Helping Leaders Believe:
Understanding Policy Engagement through Efficacy and Social Network Position

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Abstract

Leaders’ self-efficacy has recently been identified as a critical component in the success of educational reform. In educational policy and leadership, little attention has been paid to leaders’ self-efficacy beliefs as they go about the implementation of Common Core State Standards (CCSS). This study seeks to understand leaders’ CCSS self-efficacy by examining the level of CCSS-focused engagement and the degree of leaders’ network connectedness from a social learning perspective. Findings suggest leaders who report higher levels of CCSS-focused engagement tend to be more efficacious about implementing CCSS. Such a relationship is mediated by leaders’ social network position in providing CCSS advice and work effort recognition to their fellow administrators.
Introduction

This exploratory study is part of a larger research project that aims to understand the role of a school district’s leadership team in improvement efforts during the implementation of the Common Core State Standards ([CCSS], National Governors Association Center for Best Practices and Council of Chief State School Officers, 2010). The Standards are one of the most significant educational initiatives in American education. Launched in 2009 in response to the persistent achievement gaps between the US students and other high-performing counties in international assessments, the CCSS outline rigorous academic content standards for students in kindergarten through twelfth grade including identifying the sets of skills students need at each grade level to ensure they are equipped for college and career. The CCSS also emphasize on the use of innovative and cross-disciplinary approaches to developing students’ higher-order thinking skills. The CCSS reform has brought about various degrees of challenges to school districts including anchoring proper leadership, providing CCSS-aligned curricula and professional development, assessments, and finding sufficient resources to support the efforts associated with CCSS implementation (Center on Education Policy, 2014, 2017; Saad, 2014). Such challenging undertaking has placed a great deal of pressure on teachers and administrators to ensure their students are making sufficient gains. For instance, one major challenge identified in one national survey report is that 90% of the representative school districts that have adopted CCSS reported that they did not have enough time to prepare for and implement the CCSS before the CCSS-aligned assessments take effect (Center on Education Policy, 2014). The same report also indicates that more than half of the districts would not expect their district to complete millstones of CCSS implementation until the year of 2014 or later. The lack of time, resource, and readiness for CCSS implementation appears to be a common drawback for most early-implementers in 2014. The data reported in this study was collected in 2013, the year in which most districts have undergone the preparation phase. As educational leaders
continue playing a critical role in leading change and influencing student achievement (Leithwood, Patten, & Jantzi, 2010), investigating the perceptions of leaders in the era of CCSS may yield valued outcomes that can be transferred to other similar settings.

As many states and districts initiated the implementation of CCSS since 2014 or later, one may expect an increase in preparedness from most of the early implementers. However, concern about the preparedness for CCSS implementation remains one of the top challenges in a number of recent statewide and regional level reports. A recent research report, published by the UChicago Consortium on School Research in 2017 on the perceptions of Chicago public schools’ (CPS) teachers and administrators, has indicated a lack of sense of readiness perceived by school and district administrators that they felt less confident than teachers in their preparation to implement the CCSS (Gwynne & Cowhy, 2017). In the same report, less than a quarter of CPS’s administrators felt that they were prepared and received proper trainings to implement CCSS (Gwynne & Cowhy, 2017). Another statewide report indicates a set of similar challenges faced by school districts in California in implementing the CCSS such as a lack of access to high-quality, CCSS-aligned instructional materials and site-based professional development supports (Timar & Carter, 2017). Despite all the challenges, data from reports suggest that schools/districts with higher levels of organizational capacity (e.g., instructional leadership and climate of CCSS-related collaboration) reported more prepared to implement the Standards (Gwynne & Cowhy, 2017). Work in this areas has placed a strong focus on collaboration in developing district- or site-wide leadership capacity for instructional change in which leaders within the district may better develop and utilize their beliefs, knowledge, and skills for change (Day, Harrison, & Halpin, 2009).

In facilitating the development of leadership capacity, research suggests that fostering leader self-efficacy is key to build individual leaders’ sense of confidence and persistence (Paglis & Green, 2002), drive individual action toward reform efforts (Leithwood & Jantzi, 2008; McCullers, 2009),
motivate the actions of others (Louis, Leithwood, Wahlstrom, & Anderson, 2010), and, more recently, to shape districtwide collaborative network structure (Authors et al., 2014; Wohlstetter, Houston, & Buck, 2015). Since leader self-efficacy serves as a critical factor in driving one’s action in support of purposive goals, it is necessary to investigate individual leaders’ self-efficacy as it relates to carrying out reform efforts within a districtwide leadership team. To our knowledge, there remain limited empirical studies in educational leadership that focus on leader self-efficacy with regard to change efforts around a large-scale reform such as CCSS. In addressing this gap, this study attempts to answer the question: what makes some leaders feel more efficacious than others in implementing the CCSS in the initial phase of implementation progress?

We argue that the notion of leader self-efficacy is not just concerned with a cognitive aspect that is inherent in individual leaders’ internal beliefs systems (Leithwood, Day, Sammons, Harris, & Hopkins, 2006). Rather, it involves the social processes one engages with others in learning and accomplishing tasks (Bandura, 1977). Given the collective nature of implementing the CCSS, we propose that a social cognitive approach may provide analytic purchase in terms of understanding how individual leaders develop their self-efficacy beliefs about implementation. The social cognitive perspective suggests that through work engagement and interaction with colleagues in a given context (Bandura, 1977), which has also been referred to as situated learning (Lave & Wenger, 1991), the development of self-efficacy beliefs can be better understood. Yet, research literature that looks into the social aspect in self-efficacy development of educational leaders remains scares especially in the context of CCSS reform.

In addressing this gap in research, we explore factors which may be associated with individual leaders’ self-efficacy such as work engagement as measured by one’s willingness and action, respectively, in implementing the CCSS. In addition, since leader self-efficacy regarding CCSS is shaped by one’s interactions with others, we propose that the understanding of a leader’s
self-efficacy about CCSS may be influenced by the degree of their social connectedness. Social connectedness is measured by the social position a leader possesses within a CCSS-related district network. We draw on theories of self-efficacy, engagement, and social networks to respond to the following research questions:

1. To what extent are educational leaders’ perceptions of CCSS self-efficacy associated with engagement with CCSS?
2. To what extent are educational leaders’ perceptions of CCSS self-efficacy associated with their social position within the district leadership network?
3. To what degree is the relationship between educational leaders’ perceptions of CCSS self-efficacy and their CCSS engagement mediated by their social position within the district leadership network?

We focus our work on a districtwide leadership team in one large school district in California in response to the limited empirical evidence available that could help illuminate the work of leaders in the era of CCSS. The leadership team in this study refers to the certificated administrators who hold a managerial position across the district such as school site principals, district superintendent, and district coordinator and mangers. Since 2012 the district began to focus on building a collaborative culture among members across the district to ensure decisions can be made collectively. The district’s efforts around collaboration provides with this study a fruitful ground in understanding the perception of leaders regarding the level of work engagement and capacity to implement the CCSS.

**Theoretical Framework**

In framing our study, we will first present the literature behind the study’s dependent variable, CCSS leader self-efficacy, and then proceed to consider the two main independent variables: work engagement and social networks.
Leader Self-Efficacy

The concept of self-efficacy has been widely studied for decades by researchers in education (Leithwood & Jantzi, 2008; Tschannen-Moran & Hoy, 2001) and outside education (Fu, Richards, & Jones, 2009; Schmidt & Deshon, 2009; Tims, Bakker, & Derks, 2014) and has been identified as one important internal factor that affects both individual- and organizational-level outcomes (Leithwood & Jantzi, 2008; Tims et al., 2014; Tschannen-Moran & Hoy, 2001). For instance, research in education suggest that teacher self-efficacy is positively associated with their performance (Bates, Latham, & Kim, 2011; Lee, Cawthon, & Dawson, 2013), student outcomes (Lewis et al., 2012), parental support (Stipek, 2012), and self-motivation and job satisfaction (Federici & Skaalvik, 2012). While this line of research mainly focuses on the self-efficacy of students, in-service and pre-service teachers, and school principals, very few empirical studies to date have examined the perceptions of self-efficacy of districtwide leadership team such as the superintendent, managerial leaders, and site principals (Author, 2016). Therefore, it is important to fill this knowledge gap by exploring the self-efficacy of educational leaders, as self-efficacy has been identified as a key element in facilitating education reform (Authors et al., 2014; Leithwood & Jantzi, 2008; Smith, Guarino, Strom, & Reed, 2003).

Organizations that possess efficacious and adaptable leaders may be more likely to succeed in a rapidly changing environment (Bandura, 2002). In educational leadership, there are only a handful of leader self-efficacy studies and most of the studies focus on two aspects of leader self-efficacy: instructional leadership and managerial skills (Leithwood & Jantzi, 2008; Louis et al., 2010; McCullers & Bozeman, 2010; Smith et al., 2003; Tschannen-Moran & Gareis, 2004). However, these aspects of leader self-efficacy only address external and technical elements of individual leaders. While these elements are important, the ability to lead reform and initiate change may rely heavily on the internal capacity of educational leaders as they attempt to come up with innovative
strategies for instructional change (Polikoff et al., 2014). Given the lack of research on developing districtwide leader self-efficacy as related to CCSS, we focus our work on understanding the internal construction of leader self-efficacy as it may ultimately enhance the collective reform efforts of their teachers (Leithwood & Jantzi, 2008). We draw on Bandura’s (1977) social learning theory to examine core aspects of self-efficacy.

Self-efficacy is defined as the extent to which one perceives her/his competence, which may affect her/his learning and ultimately personal performance (Bandura, 1986, 1995). That is, human behavior is learned and people assess and alter their behaviors and cognitive processes to adapt to the environment through interactions with others (Bandura, 1977, 2002). There are two integral ideas about self-efficacy that can be culled from social learning theory: (1) self-efficacy is associated with the level of effort and persistence one carries out on a task, and thus is related to the level of one’s work engagement; and (2) self-efficacy is developed through observing and interacting with others based on one’s choosing (Greene & Miller, 1996; Pajares, 1996; Pintrich & De Groot, 1990). We draw on these two concepts (work engagement and social interaction) to explore the understanding of self-efficacy particularly in a leader’s ability to implement the CCSS. Specifically, the first concept is primarily concerned with one’s level of work engagement and the second concept has to do with the social interactions with others. The two concepts are presented in the following sections.

**Work Engagement and Self-Efficacy**

The development of self-efficacy is influenced by one’s prior experience such as preexisting knowledge and social support received from individuals in a situated environment (Schunk, 1995). As people participate in activities, their level of engagement is associated with situational factors from which they derive cues that signal the effectiveness of their performance. Self-motivation is developed and enhanced when individuals perceive that their ability to perform a given task is
improving and they become more competent in achieving the designated goal(s) (Schunk, 1995). Once people are motivated, they are more willing to engage in tasks, and in turn their sense of self-efficacy is more likely to be positively impacted. This is particularly the case when people are assigned a new task to which they have limited prior experience to reference. Individuals acquire cues during the process of engagement to help develop their sense of motivation from which they form beliefs about their capabilities in performing the task (Schunk, 1989). A highly motivated person is more likely to sustain higher levels of engagement in a task for a longer period of time than someone who is less motivated, and thus they are more likely to achieve their set goals (Schunk, 1989). Therefore, the level of engagement serves as an important determinant of the development of self-efficacy.

The notion of engagement has been studied in business, psychology, and education and is associated with self-motivation (Meece, Blumenfeld, & Hoyle, 1988; Parker, Jimmieson, & Amiot, 2009; Saks, 2006). While there is not a commonly used definition or universal construct that explains the concept, it is generally agreed that engagement is concerned with the presence of both psychological and physical states when one performs her/his organizational tasks (Kahn, 1990). We therefore conceptualize engagement as consisting of two major dimensions: cognitive engagement (one’s willingness to work towards achieving goals) and behavioral engagement (one’s actions in achieving goals). Cognitive engagement involves one’s cognitive investment in learning including making the necessary efforts for understanding a task (Corno & Mansinach, 1983). Behavioral engagement is concerned with the actions and practices necessary for involvement in executing a given goal-oriented task (Connell, 1990). Engaged employees tend to perform at high levels because they believe their work has meaning (May, Gilson, & Harter, 2004). Moreover, they are more willing to invest time in their work and less likely experience job burnout. Disengaged employees, on the other hand, tend to display a lack of intrinsic interest, and are more likely to experience self-doubt in
successfully carrying out organizational roles (Kahn, 1990). Engaged employees are able to learn from, and be motivated by, situational cues/influences such as goal setting and receiving information and performance feedback in situated environments (Schunk, 1995). Furthermore, this information and feedback shape their ability to perform organizational roles that are meaningful to them (May et al., 2004), which in turn facilitate the development of their self-efficacy (Schunk, 1989).

As educational leaders are adult learners, they are assumed to be self-motivated and directed in their own learning (Knowles, Holton, & Swanson, 2011). When reaching a goal (e.g., implementing CCSS) is beyond their individual faculties, they must adapt their learning to a more socially constructed model to redirect cognitive processes in developing self-efficacy (Pajares, 2002). While we have limited research on leaders’ self-efficacy about CCSS implementation, we employ a social cognitive learning perspective to address this research inquiry into leader self-efficacy and hypothesize that educational leaders who have higher levels of engagement in implementing the CCSS (both willingness and action) will perceive higher levels of self-efficacy about the implementation of the CCSS (Hypothesis 1).

Social Interactions and Self-Efficacy

While work engagement has to do with one’s self-efficacy, its direct influence on the development of self-efficacy may be limited. This is largely because self-efficacy is shaped through the interplay between the self and situated environments—the social interaction aspect of self-efficacy (Bandura, 1997)—and thus involves the interactions one has with others during a course of completing a given task for one’s set goals. Moreover, one’s willingness to engage in a task and to take actions may not be sufficient to develop and strengthen her/his self-efficacy, rather engaging in work with others may serve as a more important agentic factor that influences the shaping of one’s self-efficacy (Vancouver, Gullekson, Morse, & Warren, 2014). Individuals who work with others on tasks are more likely to engage in these tasks and increase their levels of self-efficacy (Bandura, 1986;
This social effect on self-efficacy may have a more profound influence when individuals are exposed to new and unfamiliar tasks where they feel uncertain about their own judgement of their performance and their success and the experience of and feedback from working with others may help mitigate their sense of uncertainty (Schunk, 1987). Therefore, self-efficacy can be augmented by individual engagement in interpersonal relationships with others, especially when individuals begin an unfamiliar task (e.g., CCSS implementation).

While researchers have conducted various experiments to study the interplay between interactions and self-efficacy of children and college students (e.g., Gould & Weiss, 1981; Relich, Debus, & Walker, 1986; Schunk, 1981), to our knowledge there remains scant empirical evidence documenting educational leaders and the interplay between reform-related interactions with other leaders and their self-efficacy about implementing the reform. Recently, few studies have explored the social aspect of educational leaders’ work around reform using a relational approach such as social network analysis (Authors et al., 2014; Coldren & Spillane, 2007; Spillane & Kim, 2012). We thus draw on social network theory and analysis to understand the social interactions of educational leaders around the CCSS in shaping individual leaders’ self-efficacy about implementing the CCSS.

**Social Network Theory: Relational Ties, Network Position, and Multiplexity**

Social network theory is concerned with patterns of relationships between actors (e.g., individuals, groups, entities), and the resulting network position of actors (e.g., central, peripheral, brokers) (Borgatti, 2005; Scott, 2000; Wasserman & Faust, 1994). A social network consists of sets of actors and relational ties between actors that define the network (Wasserman & Faust, 1994). Actor network position is defined by the pattern of relational ties an actor has in a network (Burt, 2005; Scott, 2000). A social network can be used to determine the social capital of individual actors (Coleman, 1990). This notion is based on the theoretical assumption that relational resources are capital embedded in social relations between actors within network structures, and can be
accumulated and mobilized across the network to increase the likelihood of success in action (Burt, 1992; Lin, 2009). This network perspective of social capital also addresses the structure of social relationships that surround actors and the resulting network position of individual actors that may support or constrain the flow of resources among these actors (Borgatti & Foster, 2003; Cross, Borgatti, & Parker, 2002). In general, network scholars posit that a closely connected network structure may facilitate or constrain the access and timing of information and the flow of social resources across a network (Burt, 1992; Inkpen & Tsang, 2005). While a dense network structure enables resources to efficiently travel across a network, it may also facilitate and further reinforce recourses that carry negative influences such as gossip, adversarial relations, and distrust (Grosser, Lopez-Kidwell, & Labianca, 2010).

Network position. Actors who possess more central and influential network positions will likely have greater opportunities to access diverse resources (Tsai, 2001) and exchange more complex knowledge and information (Lin, 2009; Raider & Krackhardt, 2002). Central actors, as defined by a higher degree of incoming and outgoing social ties, tend to possess greater influence over the network as they are connected to more actors with greater possibility to guide, control, and even broker the flow of relational resources (Burt, 2005; Kilduff & Krackhardt, 2008). However, such relational patterns may also constrain actor behavior to the central position that is defined by those relationships, which is often referred to as an inner constraint by social norms (Krackhardt, 1999). Peripheral actors or isolated actors, on the other hand, are defined by having few or no incoming and outgoing ties, tend to lack the opportunities to benefit from the resources held by central actors and tend to have less efficient influence over the larger network due in large part to the lag time in moving resources throughout the network (Cummings & Cross, 2003). However, these limited social ties reflect less social constraints on their actions and thus the peripherals may
possess greater chances of accessing external resources that are not tied to the mainland network activities (Granovetter, 1982).

**Multiple relations.** Since central actors have relatively more opportunities to interact with others, as compared to the peripheral and isolated actors, they are more likely to build, utilize, and retain multiple relations with other actors for given purposes (Brass, Butterfield, & Skaggs, 1998). These actors may have greater access to a wide variety of resources that flow in the network (Callon, 1986; Latour, 2005). For instance, school principals who have more diverse and frequent connections with other administrative colleagues are more likely to exchange a diversity of resources with others such as instructional practices or materials and information about professional learning events, as compared with those with limited, no, or less diverse and frequent connections (Authors et al., 2014). As such, individual leaders may possess more than one type of social/professional relationships with their colleagues for various purposes – a concept called *multiplexity*.

Multiplexity refers to the embeddedness of more than one type of network relation between actors (Brass et al., 1998; Scott, 2000; Uzzi, 1996). A tie between two actors is considered multiplex when their connection is defined by more than one network relationship. For instance, if A has a friendship with B, works for B, and also seeks advice from B, the relational tie between A and B is thus multiplex (friendship and work-related professional tie). Sociologists tend to assume that people possess more than one relation that is enacted under certain contexts. This concept is particularly important in organizational network studies as multiple points of contact allow for the increased movement of different types of resources (Lazega & Pattison, 1999). Since multiplexity provides additional complexity in interpreting the nature of a tie between actors, it is often used as measure of tie strength in social network studies (Brass et al., 1998; Hanneman & Riddle, 2005). Actors who are tied by multiple relations share a stronger tie than those tied by fewer relations.
Such strong ties facilitate the flow of tacit, complex, and timely information exchanged between actors (Burt, 1992; Reagans & McEvily, 2003).

**Two-plex relation: CCSS advice and work recognition.** In the current reform context of the CCSS, we draw on the concept of multiplexity to understand the professional network positions of educational leaders as a result of their multiple professional ties in two types of work-related interpersonal relations: providing CCSS advice and work effort recognition, which this study refers to as “two-plex relation.” The hypothesis is generated based on the simplest form of multiplexity, where a CCSS advice tie coexists with a work-related recognition tie in the same direction. That is, a leader provides CCSS advice to an actor and gives recognition of the work of that actor. Studying actor position within a multiplex network allows us to gain an in-depth understanding of the joint influence of CCSS advice and work effort recognition on individual self-efficacy. The two relations have been suggested to be critical in organization studies and in some educational literature in employees’ work performance, which will be discussed in the following.

Firstly, advice relationship is central to leadership and decision making (Garvin & Margolis, 2015), as it involves the sharing and development of resources, experience, knowledge, and expertise. Those who are sought for advice have the opportunity to wield soft influence onto the decisions of advice seekers (Garvin & Margolis, 2015). They are also engaged listeners. By understanding the problems that people bring them, the advisors can learn much from the problem solving process while at the same time shape their judgement which the (frequent) advice seekers oftentimes consider as good (Brooks, Gino, & Schweitzer, 2015). The process of giving solicited advice is likely to boost her/his self-confidence (Brooks et al., 2015). As such, advice relationship is considered an important relational component for development of self and organizations (Lazega, Mounier, Snijders, & Tubaro, 2012). In addition, advice exchange through informal social ties enables individuals to access and be exposed to novel ideas, approaches, and perspectives related to
their work (Albrecht & Ropp, 1984), and thus it may be associated with increased self-efficacy (Authors et al., 2014).

Second, work effort recognition involves one’s judgments about others’ job performance, work engagement, and dedication (Brun & Dugas, 2008), and has also been used as a measure for individual accomplishment in line with organizational goals (Brun & Dugas, 2008). Studies suggest that non-monetary work recognition is positively related to professional commitment and involvement, job satisfaction, sense of organizational support, and retention (Brun & Dugas, 2008; Long & Shields, 2010; Wayne, Shore, Bommer, & Tetrick, 2002). This notion is supported by a theoretical assumption that people have an intrinsic desire to be recognized for their accomplishments (Maslow, 1943) and that human behaviors are likely to be influenced when they are recognized, as argued by behavioral reinforcement theory (Skinner, 1969) and social cognitive theory (Bandura, 1986). Employees receiving workplace recognition have a stronger sense of organizational involvement (Romzek, 1985), an increased sense of self-efficacy (Bandura, 1997), as well as confidence and competence (Brun & Dugas, 2008). Furthermore, the effect of recognition provided by those with power and resources (e.g., leaders and managers) on desired outcomes as perceived by receivers is stronger than the recognition provided by those with less power and fewer resources (e.g., staff members) (Luthans & Stajkovic, 2009). While the literature demonstrates the myriad benefits of work recognition—namely increased self-efficacy (Bandura, 1997)—it tends to focus on the effect of the person receiving the recognition and not on the person giving the recognition. We would like to fill that gap in the literature and posit that providing work effort recognition to others serves as a stronger mechanism for individual leaders to develop self-efficacy than receiving recognition from their leader colleagues. In other words, we propose that the leaders who are able to provide work effort recognition are better able to identify reform-related accomplishments, which may positively reinforce judgments about their ability to implement the
CCSS. While previous studies on work recognition use perceptional survey scales as a measure for self-reported recognition, they oftentimes fail to capture the nuanced difference in the magnitude of recognition relationships occurring between leaders. We draw on social network analysis to better understand the work effort recognition relationship as our second network relation of two-plex ties. We focus on the degree of work effort recognition provided by individual leaders.

Taken together, actor network position, as a result of two-plex relation (i.e., providing CCSS advice and work effort recognition), is influential on the extent to which complex resources (e.g., advice, knowledge, and information) are exchanged. Such exchange through interpersonal relationship is integral in bolstering individual capacities for learning and self-efficacy (Junga, Chunsik, Elias, & Morrison, 2012; Kang, Kim, & Bock, 2010). As such we hypothesize that, educational leaders who possess central network position (i.e., providing CCSS advice and giving recognition of others’ work) will perceive higher levels of self-efficacy about implementing the CCSS (Hypothesis 2).

**Leader Self-Efficacy, CCSS Engagement, and Network Position**

Finally, we argue that the relationship between perceptions of CCSS engagement and self-efficacy is mediated by the extent to which educational leaders occupy a central position as a result of engaging in multiplex network relationships in the district’s network. In other words, we suggest that educational leaders who report higher levels of engagement in implementing the CCSS (both willingness and action) will perceive higher levels of self-efficacy, and that this relationship can, in part, be explained by the degree of their social engagement efforts as measured by CCSS advice and work effort recognition. That is, the leaders who report more willingness to enact reform-related efforts are also more likely to engage in collaborative interactions with others through which reform-related resources are exchanged and complex knowledge is developed, and thus self-efficacy is shaped. Building on the available literature on the relationships between self-efficacy, motivation, and social networks, we cautiously assume directionality in the relationships between CCSS
engagement, network position, and perceptions of self-efficacy. However, the aim of our study is not to test the causality of this assumption, but rather to contribute to theoretical advancement in examining whether such relationships among CCSS engagement, network position, and self-efficacy can help develop our understanding about individual leaders’ self-efficacy and some of the important mechanisms that may be associated with leader self-efficacy under the current CCSS context. As such, caution should be exercised with regard to the interpretation of our findings.

In sum, we argue that when educational leaders report higher levels of engagement in the CCSS efforts (i.e., willingness and taking action to implement the CCSS), this will be associated with greater degree of interpersonal interaction in relation to reform-related efforts (e.g., providing advice regarding the CCSS and giving work effort recognition to others). This central network position will in turn be associated with individual leaders’ perceptions of self-efficacy. As such, we hypothesize that a leader’s network position mediates the relationship between CCSS engagement (both willingness and action) and perceptions of self-efficacy (Hypothesis 3).

We have graphically represented our conceptual model and the hypothesized relationships in Figure 1.

[Insert Figure 1 About Here]

**Method**

**Sample and Context**

We use a case study design to explore our understanding of a districtwide leadership team in undertaking the CCSS initiative using multiple data sources including quantitative survey data and social network data to inform the study findings. The data for this study were gathered in 2013 at an urban fringe school district of approximately 30 schools serving diverse student populations in race and ethnicity, socioeconomic status, language learners and special education in California. We selected the district as it reflects the demographic composition of general school districts in
California. The district has had a long history of underperforming, lower levels of morale among district and community members, and high turnover rates of teaching and managerial staff members. For the past five years, beginning with the hiring of a new superintendent, the district has been undergoing a significant transformation in its leadership, values, mission, and goals with a strong focus on building collaborative relationships among and between school/district community members in an effort to support student learning. In 2011, the district’s leadership team initiated a series of discussion about the CCSS, in terms of the extent to which they have the capacity to take on the new initiative. It was not until 2012 the leadership team made a collective decision to transition to adopting the CCSS and build partnerships with a research university to help the district examine the alignment of their reform efforts on which they make evidence-informed decisions. Their continued collaborative efforts have made the district one of the successful cases nationwide with its reputation of overall climate that is supportive, collaborative, and innovative. It is this important and timely urgency that we focus our study on the type of reform-related professional relationship of a districtwide leadership team as well as factors that may bear on the district’s preparing for implementing the CCSS.

The data were collected in fall 2013, a year before the district began full implementation of CCSS so as to illuminate the district’s reform effort in the preparation and transition phase. We administered a leadership social network survey from a total of 66 educational administrators that represent all district’s central office leaders and school site principals across the district, reflecting a 100% response rate. Participants were asked to assess a series of their social and professional relationships as well as perceptions in a number of aspects that are suggested to be critical in individual and organizational performance such as organizational climate and commitment, trust, leadership, professional learning communities, and engagement efforts around and personal beliefs about the CCSS. These survey scales and social network questions were adopted from previously
validated instruments and further modified and validated by the research team in earlier works. As the present study focuses on policy engagement, social interaction, and self-efficacy, we report findings on data as to the interplay between CCSS engagement, degree of network connectivity, and self-efficacy about implementing the CCSS. These 66 educational administrators worked at either the district office (\(N = 37\)) or as a principal at one of the district’s school sites (\(N = 29\)). Of the sample, 61% were female. On average, individual administrators had been between 1 and 34 years of experience working in the district (\(M = 12.6\) years, \(SD = 10.2\)). Additional sample demographics are presented in Table 1.

[Insert Table 1 about Here]

**Instruments**

**Dependent variable: CCSS self-efficacy.** While we are interested in exploring the self-efficacy of leaders, in this study we are specifically interested in their CCSS self-efficacy. The CCSS self-efficacy refers to the self-efficacy of leaders in implementing CCSS. The scale was developed and modified to fit the study sample and context about CCSS initiative based on Five & Buehl’s (2012) work on educators’ personal beliefs. The scale was further validated in previous work (Authors et al., 2015). The CCSS self-efficacy scale used in the current study was composed of three items that measures individual leaders’ self-efficacy about implementing the CCSS on a six-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree). Principal component analysis (PCA) using verimax and promax yielded a single factor solution that explained 82% of the variance with Cronbach’s alpha of .88. A sample item is, “I am able to implement the Common Core Standards.”

**Independent variable: CCSS engagement.** The CCSS engagement scale was designed and modified to fit the study context about the CCSS initiative based on literature on motivation and work engagement (Blake, 1999; Corno & Mandinach, 1983; Spence & Usher, 2007). The scale was
tested for its model fit in previous research (Authors et al., 2015), suggesting a two-factor model. The scale consists of ten items that measure individual leaders’ perceptions about their cognitive and behavioral engagement in the CCSS initiative on a six-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree). Both varimax and promax performed in PCA yielded a two-factor solution explaining 86% of variance: CCSS willingness and CCSS action. The CCSS willingness is composed of five items that explained 56% of variance with Cronbach’s alpha of .96. A sample item is, “I am willing to adjust my instructional plan according to the Common Core Standards.” The CCSS action includes five items explaining 30% of variance with Cronbach’s alpha of .94. A sample item is, “I have taken extra time to learn about the Common Core Standards.” Table 2 presents the factor loadings of the study variables.

[Insert Table 2 about Here]

**Independent variable: Leader network position.** We collected social network data that reflected individual leaders’ social relationships in relation to the CCSS and work-related activities based on earlier work (Authors et al., 2014). We asked individual leaders to assess the frequency of interaction (1 = few times a year to 4 = daily) with their leader colleagues (1) with whom they turn to for advice concerning the implementation of the CCSS (CCSS advice network relation), and (2) from whom they received recognition about their work efforts (work effort recognition network relation). We provided a roster with the names of the central office and school site leaders for ease of response. Respondents could indicate with whom they seek advice concerning the CCSS implementation by selecting any of the names of their fellow administrators and assessing corresponding frequency of interaction with each nominee. The number of nominations that respondents could make was unlimited. Such bounded approach, meaning that we included all the members of the districtwide leadership team, is appropriate as the current study is focused on the network positions of a group of leaders within a finite district network (Cervone, 2008).
bounded approach, coupled with high response rate, provides a more complete picture of the leader networks and yields more valid outcomes (Scott, 2000). For both networks around CCSS advice and work effort recognition, we focus on the more frequent interactions individual leaders have with their colleagues, namely a few times a week and daily basis. This type of frequent interaction is assumed to be more durable and of greater tie strength (Granovetter, 1982), as compared to less frequent interaction such as a few times a year.

In addition, as we aim to understand a more realistic phenomenon of the multiplex nature of a person’s relational ties (i.e., Actor A could have both friendship and work advice tie with Actor B), we examine two-plex ties individual leaders have with other leaders regarding the connections of both CCSS advice as well as work effort recognition. The two-plex network is referred as CCA/R (CCSS advice and work recognition) hereinafter. A two-plex CCA/R tie between given two leaders indicates a joint phenomenon in which an advice tie around CCSS coexists with a work effort recognition tie regardless of the direction of ties (sending or receiving). For instance, if Leader A has a CCSS advice tie with Leader B and also has a work recognition tie with B, then the tie between A and B is regarded two-plex. In terms of interpretation of a two-plex tie, if Leader A receives a CCA/R tie from Leader B, this indicates that A is regarded by B as a provider of both CCSS advice and work recognition. This also indicates that B sends a CCA/R tie to A, meaning B reaches out to A for CCSS advice and refers to A as a provider of work recognition. In this study we focus on the provider role of CCA/R relationship and as such the direction of both CCA and R ties one has is incoming (i.e., receiving). We use UCINET 6 (Borgatti, Everett, & Freeman, 2002), a widely used and well developed social network software used to analyze network data, to generate a two-plex network matrix for calculation of individual level degree of connectedness (Borgatti, Jones, & Everett, 1998). Based on the two-plex network relation, we calculate individual indegree centrality to measure individual leaders’ central network positions. An actor indegree indicates the number of
incoming ties the actor has divided by the total number of possible ties across the network (Wasserman & Faust, 1994). Indegree centrality has been widely used in network studies (Borgatti, 2005; Freeman, 1979; Klein, Lim, Saltz, & Mayer, 2004; Penuel, Riel, Krause, & Frank, 2009; Tsai, 2001) as a useful and relevant index for understanding the degree of influence, power, and prestige an actor possesses (Brass, 1985; Ibarra, 1993; McPherson & Smith-Lovin, 1987).

**Analysis Strategy**

The analytic strategy is fourfold.

First, as we are interested in two types of network relation (CCSS advice and work effort recognition), prior to further analysis, it was important to test the correlation between the two networks, as highly correlated networks may result in issues with multicollinearity (Dekker, Krackhardt, & Snijders, 2007). We performed Quadratic Assignment Procedure (QAP) to identify the strength of correlation between the CCSS advice and work effort recognition relationships. The QAP result indicated that the CCSS advice network relation is weakly correlated with the work effort recognition relation at a correlation coefficient of 0.29. This suggests these two network relations reflect conceptually distinct types of interpersonal relationships and thus allows the study to explore a two-plex relation of these two relations. Next, we ran descriptive statistics including the network indegree centrality measures to characterize the study sample.

Third, we took a four-step process to test the proposed hypotheses. Step 1, we examined correlations to analyze the relationships among the variables. Step 2, we studied the relationship between demographic variables and perceptions of CCSS willingness and action, CCA/R indegree, and perceptions of CCSS self-efficacy. Step 3, we conducted ordinary least squares linear regression analyses to test the direct effect of CCSS willingness and action and CCA/R indegree on CCSS self-efficacy (Hypotheses 1 and 2). Step 4, we tested the mediating influence of CCA/R indegree on the relationship between CCSS willingness and action and CCSS self-efficacy (Hypothesis 3).
To test the mediation hypothesis, the following four conditions must be met, according to Baron and Kenny (1986): (1) a significant relationship between CCSS willingness and action and CCSS self-efficacy (Path A in Figure 1, addressed by Hypothesis 1); (2) a significant relationship between CCSS willingness and action and CCA/R indegree (Path B); (3) a significant relationship between CCA/R indegree and CCSS self-efficacy (Path C, addressed by Hypothesis 2) while fixing the effect of CCSS willingness and action. Mediation is indicated when the relationship between the independent and dependent variable (Path A) is either zero (full mediation) or reduces significantly in absolute size (partial mediation) after adding the mediating variable (CCA/R indegree) (addressed by Hypothesis 3) (Pearl, 2000). Following Krull and MacKinnon (2001) we calculated the size of the mediated effect by multiplying the estimate for Path B by the estimate for Path C while fixing the effect of CCSS willingness and action. The significance of the mediated effect was evaluated by calculating Sobel’s test (Sobel, 1982). iv

The final analytic strategy is to visualize the relationships among study variables. We used NetDraw (Borgatti, 2002), a type of social network software used for generating social networks along with actor-level attributes, to present visualization of the CCA/R relationship under study. A network sociogram in this study consists of nodes (individual leaders) and ties (the two-plex CCA/R network relation). Individual attributes include levels of CCSS self-efficacy, CCSS willingness and action, and degree of connection (i.e., CCA/R indegree). The network position of individual leaders may vary as they have different number of network connections with other leaders. Along with other individual attributes, we may visualize the pattern of CCA/R relationship between individual leaders’ network position and their perceived level of CCSS self-efficacy, for example. The network sociogram thus provides useful analytical information to not only help understand but also triangulate the relationships between leaders.

Results
Descriptive Analysis

Descriptive statistics (see Table 3) indicate that leaders perceive high levels of CCSS willingness, action, and self-efficacy (mean average above 5 with rounding). Regarding network position, leaders were, on average, nominated by approximately 4 other leaders ($M = 4.10$, $SD = 3.30$) as a provider of both CCSS advice and work effort recognition. In addition, as each network relationship represents its unique type of interpersonal interaction, we provide the descriptives of each relationship separately in Table 3. The results indicate that educational leaders are sought by more colleagues for advice around CCSS (mean indegree of $CCA = 9.88$) than they are to provide work effort recognition (mean indegree of $R = 7.62$), but the variation in CCA indegree ($CCA \text{ indegree } sd = 6.89$) is larger than that of R indegree ($R \text{ indegree } sd = 4.42$). This suggests that while on average individual leaders provide advice around CCSS to more people than they do to provide work effort recognition, the number of people to whom s/he provides CCSS advice varies, with some leaders who are sought by a large number of colleagues and some receiving no or few nomination(s) as an advice provider.

The correlations indicate that work level either at the central office (dummy code = 0) or school site (dummy code = 1) is statistically significantly and positively correlated with CCSS willingness ($r = .32$, $p < .05$) and CCSS self-efficacy ($r = .33$, $p < .01$), reflecting that school site principals perceived higher levels of willingness and self-efficacy concerning the implementation of CCSS. The two subscales of CCSS engagement—CCSS willingness and CCSS action—are positively and moderately correlated with each other ($r = .30$, $p < .05$). Results also suggest that both CCSS willingness and CCSS action are moderately and positively correlated with CCSS self-efficacy ($r = .48$ and $r = .52$, $p < .01$, respectively) as well as network position ($r = .31$ and $r = .36$, $p < .01$, respectively). In terms of network position, CCA indegree and R indegree are moderately to weakly correlated with CCSS self-efficacy, respectively. As for the two-plex CCA/R ties, the extent
to which leaders occupy central positions in the CCA/R network is moderately and positively related to CCSS self-efficacy ($r = .46, p < .01$), suggesting that leaders who connect more leaders in providing CCSS advice and work effort recognition tend to perceive higher levels of self-efficacy in the CCSS implementation.

[Insert Table 3 about Here]

**The Role of Demographics**

Regression results (see Table 4 and 5) indicate that leaders’ years of experience working at the district is not associated with CCSS self-efficacy, nor does this variable play a significant role in the relationships under study. However, leaders’ work level is positively associated with CCSS self-efficacy ($\beta = .252, p < .05$), indicating that leaders who work at the school site tend to perceive themselves as being more efficacious in implementing the CCSS than their peers off site. Although leaders’ years of experience did not play a significant role in the relationships under study, we controlled this variable given its high variation among the leaders and potential impact on their work performance (Branch, Hanushek, & Rivkin 2008; Coelli & Green 2009; Leithwood & Jantzi, 2008).

[Insert Table 4 and 5 about Here]

**The Relationship between CCSS Engagement and CCSS Self-Efficacy (H1, Path A)**

Regression results indicate that the level of CCSS engagement is associated with leaders’ perceived level of CCSS self-efficacy (Table 4, Model 1). Specifically, leaders who are more willing to implement the CCSS and also have taken actions in relation to the CCSS are more likely to perceive themselves as being efficacious in implementing the CCSS. These findings suggest that increased perceptions of CCSS self-efficacy of the leaders under study are related to individual leaders’ perceived willingness to implement the CCSS as well as the reported levels of action taken to implement the CCSS. The hypothesis 1 is therefore fully supported.

**The Relationship between Network Position and CCSS Self-Efficacy (H2, Path C)**
The results support the second hypothesis that the leaders who occupy central network position report higher levels of self-efficacy in implementing the CCSS (see Table 4, Model 2). Findings indicate that leaders' perceptions of CCSS self-efficacy are positively associated with the extent to which they are regarded by other leaders as central and influential in providing CCSS advice and work effort recognition, as evidenced by a statistically significant and positive effect of CCA/R indegree.

**Mediating Role of Leaders’ Network Position in the Relationship between CCSS Engagement and CCSS Self-Efficacy (H3, Path B)**

To test our mediation hypothesis, we first examine the relationship between CCSS engagement and CCA/R network position (see Figure 1 and Table 5). As our previous analysis suggests that CCA/R indegree is related to CCSS self-efficacy, precondition for mediation by this variable is met. Results show that CCA/R indegree significantly mediates the relationship between the two subscales of CCSS engagement and CCSS self-efficacy. Specifically, CCA/R indegree mediates the relationship between CCSS willingness and CCSS self-efficacy as indicated by reduced parameter from $\beta = .311$ to $\beta = .256$, $p < .01$ (see Table 4). The partial mediation effect is small but found to be significant as evidenced by Sobel’s test (Sobel test statistic = 2.06, $p < .05$). In addition, CCA/R indegree also statistically significantly mediates the relationship between CCSS action and CCSS self-efficacy as indicated by reduced parameter from $\beta = .603$ to $\beta = .518$, $p < .001$ (Table 4). The partial mediating effect is also found to be significant as evidenced by Sobel’s test (Sobel test statistic = 1.99, $p < .05$). These results suggest that the relationship between CCSS engagement (i.e., CCSS willingness and CCSS action) and perceptions of CCSS self-efficacy can be in part explained by the extent to which educational leaders actually play a central and influential role in the social network in terms of providing CCSS advice and giving recognition of others’ efforts. In other words, the leaders in the study who are more willing to implement the CCSS and have engaged in
activities related to the implementation also tend to provide advice about the CCSS and give recognition about others’ work, which is in turn associated with higher levels of beliefs about their ability to implement the CCSS.

**Visualization of the Relationships under Study**

We present two sets of network sociograms to illustrate major study relationships. The first set of sociograms (sociograms A and B in Table 6) indicate the Path A relationship as seen in Figure 1. Building on the first set of sociograms, the second set of sociograms (sociograms C and D in Table 7) provides additional information of network position (i.e., indegree) in the Path A relationship. Across all the sociograms, the nodes are individual educational leader and ties with the lines and arrows between leaders reflecting the sending, receiving, or reciprocating two-plex relation of CCSS advice and work effort recognition (CCA/R). The nodes are colored by level of perceived CCSS willingness (sociogram A and C) or CCSS action (sociogram B and D): black nodes indicate higher perception levels and gray nodes with lower levels. In addition, the nodes are grouped by two levels of CCSS self-efficacy with a cutoff point of 4.5 based on the 6-point Likert type scale (4.5 falls between ‘somewhat disagree’ and ‘somewhat agree’): higher on the right and lower on the left. The cutoff point of 4.5 dichotomizes the leaders into two groups: those leaders who perceive themselves as being efficacious and those who somewhat do not perceive they are efficacious. In Table 6, both sociograms indicate that the percentage of leaders with higher levels of CCSS willingness (black nodes in sociogram A) and actions (black nodes in sociogram B) in the higher self-efficacy group is statistically significantly greater than that in the lower self-efficacy group ($t_{64} = 4.00$, $t_{64} = 4.01$, $p < .001$, respectively). This suggests that those leaders who are more willing to implement the CCSS and have made certain efforts are more likely to perceive themselves as being efficacious in implementing the CCSS.
Moreover, when taking into account their network position, the Path A relationship can be further explained by CCA/R indegree as shown in Table 7. The graphical information in sociogram C and D is kept the same as sociogram A and B except the node size. In sociogram C and D, the nodes are sized by CCA/R indegree. The larger the node, the more central and influential role that leader plays in providing CCSS advice and work effort recognition to other leaders. Sociogram C and D indicate that the proportion of those leaders with higher levels of CCSS willingness and action who also have greater indegree in the higher CCSS self-efficacy group (larger black nodes on the right in sociogram C and D) is statistically significantly greater than that in the lower self-efficacy group ($t_{64} = 4.31, p < .001; t_{64} = 2.35, p < .05,$ respectively). In other words, those leaders who reported higher levels of self-efficacy in implementing the CCSS tend to report not only higher levels of CCSS willingness and actions but also possess central network position (larger black nodes).

**Discussion**

In our exploratory theory building case study, we attempted to address the gap in research and practice in understanding what constitutes a leader’s perceived self-efficacy in implementing the CCSS by examining the relationship between CCSS engagement and social network position within a leadership team. We empirically investigated educational leaders’ willingness and reported levels of action taken for implementing the CCSS, and related the level of CCSS engagement with network position and perceptions of CCSS self-efficacy. Results indicate that those leaders who have higher levels of CCSS-focused engagement report higher self-efficacy regarding implementation of the CCSS. Such a relationship is mediated by the degree to which leaders possess central and influential network positions in providing CCSS advice and work effort recognition to their fellow administrators.

**Understanding “I Think I Can, I Think I Can!” in the CCSS Context**
We took a social learning perspective in understanding leaders’ CCSS self-efficacy through CCSS-focused engagement and network position. Our findings suggest that leaders who indicate being willing to engage in CCSS-related activities and report having taken actions to implement the CCSS tend to be able to provide CCSS advice and give recognition to others’ efforts, and are more likely to report increased capacity to implement the CCSS. The findings support the theoretical concept that self-efficacy serves as an outcome of a series of processes of situated learning that involve cognitive and behavioral engagement as well as actual interpersonal interactions (Bandura, 1977). In addition, the findings also support a few recent research studies that underscore the relationship between self-efficacy and network position (Authors et al., 2014; Kang et al., 2010; Vardaman, Amis, Dyson, Wright, & Van de Graaff Randolph, 2012) and motivation in the form of engagement (Spence & Usher, 2007; Vancouver et al., 2014).

This work extended our understanding about self-efficacy by suggesting that self-efficacy, particularly within the CCSS context, can be explained by not only the cognitive element (extent to which one perceives their level of engagement in CCSS-focused work) but also the social element (degree to which one interacts with others to engage in work-related professional activities). Both elements go hand in hand in the level of work engagement and are significant in the shaping of leader self-efficacy. Particularly, our data indicated that the effect of CCSS action is twice than CCSS willingness on leaders’ CCSS self-efficacy, even more so when leaders’ CCA/R indegree was taken into account. This suggests that in order to enhance leaders’ beliefs in their ability to implement the CCSS, getting everyone on board is one important and necessary condition. However, another crucial condition that has double effect on efficacy building is to ensure leaders are provided with opportunities to engage in targeted activities that are specifically designed to support leaders’ CCSS literacy in terms of providing useful feedback to one another and to teachers
on their instructional plan, which has been one of the significant struggles administrators encountered in implementing CCSS (Gwynne & Cowhy, 2017).

The leaders’ taking actions in support of CCSS implementation (e.g., collaborating with one another on the Standards, attending CCSS-focused meetings and professional activities, and taking time to learn about CCSS and adjusting improvement plan accordingly) means that the district in the early implementation phase has arranged time and structures for leaders to not just learn from professional trainings but also be able to develop their own capacity for being CCSS literate. This could be due in large part to the district’s collaborative efforts in creating a networked, supportive learning community in which the leadership team not only meet together on a regular basis but also with partnership organizations (research institution of higher education and community business organizations) with a strong focus on network building across sites. The mechanism of connecting resources (people, organizations, and communities) for district members seems to be critical at the early stage of preparing for adopting CCSS so that members are provided with knowledge about CCSS and access to diverse resources in order to develop their understanding and confidence about the reform. For school districts that attempt to develop and/or enhance leader self-efficacy, one practical course of action would be to create organizational routines (Spillane, Parise, & Sherer, 2011) such as a formally structured opportunity allowing district and school site leaders to engage in reform-related activities on a frequent and regular basis. Such collaborative opportunities may help develop the norm of sharing and thus increase the likelihood of collaboration and developing ideas related to the CCSS, which in turn may facilitate the shaping of individual CCSS self-efficacy.

The Role of Strong Ties in the Relationship between CCSS Engagement and CCSS Self-Efficacy

Supporting the concept of multiplexity and its potential influence on the flow of information (Brass et al., 1998; Burt, 1992; Hanneman & Riddle, 2005; Reagans & McEvily, 2003), our results
indicate that leaders with multiplex ties with others (i.e., providing CCSS advice and work effort recognition) tend to influence their level of work engagement and self-efficacy. Network scholars suggest that multiplexity bolsters the ability of an actor with strong ties to exchanging multiple and high value resources with others to achieve purposive goals (Katz & Anheier, 2005; Lazega & Pattison, 1999). As a result, they are more likely to engage in complex and tacit information exchanges with others (Athanassiou & Nigh, 1999; Powell, White, Koput, & Owen-Smith, 2005) as opposed to those with fewer and thinner connections. In this study, leaders who occupy central positions in the two-plex CCA/R network, i.e., those leaders who serve as “hubs” for others, were seen as sources for CCSS-related advice and recognized value at work (Dahlander & McFarland, 2013). These “hubs” may provide greater opportunities for others to be exposed to and gain knowledge from a wide variety of job-embedded experience (Gulati, 1999). Although providing goal-specific advice (e.g., CCSS advice) may help the advisors improve her/his knowledge and understanding of the problems brought to them by advice seekers, it may not help her/him reflect on the value of advice and its potential consequences without the appraisal of the work of others. As such, in a team-based context, like a leadership team, the role of recognizing team members’ work is critical as work effort recognition involves judgment of others’ work engagement and level of accomplishment (Brun & Dugas, 2008), reinforces the value of advice that is given to the team members and as such may boost team members’ sense of support, morale, self-esteem, self-efficacy, competence (Brun & Dugas, 2008). It may be the case that the study leaders who provide frequent CCSS advice and recognition are not only aware of their engagement in CCSS activities, but also able to provide relevant support to team members based on the appraisal of their advice around CCSS and judgments about team members’ efforts. In turn, the leaders who provide advice and recognition would be able to develop their understanding about the work of their team and potential problems related to CCSS reform and thus increase their capacity to implement the CCSS.
Furthermore, previous studies suggest that the effect of recognition provided by the leaders on desired outcomes is greater than that provided by those with less resources and power (e.g., Luthans & Stajkovic, 2009). While we do not attempt to compare the difference in such effect, in our case it underscores the important role these educational leaders play in their efforts with regard to the CCSS implementation. One of the important secondary outcomes would be the potential influence of recognition along with advice giving provided by these leaders on the work of teachers. Previous work suggests that leaders who recognize a team’s efforts and accomplishments may also influence others to value the teamwork and collaborative efforts of others (Whitford & Moss, 2009; Yun, Cox, Sims, & Salam, 2007). For instance, a principal who recognizes a teacher’s efforts may well influence the teacher’s sense of self-efficacy, competence, and confidence (Ashton & Webb, 1986; Hipp & Bredeson, 1995). Our work suggests that the degree to which educational leaders engage in both advice giving and recognition is important in developing their ability to provide reform-relevant advice and identify others’ work-related accomplishments, which in turn shapes their judgments about their ability to implement the CCSS.

It is noteworthy that there remained seven isolated leaders who reported lower levels of self-efficacy in the CCA/R network. This indicates that while 89% of the network was connected among leaders around CCSS advice and work effort interactions, 11% of the network members were neither sought by others for CCA/R, nor did they reach out to others for CCA/R, leaving the network system with disconnected areas to which the mainstream resources and information were not reaching efficiently. This implies that the self-efficacy of the isolated leaders around implementing the CCSS may remain low levels if they are not encouraged or given opportunities to access relational resources that surrounded them in the district network, as they would be less likely than the connected leaders to engage in CCSS-related activities with their administrative colleagues.
A key takeaway from the result of multiplex ties is for districts to encourage diverse interpersonal relationships so as to develop multiple, high value, and resilient ties within the leadership team. Such strong ties not only mediate how employees go about accomplishing their work and enhance self-confidence but also influence their level of engagement with their work and commitment to the organization (Siciliano & Thompson, 2015). In the long term, we may expect the development of reciprocated relationships around advice exchange and mutual recognition (Grutterink, Van der Vegt, Molleman, & Jehn, 2013) among the leaders, which may build the strength of the network in communicating for CCSS implementation. As we have little empirical research that supports the understanding of leader self-efficacy about the implementation of CCSS, this important mediation effect of a leader’s network position in the current reform context provides a fruitful area for future investigation.

Finally, self-efficacy involves not only one’s interactions with others in a given context, but also the levels of effort one applies toward tasks and goals (Greene & Miller, 1996). For a leader to develop higher levels of self-efficacy, it is important that s/he perceive a sense of willingness to fully understand the scope of the task, as well as the drive to invest in the cognitive and behavioral effort necessary to achieve or complete the task. With such willingness, individuals may persist longer in carrying out the tasks. In a teamwork environment, reform-related tasks are mostly accomplished through collaboration due in large part to the complexity of the work (McLaughlin, Glaab, & Carrasco, 2014; Timar & Carter, 2017). If one fails to persist in the process of working with others, it may negatively impact sense of self-efficacy. Therefore, in understanding the leader self-efficacy about implementing the CCSS, assessing their sense of willingness and giving recognition about their work effort is critical in facilitating the interpersonal collaboration as can be measured by social network position. Taken together, our results emphasize the importance of attending to both CCSS engagement and work-related social network position in the CCSS preparation phase, as each aspect
is significantly associated with a leader’s sense of self-efficacy about implementing the CCSS. The importance of social influence and interaction is key path that leads to enhancing individuals’ self-perceptions, which ultimately may impact the collective sense of preparedness for full implementation of CCSS (Gwynne & Cowhy, 2017).

**Significance, Limitations, and Implications**

Given the national and state level pressures around the CCSS, the preparation of leaders and educators to implement the CCSS varies and much of the reform efforts are context specific. In our exploratory case study in which the leadership team takes a collaborative approach to improvement, we profiled self-efficacy of the leadership team in implementing the CCSS. Our work makes a theoretical and practical contribution to the field of leadership and social networks.

Theoretically, our work built on the existing theoretical concept of self-efficacy through the lens of social learning and further situated the context within the CCSS reform. This endeavor to investigate CCSS self-efficacy not only adds to existing knowledge base on leader self-efficacy with regard to work engagement, but also provides new evidence to support the social aspect of self-efficacy such as individual degree of connectedness. Together, the theoretical understanding of leader CCSS self-efficacy can further help practitioners and policy makers envision courses of action that may develop leadership practices necessary for implementing the CCSS. In addition, our work also adds to existing network research concerning educational leaders by providing another level of understanding of leaders’ multiplex network relations. As the work of leaders involves interaction and communication with others for various purposes, the multiplex aspect of leadership helps manifest the complex nature of professional relationships between and among leaders.

As with other empirical studies, some limitations of our study need to be noted. We acknowledge that our findings may not be generalized, but can help add to our theoretical understanding of these important concepts. While our findings correspond to results from several
recent studies on social networks and self-efficacy (e.g., Authors et al., 2014; Kang et al., 2010; Vardaman et al., 2012), our sample consisted of a leadership team in a school district that has endeavored to encourage collaboration, which has become a hallmark of many other reform efforts. It would be interesting to extend this study to include a broader variety of school districts, as well as to contexts, to explore differences regarding the influence of social network structure on educational change efforts.

Causality between the relationships under study was supported by suggestions and evidence from reviewed literature. We attempted to provide a first exploration of the relationships among the study variables in this instructional case to contribute to conceptual understanding of the role of interpersonal relationships in shaping self-efficacy of educational leaders. However, our research design was not aimed toward testing the causality of the study variables. Readers should proceed with caution when inferring causal conclusions from our findings. Future empirical studies should give more attention to the examination of causality, for instance, by complementing quantitative data with data from in-depth qualitative research as well as examining the hypothesized relationships in a longitudinal approach. In contrast to the cross-sectional nature of our data, social networks are dynamic and change over time (Kilduff & Tsai, 2003). Therefore, longitudinal studies are needed to enhance our understanding of the dynamic exchange of different types of relational resources in social networks, the implementation of change strategies, and resulting outcomes over time.

Our findings may yield transferable implications to other school districts with similar contexts as well as to the broader educational policy. First, school districts may benefit from employees’ work engagement and interpersonal exchange of resources when they are intentional about creating organizational routines for regular collaboration and accessibility of relational resources in support of the CCSS implementation. The districts may organize multiple structures and professional trainings that both support and encourage educational leaders to engage with their
colleagues in sharing and developing ideas, as well as appreciating others’ effort. The opportunity for developing individual and organizational routines may potentially allow the leaders to craft their networks in ways that support professional development such as self-efficacy about their capacity to carry out the CCSS. In our case, the leadership team meets a few times a month in various configurations to discuss instructional strategies, practices, and materials that may be potentially useful for their teaching staff as well as to engage in professional development activities such as making sense of the school data to support their instructional decision making on school issues. This type of organizational routine seems to shape individual leaders’ perceptions of self-efficacy, which is critical to individual performance and ultimately the outcomes of the district organization (Spillane et al., 2011).

With regard to policy, districts may treat the CCSS as an opportunity for change and innovation rather than as a threat to organizational learning. If the CCSS are treated as a threat, organizations may respond in a very rigid manner resulting in organizational inertia (Author et al., 2011; Gilbert 2005; Larsen & Lomi, 1999). On the other hand, organizations that are better able to maximize the development of its human and social capital are more likely to adapt and meet reform challenges. With that said, local educational policy could move in a direction in which opportunities for collaboration are routinized to create social infrastructure such that individual leaders’ capacity for leading the reform may be strengthened as well as distributed across the district.

Our work sheds new light on conventional understanding of leader self-efficacy and the extent to which leader self-efficacy may be ascribed to individual leaders’ reform engagement and more importantly individual social position in a districtwide network in support of the CCSS. Gaining a better understanding of the ways in which leader self-efficacy about the implementation of the CCSS may be shaped by levels of work engagement and social connectedness is imperative for developing and strengthening individual leaders’ self-concept about her/his capability for
implementing the CCSS, as reflected by one district administrator who shared her thought about the work of district’s leadership team:

The more opportunities we have to collaborate the better we are. There is a wealth of knowledge within our leadership team and we don't have a way to regularly access and share with one another. I think this will be the key to ensuring the Common Core is implemented with fidelity. As the plan has already been developed, I think we should work on the implementation as an entire leadership team - to ensure everyone knows how they fit in and that we should meet to collectively review and discuss this implementation as an entire management team (classified and certificated, department and site). From the Purchasing Director to the Superintendent, each one of us should know in our heads what role we play in ensuring student achievement.

Knowing the “how” in terms of shaping leader self-efficacy about implementing the CCSS may likely enhance the collective efficacy of a leadership team. The important message of this work is that investing in individuals’ social capital, particularly by encouraging strong ties in the early preparation phase, is not only critical for the implementation of CCSS, but also for the sustained development of leadership capacity and ultimately, for organizational improvement.
Reference


Siciliano, M. D., & Thompson, J. R. (2015). If you are committed, then so am I: The role of social networks and social influence on organizational commitment. *Administration & Society*. DOI: https://doi.org/10.1177/0095399715617987.


Table 1: Characteristics of Participants in the Study

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<td>≤ 6.5 years</td>
<td>22</td>
<td>33.3</td>
</tr>
<tr>
<td>6.5 - 9.0 years</td>
<td>20</td>
<td>30.3</td>
</tr>
<tr>
<td>≥ 10.0 years</td>
<td>24</td>
<td>36.4</td>
</tr>
<tr>
<td><strong>Years at the district</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 3 years</td>
<td>20</td>
<td>30.3</td>
</tr>
<tr>
<td>4-17 years</td>
<td>25</td>
<td>37.9</td>
</tr>
<tr>
<td>≥ 18 years</td>
<td>21</td>
<td>31.8</td>
</tr>
<tr>
<td>Survey items</td>
<td>Factor loadings</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
<td>-----------------</td>
<td></td>
</tr>
<tr>
<td>CCSS self-efficacy (α = .88)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have a working understanding of the Common Core Standards.</td>
<td>.96</td>
<td></td>
</tr>
<tr>
<td>I am able to implement the Common Core Standards.</td>
<td>.89</td>
<td></td>
</tr>
<tr>
<td>I am familiar with the Common Core Standards.</td>
<td>.86</td>
<td></td>
</tr>
<tr>
<td>CCSS Engagement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. CCSS willingness (α = .96)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am willing to attend useful workshops and meetings I need to help me</td>
<td>.98</td>
<td></td>
</tr>
<tr>
<td>implement the Common Core Standards.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am willing to adjust my instructional plan according to the Common Core</td>
<td>.97</td>
<td></td>
</tr>
<tr>
<td>Standards.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am willing to collaborate with other administrators about the Standards</td>
<td>.93</td>
<td></td>
</tr>
<tr>
<td>(e.g., sharing and exchanging resources, materials, and ideas).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am willing to use existing student data in a way to help me design</td>
<td>.93</td>
<td></td>
</tr>
<tr>
<td>strategies for student learning.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am willing to devote extra time to learn about the Common Core Standards.</td>
<td>.88</td>
<td></td>
</tr>
<tr>
<td>2. CCSS action (α = .94)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have collaborated with some of the administrators about the Standards</td>
<td>.93</td>
<td></td>
</tr>
<tr>
<td>(e.g., sharing and exchanging resources, materials, and ideas).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have used existing student data in certain way to help me design strategies</td>
<td>.92</td>
<td></td>
</tr>
<tr>
<td>for student learning.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have attended workshops or meetings that helped me implement the Common</td>
<td>.92</td>
<td></td>
</tr>
<tr>
<td>Core Standards.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have taken extra time to learn about the Common Core Standards.</td>
<td>.90</td>
<td></td>
</tr>
<tr>
<td>I have adjusted my instructional plan according to the Common Core Standards.</td>
<td>.87</td>
<td></td>
</tr>
</tbody>
</table>
Table 3: Descriptive Statistics and Correlations for the Study Scales

<table>
<thead>
<tr>
<th>Scale</th>
<th>Min.</th>
<th>Max.</th>
<th>Mean</th>
<th>SD</th>
<th>2</th>
<th>3a</th>
<th>3b</th>
<th>4a</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work level</td>
<td>0.00</td>
<td>1.00</td>
<td>--</td>
<td>--</td>
<td>-19</td>
<td>.32*</td>
<td>.23</td>
<td>.14</td>
<td>.33**</td>
</tr>
<tr>
<td>Years at district</td>
<td>1.00</td>
<td>34.00</td>
<td>12.63</td>
<td>10.24</td>
<td>-0.08</td>
<td>.03</td>
<td>-.14</td>
<td>-.04</td>
<td></td>
</tr>
<tr>
<td>CCSS engagement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3a. CCSS willingness</td>
<td>2.40</td>
<td>6.00</td>
<td>5.33</td>
<td>0.65</td>
<td>.30*</td>
<td>.31**</td>
<td>.48**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3b. CCSS action</td>
<td>1.60</td>
<td>6.00</td>
<td>4.80</td>
<td>0.95</td>
<td>.36**</td>
<td>.52**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network position</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4a. CCA/R indegree</td>
<td>0.00</td>
<td>14.00</td>
<td>4.10</td>
<td>3.30</td>
<td></td>
<td></td>
<td>.46**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4b. CCA indegree</td>
<td>0.00</td>
<td>24.00</td>
<td>9.88</td>
<td>6.89</td>
<td></td>
<td></td>
<td>.47**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4c. R indegree</td>
<td>0.00</td>
<td>19.00</td>
<td>7.62</td>
<td>4.42</td>
<td></td>
<td></td>
<td>.32**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCSS self-efficacy</td>
<td>3.00</td>
<td>6.00</td>
<td>4.89</td>
<td>0.75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: *CCA/R refers to the type of multiplex network relationships in the present study. CCA refers to the advice relationship around CCSS and R indicates the relationship around work effort recognition. We examine multiplex network relationships of both CCSS advice and work-related recognition. **p < .01, *p < .05.
Table 4: Regression Analysis of the Influence on Perceptions of Leader CCSS Self-Efficacy of CCSS Engagement (Hypothesis 1, Path A) and Network Position (Hypothesis 2, Path C)

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th></th>
<th>Model 2</th>
<th></th>
<th>Model 3</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>SE</td>
<td>β</td>
<td>B</td>
<td>SE</td>
<td>β</td>
</tr>
<tr>
<td>Intercept</td>
<td>.012</td>
<td>.668</td>
<td>3.694</td>
<td>.008</td>
<td>.680</td>
<td>.408</td>
</tr>
<tr>
<td>Demographics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work level</td>
<td>.147</td>
<td>.144</td>
<td>.094</td>
<td>.391</td>
<td>.181</td>
<td>.252*</td>
</tr>
<tr>
<td>Years at district</td>
<td>.032</td>
<td>.049</td>
<td>.057</td>
<td>.073</td>
<td>.064</td>
<td>.130</td>
</tr>
<tr>
<td>CCSS willingness</td>
<td>.421</td>
<td>.124</td>
<td>.311**</td>
<td></td>
<td></td>
<td>.351</td>
</tr>
<tr>
<td>CCSS action</td>
<td>.479</td>
<td>.072</td>
<td>.603***</td>
<td></td>
<td></td>
<td>.412</td>
</tr>
<tr>
<td>Network position</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCA/R indegree</td>
<td></td>
<td></td>
<td></td>
<td>.028</td>
<td>.007</td>
<td>.463***</td>
</tr>
<tr>
<td>$F$</td>
<td>21.13***</td>
<td></td>
<td>8.59***</td>
<td></td>
<td></td>
<td>19.12***</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>.59</td>
<td></td>
<td>.29</td>
<td></td>
<td></td>
<td>.62</td>
</tr>
</tbody>
</table>

Notes: *Work level refers to the leaders either working at the district (coded as 0) or at the school site (coded as 1). $sr^2_{CCSS willingness} = 13.1\%$, $sr^2_{CCSS action} = 37.2\%$, and $sr^2_{CCA/R indegree} = 8.7\%$.

*p < .05, **p < .01, ***p < .001.
Table 5: Regression Analysis Results of the Influence on Leaders’ Social Network Position of Perceptions of CCSS Engagement (Hypothesis 3, Path B)

<table>
<thead>
<tr>
<th></th>
<th>CCA/R indegree</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>SE</td>
<td>β</td>
</tr>
<tr>
<td>Intercept</td>
<td>-39.256</td>
<td>15.403</td>
<td></td>
</tr>
<tr>
<td>Demographics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work level</td>
<td>1.009</td>
<td>3.331</td>
<td>.039</td>
</tr>
<tr>
<td>Years at district</td>
<td>-0.736</td>
<td>1.126</td>
<td>-.080</td>
</tr>
<tr>
<td>CCSS engagement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCSS willingness</td>
<td>6.851</td>
<td>2.857</td>
<td>.307*</td>
</tr>
<tr>
<td>CCSS action</td>
<td>3.776</td>
<td>1.650</td>
<td>.288*</td>
</tr>
</tbody>
</table>

\[ F = 4.33^{**} \]

Adjusted R\(^2\): .19

*Notes: *\(p < .05, **p < .01.\)
Table 6: Multiplexity Network of CCSS Advice and Work-Related Recognition (CCA/R) of Educational Leaders: CCSS Willingness/Action and CCSS Self-Efficacy (Path A)

<table>
<thead>
<tr>
<th>Path A</th>
<th>Visualization of path A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sociogram A: CCSS</td>
</tr>
<tr>
<td></td>
<td>willingness and CCSS</td>
</tr>
<tr>
<td></td>
<td>self-efficacy</td>
</tr>
<tr>
<td></td>
<td>Sociogram B: CCSS</td>
</tr>
<tr>
<td></td>
<td>actions and CCSS</td>
</tr>
<tr>
<td></td>
<td>self-efficacy</td>
</tr>
</tbody>
</table>

*Note: Nodes are 66 individual educational leaders and lines represent the two-plex CCA/R network relationship including 1) providing/receiving CCSS advice and 2) providing/receiving work effort recognition. The arrowed heads represent providing or receiving such CCA/R relationship. For instance, an actor A with an incoming tie from actor B means A is sought by B for CCSS advice and also nominated by B as the person who gives recognition of B’s work. The nodes are grouped by the level of perceived CCSS self-efficacy (group on the right/higher CCSS self-efficacy; group on the left/lower CCSS self-efficacy), and colored by level of CCSS willingness/action (black/higher levels; gray/lower levels).*
Table 7: Multiplexity Network of CCSS Advice and Work-Related Recognition (CCA/R) of Educational Leaders: Indegree, CCSS Willingness/Action, and CCSS Self-Efficacy

<table>
<thead>
<tr>
<th>Sociogram C: Indegree and CCSS willingness and CCSS self-efficacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower CCSS Self-Efficacy</td>
</tr>
<tr>
<td>Higher CCSS Self-Efficacy</td>
</tr>
</tbody>
</table>

Note: Graphical information in Figure 3 is the same as Figure 2 except the node size. In Figure 3, the nodes are sized by degree of incoming ties (larger/greater indegree); grouped by the level of perceived CCSS self-efficacy (group on the right/higher CCSS self-efficacy; group on the left/lower CCSS self-efficacy); and colored by level of CCSS willingness/action (black/higher levels; gray/lower levels).
To our search of literature, studies, and reports, a vast majority of works focus on the perceptions of school teachers with little emphasis on site principals, and even scant of evidence in regard to the perceptions of districts’ central office administrators. As educational leaders at all levels act as core engine that drives the operation and governance of the large district organization systems, it is crucial to attend to their attitudes/perceptions that may in fact influence the extent to which their colleagues, subordinates perceive their work as well.

Social learning theory offers some insight into understanding the development of self-efficacy in leaders. Social learning theory proponents posit that social context plays an important role in developing one’s self-efficacy as does reflecting on one’s thinking and behaviors while observing and interacting with the situated environment (Pajares, 1996).

Quadratic Assignment Procedure (QAP) is designed to test the statistical significance for social network data that is interdependence in nature. Unlike parametric statistical techniques, which assume observations that are analyzed are independent of one another, QAP is a nonparametric technique with no assumption of independence between observations. While using parametric statistics for social network data violates the assumption of independence, QAP is a suitable analytic strategy to test the statistical significance of social network data that are interdependent to one another. More information about QAP can be obtained from Hanneman and Riddle’s (2005) tutorial.

It is an important methodological point to note that when conducting regressions using network measures, violations to the basic assumption of independence underlying regression analysis may occur (see Kenny, Kashy, & Bolger, 1998). Since individuals in a social network are by definition interdependent, the measures assessing leaders’ social network position cannot be considered independent, which may pose an issue of multicollinearity. While multicollinearity does not affect the predictive power of the model as a whole, it may inflate the standard errors of the individual predictors. As the current study only includes one network measure – indegree – in each model, we may exclude the multicollinearity effect between network measures. We thus checked the Variance Inflation Factors (VIF) for all variables included in all

![Figure 1: Path Diagram of Hypothesized Mediation](image-url)
models, which varied between 1.04 and 1.37. As such, we may assume that multicollinearity did not pose a significant threat to the robustness of our findings.

We also ran additional analysis to demonstrate the difference between these two network relationships. We examined the pattern of whole network through the degree of overall connectedness. For instance, CCA network is much dense than the R network but the difference in density is not significant based on the density comparison analysis (95% CI for the difference falls between -0.0176 and 0.0870). This indicates that the overall connectivity between CCA and R networks are not significantly different, but when we further examined individual leaders’ degree centrality between CCA and R relationships, we found a significant difference (t=-4.048, p<.001). This suggests that overall the number of ties traveling among these leaders within CCA and R networks are similar, but the number of colleagues with whom they are connected for CCA and R are not necessarily the same, given the non-significant difference in density, significant difference in degree centrality and the weak correlation between the CCA and R networks from the QAP analysis.

Therefore, at the actor level, a CCA tie is a lot different from a tie for work effort recognition. Investigating the ties that connect the two distinct types of relationships is critical, as suggested by network scholars that individual social capital can be developed, accumulated, and transformed through different types of ties (Granovetter, 1985; Nahapiet & Ghoshal, 1998).

While this study focuses on the two-plex CCA/R relationship, it is important to note that we also ran a series of mediation tests for each network relationship to demonstrate its role in explaining the relationship between policy engagement and CCSS self-efficacy. The additional mediation tests indicate that none of the indegree centralities significantly mediates the relationships between CCSS engagement (willingness and action) and CCSS self-efficacy except the mediation effect for CCA indegree centrality on the relationship between CCSS action and CCSS self-efficacy (the Sobel test results are provided in the note sections). In other words, we did not find consistent and significant mediation effects of indegree centralities in the relationships between policy engagement and CCSS self-efficacy if we examined the network relationships separately. This also demonstrates the unique and important role of the two-plex tie in explaining the association between leaders’ policy engagement and their sense of self-efficacy.