capture the complexity and portray a more accurate picture of the space.

In short, our work from this pilot project indicates that virtual networks can be mapped, analyzed, and utilized; they are dynamic and formed around issues and influential actors; and the lines between the online and offline networks are not clear and often intersect (Hashim & Carpenter, 2019, this yearbook). This social media pilot work and set of propositions in the teacher space set the stage for adding the important and understudied area of educational leadership: How do leadership networks form and grow over time? Who are the influencers in these networks, and how can they be leveraged? What are the intersections of the offline and online networks? These questions offer a host of opportunities for future research and practice, as we outline next and offer some early preliminary data.

**THE RESEARCH AND PRACTICE OPPORTUNITY**

The previous sections argue for the social side of leadership, the importance of examining educational leadership from a social network perspective, and some general propositions from our pilot work. As we argue, the role of educational leadership has become increasingly important in the process of educational improvement, and change and is often touted as critical in the work of network improvement communities but is far less
examined. Although other aspects of the educational endeavor have been explored in the network community space (e.g., teacher networks), we still have a dearth of work that examines the role of educational leaders, particularly in terms of accessing and leveraging virtual and face-to-face networks around high-quality practices, tools, and approaches. Given the changing workplace of education, educational leaders, particularly principals, need to continuously adapt and update their identity, knowledge, and skills to meet the challenges of their everyday work, particularly in new virtual spaces (Cho & Jimerson, 2017).

In realizing the goal of meeting complex educational challenges, high-quality, sustained, and relevant leadership professional development has been recognized as a key factor that can contribute to this development and change. Although some formal development opportunities are in place for educational leaders, they do not always seem to fit the needs and requirements of leaders and their unique contexts. As a result, leaders are increasingly searching for, and depending on, (informal) networks to engage in discussions, share relevant and high-quality resources, and further enhance their knowledge and practices.

A growing body of research around leadership and networks outlined earlier shows that these more informal social ecosystems in which resources like practices, tools, and approaches move are consequential to access, use, and diffusion of these resources and their relationship to outcomes (Daly, Del Fresno, & Supovitz, 2019). Although we have some work on the role of informal networks of educational leaders and their relationship to other leaders from face-to-face networks (see Daly, 2010), the role of online spaces/social media for educational leaders has not been as carefully examined at scale. The limited studies that have been completed around school leaders in online spaces suggest that educational leaders use online networks for forming communities of practice, which is critical given the typical professional isolation of school leaders (Carpenter & Krutka, 2014). Within these communities, leaders draw on connections primarily for educational purposes, suggesting that school leaders use social media connections for professional exchanges much more than does the general public.

Social media, as a growing body of research is suggesting, is becoming increasingly more important for (informal) professional development for educators, particularly for educational leaders, who often do not have access to more formalized forms of professional development or “just-in-time” access to development resources. Consequently, educational leaders are increasingly participating in social media spaces to help them (and their colleagues) in their efforts to engage in high-quality practice. Moreover, accessing these social media networks may provide access to a
professional community and record of the flow of resources (practices, tools, approaches, etc.) that can be traced, examined, and quantified. Through this communication, distribution, and sharing of resources, a digitally driven online community of practice may develop that provides opportunity for collaboration, reflection, development, and, importantly, just-in-time professional learning.

The social continuum of online and offline interactions reflects a complex labyrinth of networks and connections that link people who share information, (innovative) ideas, resources, perceptions, beliefs, myths, rumors, and so on, in a real-time, immense, networked communication system. The result is that everything is connected in some way, from people, to information, to data, to events, and even to places, all with multiple interdependent relationships that form a vast aggregate social network (Wellman, 2004). The constellation of ties that surround actors can occur in both offline and online contexts and, we argue, is actually part of the same social continuum.

The complex relationship structures that emerge online—such as leadership practices, support, and expertise—are currently uncharted. Through social media, the interpretation and mediation of meaning occurs at the level of interaction, and these interactions represent explicit ties that bind people together. Through an innovative set of methods similar to what we applied to the Teacher2Teacher network, we have been capturing and analyzing these interactions as a social network at a depth and scale that makes the invisible visible (Supovitz, Daly, & Del Fresno, 2018). The relational data captured from social media offer many new opportunities to understand communication and knowledge practices in the social media space and provides unique insights into the virtual networks of educational leaders.

To bring all these ideas to life and illustrate our argument, we offer some longitudinal work from Twitter data from a year of collection (June 2017 to December 2018) in which we tracked several key educational leadership hashtags (e.g., #leadupchat, #edadmin, #principalsinaction) to visualize the network and identify influencers. Over this period, the network remained consistently active, resulting in a collection of 800,000 tweets reflecting more than 110,00 unique actors who interacted around 13,000 unique hashtags. It should be noted that the individuals in this space are not necessarily in formal leadership roles; part of our analysis will be to unpack formal positions. However, the assumption in our work is that these hashtags reflect virtual spaces where those interested in educational leaders, presumably educational leaders themselves, will interact.

Our analysis reveals the overall network structure of the educational leadership virtual space, highlighting several key structural dimensions
and a host of highly influential actors (see Figure 1). In Figure 1, each node represents a unique actor, and the lines reflect the tweets, retweets, and/or mentions between each actor. The different groups that are reflected by varied colors indicate subcommunities that interacted more with other leaders in that group than outside it, resulting in four unique groups: red, blue, green, and purple subcommunities.

In addition, we identified the major hashtags with which educational leaders were interacting that went beyond the initial collection of hashtags (e.g., #leadupchat, #edadmin, #principalsinaction; see Figure 1). In the visualization of hashtags in Figure 1, two main hashtag communities were formed around “leadupchat” and “JoyfulLeaders,” which are the predominant hashtags that educational leaders seemed to be using over the time period.

![Overall actor and hashtag network, June 2017–December 2018](image)

**Figure 1. Overall actor and hashtag network, June 2017–December 2018**

We also identified the top 1% of actors and hashtags in the educational leadership space (see Figure 2). Key influencers were in this space, @Jeffhiseredu (college director), @SteeleThoughts (principal), and @Bethhill2829 (principal and founder of “joyfulleader”), for example (Figure 2). Those individuals and the material they tweeted were quite often retweeted, so they may have had disproportionate influence over the field. When we examined the material that was being highly retweeted, it was primarily inspirational messages and quick-to-implement practices, but this assertion is speculative because we have not conducted our final systematic analysis to date. This early work indicates some important
areas for future work and, like the teacher network described earlier, indicates the presence of social structure, individual influencers, and subcommunities.

The visualization of the 1% hashtag network in Figure 2 is to get an idea of where leaders are typically gathering in virtual space. These data indicate that there are two main communities where leaders virtually congregate—these communities are anchored by #leadupchat and #joyfulleader. Interestingly, there is only minimal overlap in these communities, suggesting two core communities that are highly active within their community parameter. In addition, a more general education hashtag, #educhat, also was present, suggesting overlap between more traditional teacher virtual spaces and leader spaces. Our future work will more clearly discern the population of actors that occupy these spaces.

![Figure 2. “Elite” (top 1%) of actor and hashtag network, June 2017–December 2018](image)

This network perspective on leadership in virtual space and preliminary work represents some of the earliest efforts in analyzing the virtual networks of educational leaders and provides some tantalizing evidence about leader networks. Although we have some interesting insights from the teacher space, we have limited knowledge about the virtual communities of educational leaders, the influencers in the space, and the type of content they may be sharing; these early results suggest that this is fertile ground for exploration. This chapter is not to make evidence-based conclusions; rather, we set about to argue for the analytic potential of a network perspective in education in general, and for educational leadership in particular. We are offering a proof of concept that suggests we can learn more about educational leadership from this type of endeavor and, it is hoped, catalyze additional thinking and effort in the space.
CONCLUDING THOUGHTS

As we think across what we present in this chapter, we are also attempting to reconceptualize “space” and social activity that goes well beyond physical geographies to embrace the idea of activity and social geographies in order to encompass an even wider perspective about what is happening in educational leadership spaces. At its core, the work presented in this chapter is based on the proposition that activity in social space produces complex systems that are situated in networks of interactions and interdependence. Moreover, the work underscores the importance of networks and relationships to better understand the growth and spread of innovation, ideas, and resources. It also supports the social network perspective that we live in a social world and are impacted by others in ways that are both conscious and unconscious. Our ability to actively interact with others, network, and engage in new social systems is critical for our work and understanding of ourselves as we move deeper into a knowledge economy in which collaboration, social skills, and leveraging interdependent social networks are increasingly important and necessary, and hold potential economic, social, political, and cultural value.

Better understanding of newly evolving concepts and findings from network science that are enacted in a social continuum are important for adding to our knowledge and building our individual and collective ability to learn, lead, and leverage networks for change and growth. Our research suggests that the work of the 21st century is not only about facts, figures, and rote learning; it is also about the generation of intellectual capital and the creation, development, and management of knowledge and opinion as they exist in multiple, complex, and dynamic systems. Approaching the work of educational leadership as a system of relations recognizes that while the individual is important, it is the system of interactions among individuals that is equally informative. A social network perspective reveals the consequential interactions that are hidden in plain sight and has the potential to provide us with unique insights.

NOTE

1. See www.hashtagcommoncore.com for insight into methods and approaches used on a different data set.
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