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The Intersection Of Organizational Form And Employee Relationships: A Social Network Analysis Of Rural School Educators

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THE INTERSECTION OF ORGANIZATIONAL FORM AND EMPLOYEE RELATIONSHIPS: A SOCIAL NETWORK ANALYSIS OF RURAL SCHOOL EDUCATORS

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ABSTRACT

Public schools in the United States are organized in a formal structure with a principal serving as a hierarchical lead, teachers in a variety of professional roles reporting to them and paraeducators supporting the work of teachers. As is seen in an increasing number of organizations, there are informal networks built on the inter-personal relationships of the members of the community (Krackhardt, 1993). The purpose of this study is to measure and describe four types of informal networks, to compare these networks to each other, and to learn about how professional roles influenced the formation of the networks. This study considers how informal networks organize the attitudes and beliefs of teachers towards concepts like curriculum and instructional practice. The primary research question for this study is, "How do informal networks support or challenge the school's organizational structure and staffing patterns?" This overarching question was answered using a mixed methods approach, combining Social Network Analysis (SNA), with qualitative interviews and observations at one K-8 school in the state of Vermont. Four networks were measured including instructional support, professional advice, emotional support and friendship, using a survey of teachers and UCINET analytical software. All interviews were coded and compared to observational data, as a supplement to the SNA results.

The results of this study identify variation in how informal networks operate and contribute to the provision of instructional support in schools. Moreover, the results show that informal networks, more than professional roles, are more influential sources of advice giving and collegial trust. In related research, advice giving and employee trust are shown to strongly influence reform efforts and student educational outcomes in schools. Results of this study identify organizational similarities between the advice and instructional support networks indicating relational stability. There are central members of the advice and instructional support networks who significantly influence communication and reform efforts, having direct implications to the success of school initiatives. Findings from this study indicate that professional roles do not influence advice seeking behavior. As well, trust is a necessary factor in a teacher's willingness to engage in new initiatives.

DEDICATION

I dedicate this research to the incredible colleagues I have had the privilege of working with over the course of my career and to my children, Spencer, Parker and Sydney, and my parents, Jan and Norm who have been patient and supportive of me every step of the way.

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CHAPTER 1: INTRODUCTION

This educational research seeks to explore informal social networks within one PK-8 School, with attention paid to the relationships between networks and professional roles. This follows a body of work that examines collaborative teacher practices in schools, the importance of verbal and nonverbal communication, organizational trust and the influence of informal social networks on the inner workings of an organization. This research examines teacher responses to questions regarding who they associate with and the nature of their collaborations, in one New England, pre-kindergarten through eighth grade school. Social Network Analysis and qualitative research methods were used to analyze relationships among these teachers.

Teacher collaboration has been linked to increased student performance and yet teachers in different professional roles at the school often struggle to effectively work together. There is a significant body of research on teacher collaboration (Bailey, Arllen, & Gable, 1993; Goddard & Tschannen-Moran, 2007; Thousand & Villa, 1992; Welch, 1998) and an increasingly rich body of research exploring social networks at schools (Coburn, Russell, Kaufman & Stein, 2012; Gibbons, 2004; Hawe & Ghali, 2008; Moolenaar, Sleegers, & Daly, 2011; Moolenaar, Sleegers, Karsten, & Daly, 2012; Spillane, Shirrell & Sweet, 2017). To date, there is scant research in important educational domains, like the relationships between classroom teachers and special educators. Experience and subjective feedback from educators indicates professionals in these roles struggle to collaborate. Research with a focus on advice, communication, trust, and support seeking networks within a school, with consideration of the roles of every educator will offer a new perspective on the informal networks themselves, and the

level of influence a teacher's professional role has on who they seek out for advice and support.

Students with disabilities have been entitled to receive a free and appropriate public education in the United States since the 1970s, yet general education teachers and special educators often do not partner collaboratively regarding student programming. It is possible that organizational opportunity, including the school schedule, prevent teachers from working together, and these have been identified as barriers (Friend & Cook, 2017). However, even when these barriers are removed teachers do not consistently work together. It is also possible that teachers do not have the communication skills to effectively work together, however, even in the absence of well-honed communication skills, if teachers really *want* to work together they generally find ways to overcome this challenge. Social network analysis that considers the roles of educators and their advice and support seeking networks can help identify whether homophily is influencing the choices teachers make. Homophily is the tendency for people to seek out others who are similar to them. Considering this as it relates to a teacher's professional role and inter-personal advice and support seeking behaviors offers a new perspective to this field of educational research. This study identified how the informal networks within the school influenced teacher advice seeking and support patterns. It also sought to determine whether teachers seek support and advice from colleagues in their same professional role at a higher rate than those in a different role. The roles of all educators at the school will be considered. The primary question guiding this research is, "*How do informal networks support or challenge the formal networks implied by the school's organizational structure and staffing patterns?"*

This dissertation is organized in five main parts. Following this introduction, the research question and analytical approach is situated in an existing theoretical and empirical research base. This work summarizes research in the areas of teacher collaboration, communication, trust, and social networks from which this proposal builds. Following this literature review the data collection and analysis process used to complete the research is presented. Results and analysis are then presented followed by the conclusions of the research study and recommendations for future study.

CHAPTER 2: LITERATURE REVIEW

This literature review provides the foundation for this research study and provides information related to literature on the broad topic of collaboration, as well as the methodology of social network analysis, selected for this work. Literature related to teacher collaboration is reviewed first, with an emphasis on collaborative practices and barriers to effective collaboration in schools. Following this, non-verbal communication research is reviewed which highlights the many ways teachers communicate and the impact of non-verbal communication methods on successful collaborative outcomes. The current literature around inter-personal trust is then discussed, highlighting the ways in which this impacts educational reform efforts and inter-personal relationships. Following this, literature including social network analysis in the field of education is reviewed and literature discussing the development of and importance of informal networks within a work setting.

Teacher Collaboration

Teachers work together for a variety of reasons with a range of motivations and with variable success rates. It is important to have a clear understanding of what is known about teacher collaborative processes prior to exploring the benefits and challenges teachers face when working together. There are several well-known models of teacher collaboration. Coombs-Richardson and Rivers (1998) identified five main characteristics necessary for collaboration to be successful: Collaboration is voluntary, requires parity, is based on mutual goals, depends on shared responsibility for decision making, and requires accountability for outcomes. The Richardson-Rivers model of collaboration has

been used in research on collaboration (Bouchamma, Savoie & Basque, 2012; Lee, 2006; Thomas, Sealey, 2013) and they identify the development of greater communication awareness as a foundation to effectively send and receive messages. Effective communication undergirds the five main characteristics they identify. Bailey, Arllen and Gable's (1993) work also found that effective communication skills during collaboration were recognized as important across all educational disciplines. Both special education teachers and classroom teachers agreed that "collaboration is an effective problem solving process and one that is likely to be successful" (p.11).

Bolman and Deal (2003) found that "Collaboration is a form of lateral coordination that can improve organizational performance by fostering "creativity and integration around specific problems" (p. 55) and Goddard and Tschannen-Moran (2007) also supported this finding, adding that working together can help teachers solve educational problems, which in turn has the potential to benefit students academically (p.891). A key finding from their research was that 4th grade math scores were higher in schools in which the schools they attended were rated higher on the presence of a collaborative culture than schools that were lower. These are a small sampling of research conducted linking stronger student outcomes with increased teacher collaborative practices. With positive outcomes for both students and teachers, there are barriers that prevent effective collaboration from occurring in American schools.

Villa, Thousand, Stainback and Stainback (1992) identified five elements of an effective collaborative teaming process: 1) face to face interactions on a frequent basis, 2) a mutual "we are all in this together" feeling of positive interdependence, 3) a focus on developing small group interpersonal skills in trust building, communication, leadership,

creative problem solving, decision making and conflict management, 4) regular assessment and discussion of the team's functioning and the setting of goals for improving relationships and more effectively accomplishing tasks, and 5) methods for holding one another accountable for agreed-upon responsibilities and commitments.

Research from Fullan and Pomfret (1977) found that empowering teachers through collaborative decision making results in desired educational outcomes. Duke and Showers' (1980) research supported this work. Welch (1998) found in his research that the quality, range and number of solutions generated by a group of educators are superior to those of one individual. Teacher collaboration yields stronger educational outcomes in more areas and an increase in range of possible solutions than are possible by a single educator. There is consistent and clear evidence of the positive effects of collaborative practice, and yet, many teachers continue to work in isolation (Bailey, et al., 1993; Bolman & Deal, 2003; Brownell, et al., 2006; Porter, 1987; Friend & Cook, 2017; Goddard & Tschannen-Moran, 2007). On the surface, this is perplexing and one might question why this is true. Why wouldn't teachers work together if it improves practice and leads to stronger outcomes for students? The answer is not simple, primarily due to the challenges associated with working with others.

Welch (1998) recognized that the attitudinal and pedagogical shifts that are required under IDEA would likely be incompatible with the ways in which educators have worked, requiring second order change level shifts in educational practice. In addition to learning how to work with others and not in isolation, teachers are being asked to change the essence of how they taught previously (Monahan et al., 1996). Many teachers do not feel skilled or confident in their ability to be effective teaching students

with disabilities and continue to believe this to be the role and responsibility of a special educator. Special educators also identify educating students with disabilities as their job. The deep rooted nature of this belief cannot be understated. There is a significant difference between a special educator who provides specialized instruction *in addition to* classroom instruction by the teacher and a special educator who provides *all instruction* to students who have IEPs, thus relieving the classroom teacher of all responsibility for educational outcomes (Miller et al., 1999). While the law may require all students to access grade level content and to be educated in the least restrictive setting, agreement does not come easily or quickly. In fact, when faced with "top down" mandates, teachers will often resist in some capacity (Monahan et al.,1996). Educators receive feedback about their performance from a wide range of stakeholders and face criticism on a frequent basis. Working under these conditions creates a hardening effect in which teachers become resistant to feedback because everyone wants something different and they are not able to make everyone happy. This perpetuates the status quo in their classroom and they continue teaching the way they have always taught.

Barriers to Collaboration

While there are many benefits of teachers working together, there are barriers that interfere with collaborative practices becoming fully established in schools. In Heifetz, Grashow, and Linsky's (2009) book *The Practice of Adaptive Leadership: Tools and Tactics for Changing Your Organization and the World* they discuss the difference between technical and adaptive behaviors. Technical behaviors are concrete actions that may be taken to address a situation. Adaptive behaviors are more nuanced, subtle, and more difficult to change. The technical challenges of collaboration relate to the barriers

caused by variables such as time, scheduling, role definition, norm setting, and clear direction by school leaders. These have the capacity to be changed by an action, not necessarily a simple or easy action, but an action nevertheless. These barriers are not the focus of this literature review, but it is important to comment on these upfront. There are countless research articles that include details about how these impact collaboration, however, the focus of this discussion is on what Heifetz et al. (2009) refer to as *adaptive behaviors*.

Adaptive behaviors are behaviors that are slow to change and are connected to shifting deeply held beliefs that require people to act and think differently. The barriers that will be discussed here, relate to core belief systems and patterns of behaving that will be slow to change and, yet, are necessary for meaningful working partnerships to occur. Bailey et al. (1993) identify that, while collaborative practices are growing in popularity, there is "unmistakable resistance among educators to collaboration" (p. 10). The resistance they are referring to indicates that not only are teachers not collaborating, but they are actively resisting the practice. There is over 40 years of research supporting the idea that when teachers work together there are stronger outcomes for students and educational initiatives are more successfully implemented, and, yet, teachers continue to work primarily in isolation.

Ware (1994) found that educators are "culturally isolated by long-established professional behaviors and beliefs" (p. 344). It is hard to change patterns and habits that are deeply entrenched in the culture of a profession. Two hundred years ago, teachers worked alone in one room schoolhouses without support. Our system changed over time, but late into the 20th century teachers worked in their classrooms by themselves and were

solely responsible for teaching their class of students. While the educational system has changed, a culture of teacher isolation persists. The impact of these long-established professional behaviors has lingering effects.

There are a number of examples of how and why this isolative tendency continues. Friend and Cook (2017) identify that many educators do not feel comfortable with conflict and do not expect to experience conflict with colleagues to be a part of their daily professional experience. Barsky (2007) expands upon this by saying that other professions have evolved both systemic means of considering conflict as part of the work environment, and models of resolving it. Schools are not places in which the professionals feel comfortable engaging in conflict nor do they know how to resolve it when it occurs. This is particularly interesting given that educators regularly provide a significant amount of time and attention to facilitating conflict resolution for students. Working with colleagues in an authentic way that yields results requires team members to utilize a conflict resolution approach that yields results. This will require adaptive change for many, and in the absence of this shift, conflict will likely prevent effective work from occurring. Friend and Cook (2017) identify different types of conflict that interfere with teachers' ability to work together. Teachers sometimes want different outcomes and ultimately must agree on one outcome that may not represent what either individual wanted. They also experience conflict when teachers are interested in the same outcome, but do not reach it due to variables outside of their control. A third type of conflict identified is when the conflict is not about goals at all, but rather about perceptions of power between those involved. This final conflict cause will be addressed later in this paper, as it is closely related to both nonverbal communication and the development and

maintenance of informal social networks within schools. The manner by which someone asserts their power, or how power is perceived can have a strong influence on the outcomes of a professional partnership and reform initiatives. This particular conflict is connected to the work by Coombs- Richardson and Rivers (1998), who identified the need for parity in a collaborative team. Parity is the presence of a partnership in which there is a balance of power, and all members have equal voice and value. If someone is asserting, or attempting to establish power within a group, the group loses parity and the ability to effectively work together is greatly reduced. The desire to avoid conflict of any type prevents teachers from seeking out the opportunity to work with others.

There are a number of other inter-personal challenges that also interfere with an effective partnership. Weak communication skills can lead to significant barriers to collaboration. Bondy and Brownell (1997) found that teachers often have limited opportunities to get to know those with whom they will be teaching and the absence of a base relationship can lead to teachers being "cynical of their values and distrusting of their motives" (p.113). This lack of trust significantly impedes effective collaboration and can quickly become an insurmountable hurdle. They also found that "differences in perspectives, values, and personalities can result in frustration, blaming, and resistance" (p. 113). If these differences are not addressed and worked through so that team members find solid ground, genuinely feel like they are able to respect each other, and value each other's perspectives, the teachers will not be effective collaborators. Wyman's (2010) doctoral dissertation findings supported this, as well. She found that when teachers felt threatened, their "affective filter became too high for learning to occur" (p. 85). Teachers were not able to effectively work with others when they felt threatened by a

colleague. They reported that they preferred working with colleagues when the relationship was non-threatening and based on equitable relationships (parity), which is expected given that parity was a key component in many collaboration models.

Research has found that interpersonal relationships, power, and communication challenges interfere with the effectiveness of collaborative practices. Humans are social beings who feel comfortable with some individuals and not with others. When professionals are asked to work together and to be honest and open about their pedagogy, they are being asked to exhibit a level of vulnerability that is difficult for many to demonstrate. These barriers are strong enough to prevent teachers from collaborating effectively, thus not meeting the needs of all students to the maximum extent possible.

Nonverbal Communication

Collaboration within organizations is dependent on formal and informal communication practices, some of which include non-verbal communication patterns. While verbal language is often considered a primary means of communication, extensive research over fifty years has clarified the important role of non-verbal communication processes. According to Rubin et al. (1988), there are two primary functions of nonverbal communication: controlling the interaction and highlighting or replacing verbal communication. Burgoon (1985) identified six nonverbal communication functions: symbolic representation, expressive communication, structuring interaction, impression, formation/management, metacommunication, and social influence. Elkman and Friesen (1969) grouped nonverbal behaviors according to five functions: illustrating, displaying affect, regulating, replacing and adapting. These different ways of categorizing the purpose of nonverbal communication all indicate the power of

communicating without the use of verbal language and include communicating emotion and affect. Research shows that nonverbal communication effectively communicates what someone is feeling. In fact, it is such a powerful form of communication that others are often able to identify what someone is feeling before they speak. A landmark study by Mehrabian and Ferris (1967) identified that communication was 7% verbal, 38% of information was communicated through tone of voice, and 55% of content was communicated through body language. Given these results, a full 93% of communication is transmitted through non-verbal messaging.

Skow and Whitaker (1996) identified one of the most essential tools a skilled communicator uses is the ability to be aware of how they are perceived by others. This awareness relates to both verbal and nonverbal communication. Someone who is self-aware, monitoring, tone, facial expression, voice and other key non-verbal qualities will be a far more effective communicator than someone who does not embody this awareness. They also found in their research that principals are often able to diffuse a difficult interaction more effectively using nonverbal communication than by speaking.

When teachers begin working together, Skow and Whitaker (1996) suggest they initiate communication before speaking. How teachers enter the room, their body language, facial expressions and affect, all interact to communicate how they feel about the impending conversation and partnership. Their nonverbal communication sends clear messages about their feelings about the upcoming meeting. Welch (1998) found that when educational leaders ask teachers to collaborate, embedded within this request is the prerequisite of effective communication and active listening skills. There is an assumption that teachers have the skills to effectively communicate and, yet, many have

never received training, nor do they inherently have the ability to do so. This creates a situation that is destined to have challenges. If teachers are asked to work together and do not know each other or would not prefer to work together, *and* they do not have effective communication skills, they will likely struggle with this partnership. If building leaders have an expectation for collaboration it is essential that teachers receive training in effective communication.

It is important that this professional development includes instruction with how to be an effective listener. If someone feels heard, and believes another is interested in what they are saying, the person is more likely to feel comfortable and open themselves up to more vulnerable conversations. Boyd (2001) offers a number of key behaviors that effective listeners demonstrate. He found that summarizing what someone else is saying builds positive interactions. He identified that listening with more than one medium, such as using the eyes *and* ears to communicate, sends the message that someone is listening closely. He suggested that when in a one on one conversation it is helpful to sit in such a way that there is no object between those having the conversation. He identified a number of non-verbal behaviors that will enhance listening skills. Expressing emotions that reflect the content of the speaker and communicating engaged listening to the speaker send the message that someone is listening. Asking questions that directly link to the content being shared also communicates to the speaker that you are engaged in what they are saying and want to better understand their thoughts.

Skow and Whitaker (1996) identified an additional three ways that nonverbal communication can enhance nonverbal immediacy, which supports effective communication. When someone is approachable it communicates a welcoming in of

others. A relaxed stance, gestures, a smile, making eye contact and leaving the body in an "open" stance invites others in to communicate and supports nonverbal immediacy. Sending the message that you are available, have time to talk and are not preoccupied, also increases the likelihood that someone will feel comfortable engaging with you. The third way that nonverbal immediacy is established is by communicating closeness and warmth. These three messages should be simultaneously conveyed if someone is going to effectively communicate nonverbal immediacy. The message that is sent is "it is safe to come near, I have time to talk to you, and I want to talk to you because I care about you." (Skow & Whitaker, 1996, p. 92-93).

Trust

Hoy, et al. (1992) found that there was a link between trust and student achievement in elementary schools. The higher the trust level between colleagues, the more positive the educational outcomes were for students. Hoy and Tschannen-Moran (1999) also found that trust is associated with higher levels of student performance. Goddard and Tschannen-Moran (2007) conducted a study that compared student achievement on standardized assessments with the strength of collaborative practices at the school. Findings from their research identified that 4th grade students have higher levels of achievement in reading and math when they attend schools with higher levels of teacher collaboration. Louis (2006) added to this finding as she identified that building trust within a school community is key to sustaining effective change. If there is not institutional trust prior to a change initiative, it will be difficult to move forward successfully.

Tschannen-Moran's doctoral dissertation research in 1998 found that there was a positive relationship between teachers' sense of efficacy, trust in the principal, and trust in colleagues. She also found that the trust dimensions that played the largest role in teachers' "trust judgments of their colleagues" were openness and benevolence. Openness referred to a willingness to share ideas and resources within school, and also to open up and share information about their personal lives outside of school. The more colleagues opened up and shared about life outside of work, the higher the level of trust was between staff members. Benevolence referred to how colleagues felt cared for at work and how they perceived others to be kind to one another. A key finding in Tschannen-Moran's (1998) study was that her hypothesis, that trust in colleagues would be related to collaboration with colleagues, was not confirmed. In this original study, trust was a weak predictor to collaboration. She offered two possible explanations, noting that it was possible that a faculty could have high trust but not a lot of opportunity for planning together and making shared decisions. Essentially, it was possible that the *opportunity* was not there. She also noted that it was possible that maintaining trusting relationships becomes more difficult when teachers work more closely together because of the increased opportunity for conflict. Following her doctoral dissertation, Tschannen-Moran continued to study the role of trust and collaboration in her research. In 2001 she published an article titled *Collaboration and the Need for Trust* and found that building an atmosphere of trust was a significant factor in constructing a collaborative climate. She found that there is evidence that trust is an important factor in the organizational effectiveness of schools and that in order for teachers to be effective in their work there

must be time for them to dialogue with colleagues and to support and challenge one another in their work.

Hattori and Lapidus (2004) conducted research on collaboration, trust, and innovation in the business sector [1]and their findings are similar to what was found in the field of education. They identified 4 types of relationships between co-workers: collaborative, cooperative, competitive, and adversarial and found that each of these relationships exhibits a different state of trust. In addition to trust they identified four additional dimensions of relationships. (Table 1)

Table 1

A Matrix of Dimensions/Dynamics of Four Types of Relationships

Relationship Type	State of Trust	Motivating Force	Outlook	Behavior	Potential Outcomes
Collaborative	Highly invested	For the good of the whole	Synergy	Responsible	Breakthrough innovation
Cooperative	Transaction Oriented	For successful project	Win-Win	Willing	Preconceived success
Competitive	Reluctant or cautious	To look good	Win within rules	Shrewd	Compromise
Adversarial	Distrust	Not to lose	Win at any cost	Cut-throat	Unpredictable

From: Hattori, R.A., Lapidus, T. (2004). Collaboration, trust and innovative change. Journal of Change Management, 4(2), 97-104.

[1] In addition to the research by Hattori and Lapidus (2004) and Cross, Cunningham, Showers & Thomas (2010) in the business sector, Lyons, Swindler & White (2008) conducted research on collaboration in the US Military. Results of all research demonstrate improved outcomes with collaborative practices.

The matrix in Table 1 provides a clear model for conducting a self-reflection or a system-wide assessment of current relationships within an organization. The research discussed thus far has provided evidence of the importance of collaboration, communication and trust within schools, and, yet, often there is generally not a high level of effective collaborative practice in schools. Hattori and Lapidus (2004) offer a thought provoking perspective regarding a barrier to building trust and collaboration. They identify a type of resistance called a "masquerade" as a major obstacle to building trust, fostering collaboration and creating innovation. They found passive, but powerful behaviors that masquerade as trust, collaboration, and innovation. Avoiding confrontation can often present itself as 'trust'; showing up to meetings on time, being a good listener, and showing up present as 'collaboration'; and brainstorming with colleagues create the impression of 'innovation'. It is quite possible that these behaviors might occur due to a lack of understanding about how to actively participate in a collaborative relationship, however, it is worth considering that there are times when resistance is subtle, yet intentional, and more insidious than overt, clear opposition. It is important for school leaders to ensure that faculty have a clear understanding of how to effectively collaborate and build trust in order to innovate and problem solve to effect change.

Social Network Analysis in Education

Interpersonal relationships at work have been studied in different ways over time both through a range of qualitative and quantitative methodologies. Reich and Hershcovis (2011) have written extensively about the measurement of inter-personal relationships in the workplace. They along with many others have found that researchers have struggled to operationalize the nature of "relationships" in order to study them (Ashforth & Mael,

1989; Aron, et al., 1992; Edwards & Peccei, 2007; Thau, et al., 2007). Among the more favored techniques for assessing workplace relationship issues involves the use of network analysis.

Social Network Analysis is a methodology that has increased in popularity over the past thirty years as a method to study relationships of members of a group in a way that mathematically measures the nature of the relationships within the group. Increasingly, researchers have favored the analysis of social networks to identify, examine and portend the implications of how teachers and staff interact at school. One specific focus has been on how the role of proximity in a building influences relationships between educators, that is how spatial distance between people relates to connectedness. Bryk and Schneider (2002) conducted longitudinal research in the Chicago Public Schools, studying which social exchanges in a school influence the educational environment both positively and negatively. These researchers found that patterns of movement within a workplace strongly influences social interactions within the organization. They also found that positive social relationships within a school are highly correlated to improved student outcomes. Spillane et al., (2017) conducted a longitudinal study at three different schools and their findings supported those identified by Bryk and Schneider (2002). Physical proximity within a school building increases connection between educators, and teachers identify that they tend to interact more with those whose classrooms are close to theirs. Teachers reported that they talk about instruction and pedagogy more with those who work in close proximity to them than those whose work spaces are farther away.

Social Network Analysis research also explores the role that trust plays with regard to how teachers collaborate within a network. One study found that when the density of the network is higher, and teachers recognize that all members are working hard to implement a reform, they have greater satisfaction in the collaborative partnership. When the density is weaker, with team members not perceiving others as pulling their weight, there is lower satisfaction (Daly et al., 2010). In this same study, teachers in a loosely connected network with grade level partners, identified themselves as not feeling safe and struggling to successfully navigate politics and conflict at work. When looking at SNA models, a dense network is one in which the actors are tightly grouped with high levels of interconnectedness (Borgatti, 2017). Daly et al. (2010) also found that dense networks indicate higher trust levels between staff within the school. Coburn et al., (2012) had similar findings, identifying that a network with weak ties was not able to implement and sustain high quality reform efforts. What is important here is that the reform efforts themselves had a strong research and evidence base, but were not successfully implemented because of weak ties between teachers within the network. This research further found that it takes strong ties, teacher expertise, and an evidence based reform effort to lead to long term change. All three components were important for the long-term change.

Formal and Informal Social Networks

A formal network is one that reflects the actual structure of the organization. It has structure, rules and a hierarchy and is easily and accurately represented by a flow chart (Allen et al., 2007). One might imagine a formal organizational structure with the president at the top, followed by directors, then managers, then customer service

representatives, etc., where the vertical chain of command is evident and clear. Informal networks, on the other hand, represent the inner workings of an organization and show how information is actually transmitted, who has social capital and who facilitates, or inhibits initiatives (Allen, et al., 2007; Krackhardt & Hanson, 2003; Penuel et al., 2009). Social capital theory states that embedded within a social network are resources and expertise and through social ties a member of the network has more or less access to these resources and experts than others and this can directly effect change (Coleman, 1990; Lin, 2001; Penuel et al., 2009; Portes, 1998;). Collaborative practices, non-verbal communication and trust levels of teachers, directly impact informal social networks, as they all influence the relationships between members of the network and their thinking and behavior.

Analyzing informal networks through Social Network Analysis has been found to provide valuable information about the complexity of the relationships between members of a professional group (Penuel et al., 2009). An example of this complexity is that being well known or someone who others turn to during a reform effort does not always indicate that person is the most influential during a time of change within the organization (Hawe & Ghali, 2007). Tuomainen et al.'s (2012) work supported this, finding that special educators in Finland were identified as knowledgeable and a valuable professional resource but were peripheral in the informal friendship and social networks at the school. Research findings show a strong correlation between the overall strength of the ties within an informal network as a whole and the efficacy of a reform initiative (Penuel, et al., 2009).

Teacher empowerment is also closely affiliated with trust. Several researchers have found that empowering teachers who are trusted and have expertise to be actively involved in the planning and implementation of reform efforts will have positive effects on schooling outcomes (Penuel, et al., 2010). Penuel et al. (2010) identified that, "…any new initiative in a school begins with a pre-existing informal social structure, which is likely to influence—to varying degrees, depending on the school—current and future initiatives" (p.89). Having a keen understanding of the informal networks in a school and leveraging teachers in a transparent, authentic manner will yield more positive results (Penuel, et al., 2010). Datnow (2012) also identified that teachers play an important role in brokering information between subgroups of informal networks. Key teachers are more influential in the implementation of change than the formal leaders of the organization.

Limited research that studies the informal trust, communication, advice seeking and friendship networks within schools has been conducted and this is an area that will provide useful information to educational researchers and leaders to guide their work. No studies have conducted Social Network Analysis examining both the informal networks and the professional roles of the members of these networks.

Conclusion

The purpose of this section was to provide an overview of the literature and research conducted in the areas of teacher collaborative practices, trust, non-verbal communication, formal and informal social networks and social network analysis in education. It was intended to provide a foundation of information from which to contextualize this research study.

In summary, there is an extensive body of research on teacher collaboration practices with outcomes indicating a range of benefits for adults and students. There are factors that inhibit collaboration, however research provides evidence that there are benefits for students when educators work together to meet their needs. When considering the inter-personal aspect of relationships between teachers, the research reviewed demonstrates how non-verbal communication and trust levels influence effective partnerships. Within an organization, these relationships lead to the development of informal social networks that influence the efficiency and operations of organizations. These relationships and networks will be explored through this research study.

CHAPTER 3: METHODOLOGY

The following section will describe the methodology used in this research study. Details related to the research questions, timeline, participants, and methodology are provided to ensure a comprehensive understanding.

Research Questions

This research study explores teacher relationships within a school using Social Network Analysis and qualitative research methods. including conducting interviews and collecting observational data. Consistent with a body of scholarship related to social network theory and analysis, teacher networks associated with informal advice seeking, instructional support, friendship, and emotional support were examined. These networks were then compared to the formal organizational structure. Every organization has a formal hierarchical structure, usually depicted in an organizational chart, and maintained by rules and rigid structure (Allen et al., 2007). Informal networks are not guided by an imposed hierarchical structure, but emerge through inter-personal interactions and relationships that develop when working with others. It is through these informal networks that organizational leaders are able to learn a lot about how work is completed, which employees have the highest social capital with their colleagues, who are the greatest influencers, who are the most trusted employees, and other valuable information (Krackhardt et al., 1993). Learning about the informal advice seeking, communication, friendship, and emotional support networks within a school offers valuable insight regarding the inner workings of a school that influence myriad factors relating to the school's functioning. The primary research question guiding this proposed research is,

"*How do informal networks support or challenge the formal networks implied by the school's organizational structure and staffing patterns?"* This research question is supported by four additional questions:

1. How do the informal advice seeking, instructional support, emotional support and friendship networks compare to each other?
2. How do informal social networks influence staff interactions, as communicated by educators?
3. To what extent does professional role influence the structure of the school's informal networks and teacher interaction patterns?
4. What do instructional support, advice seeking, friendship, and emotional support networks convey about the overall organization of the school staff?

Timeline, Setting, and Participants

Research for this study was conducted from February 2018 through August 2018, with principal analyses taking place from August 2018 through June 2019. This research was conducted within a bound network, a network that only contains the members from within this school organization (Scott, 2017). This bound network includes all classroom teachers, special education teachers, reading and math interventionists, unified arts teachers, principals, guidance staff and paraeducators at one PK-8 school in Vermont. This site and its participants were selected using purposeful selection, as this school provided participants and composite structure that aligned with my research questions and goals (Maxwell, 2013). The chart below provides pertinent information about the school.

Table 2

PK-8 School Demographics

Demographic Area	Number*
Student Enrollment	352
Classroom Teachers	21
Unified Arts Teachers	6
Interventionists	5
Special Education Teachers	10
Paraeducators	17
Co-Principals	2
Guidance Counselors	2
Total Participants	**63**

**Exact numbers in this column, subject to change, as student enrollment changes, or staffing patterns change*

All participants were included in the social network analysis (SNA) research and surveys were distributed in paper format. At the time of the social network survey, participants were given an informational survey in which they respond to basic demographic questions. These questions include:

1. How long have you been teaching?
2. What has been your primary role for the past four years?
3. What is your current role in the school?
4. Gender (M/F/Non-binary)
5. Highest level of Education

6. Do you hold teaching certifications in multiple areas? If so, which?
7. How long have you been teaching in this school?
8. To what extent do you enjoy your job? (Likert scale 1-6)
9. To what extent do you believe that public schools should educate every child in a community? (Likert scale 1-6)

Observations were conducted at staff meetings and grade level team planning meetings and everyone in attendance at those meetings was observed. Interviews were conducted with classroom teachers and special educators who were central to all networks. All participants signed a statement identifying they understood they would be a part of this research study and individuals would not be personally identifiable in the research findings. Individuals would be identified by the role they play in the school, such as classroom teacher, special educator, paraeducator, etc., but not by name. One area of concern identified was that there are only two guidance counselors and two administrators making it relatively easy to identify these two individuals. Given this concern, as well as the fact that these individuals did not actually provide instruction to students, they were omitted from the network results.

Methodology

A combination of SNA and qualitative research methods, using interviews and observations, was used to conduct the research for this study. The research questions were designed to elicit information about advice seeking, instructional support, friendship, and emotional support networks at one PK-8 school, with the intent of comparing these to both each other and the formal organizational structure as a means of learning more about the organization as a whole. Using a mixed method research

provided a holistic approach to studying the networks. The use of surveys provided the data for the SNA research to study the professional relationships of staff members through network analysis. Using a qualitative approach by conducting interviews and observations provided the data to develop a deeper understanding of the network formation.

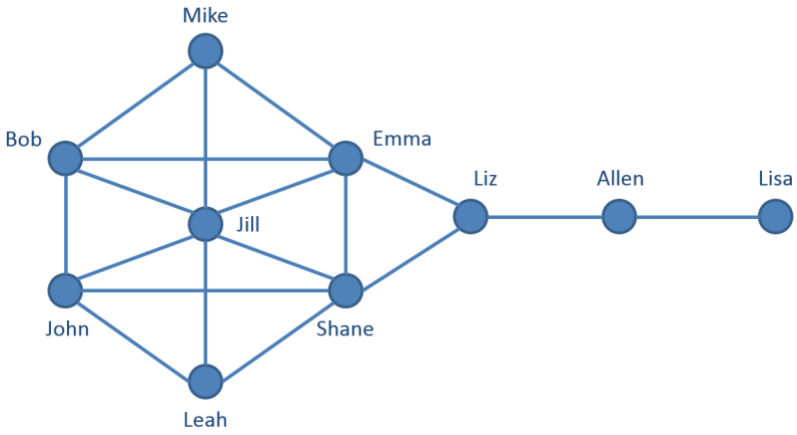
This mixed methods approach provides a means of capturing and understanding the informal networks within a school that is intended to provide valuable information about the inter-personal relationships within the building and how these may impact the work of the school. With the passing of the Individuals with Disabilities Education Act in 1997, followed soon after by the No Child Left Behind Act in 2002, expectations for educators significantly changed, and while there are laws establishing professional expectations, practices in schools have not yet reached the level of accountability and inclusivity that are intended by the laws. Understanding the nature of what teachers' experience in their work, who they seek out when they need advice, and who they trust will provide insight into the inter-personal relationships of the teachers. Understanding factors that influence collaboration will provide valuable information about how these may influence educational outcomes and reform efforts.

Social Network Analysis

Social network analysis (SNA) is a method to identify and describe a network's membership, and analyze relationships among members. It is a way to explore the relationships between members of a community and to identify patterns, trends, strengths and weaknesses within the group. It is important to have a basic understanding of social network analysis in order to understand how it will be used in this research study.

Figure 1

Social Network Analysis Example



In Figure 1, each circle is called a *node,* and every node represents one member of the network represented. In this sample network there are 10 people (depicted by each of the ten nodes), representing a bound network, a network with a finite number of nodes. An example of a bound network would be the employees of a school, or the dogs in a neighborhood. The lines that connect nodes are called ties, and represent a connection between nodes. These ties can be directed or undirected.

Figure 2

Tie Directionality Example

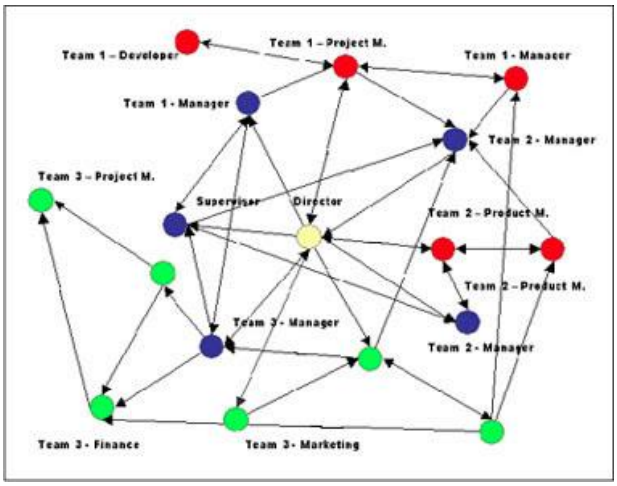
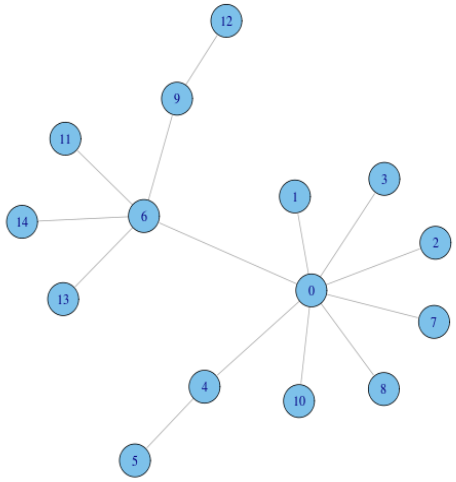


Figure 2 illustrates nodes and tie directionality. There are ties with only one arrow and ties with arrows on both ends. Ties with one arrow represent a directed relationship in which one node does something for the receiving node, but it is not reciprocated. An example of this would be someone providing a ride to someone else who does not drive. An undirected tie has arrows on both ends and represents a reciprocal relationship in which the nodes give and take freely from each other. An example of an undirected relationship would be one in which both nodes carpool to work together and share the driving responsibility. Ties provide useful information about a network and illustrate an important facet of relationships. Nodes with high centrality are connected to other nodes who have direct ties to nodes who also have many connections with other nodes. A dense area within a network is an area with many nodes having many ties to other nodes indicating tight social connectivity (see Figure 3). Nodes on the edge of the network with a few ties, that are connected to other nodes who also have a few ties represent an area of the network with weak social connectivity and less centrality within the network.

Figure 3

Example of Network Centrality



In Figure 3, there are two different social cliques within the network. Nodes 6, 9, 11, 12, 13, and 14, represent one clique and nodes 0, 1, 2, 3, 4, 5, 7, 8, and 10 represent a second clique. Nodes 6 and 0 are necessary nodes in the network as they are the only nodes to connect members of each clique. Within a network, nodes who bridge cliques are essential to the functioning of the network and when analyzing the nature of the network, these nodes need to be well understood. Without these members, the entire network changes in a significant manner and the communication, work flow, and relationships become radically different. The closer to the center of a network a node is, the more impact their removal from the network will be.

Understanding a network and how the nodes relate, and do not relate, to each other offers a lot of information about the relationships within a community. Nodes can serve in different roles, which provides information about the individual members of the

network. A node may be *peripheral* and have below average centrality (nodes 12 or 5 in Figure 3). They can be a *central connector* and have above average centrality, meaning it is connected to many other actors, such as Team 2 Manager and Team 3 Manager in Figure 2. The final role a tie can have is as a *broker*, in which the node has above average betweenness, meaning the node is integral to joining different cliques in the network, such as Nodes 6 and 0 in Figure 3.

In the field of education, by asking teachers to reveal who they will seek out in specific situations, it is possible to identify patterns and/or trends about the informal social network and its influence on work-related activities. In this study, patterns were analyzed within each network and between networks. Interviews and observations provided additional qualitative data allowing for a deeper understanding of the rationale behind the responses provided through the social network analysis. Both the network data and the "why" behind the data is explored through this research study.

To conduct social network analysis, all teachers, special education teachers, interventionists, unified arts teachers, principals, guidance counselors, and paraeducators were provided with a summary of the research being conducted, including the opportunity to engage in the study at three different levels: fully participate, participate in parts of the study (which were disaggregated on the participation document), or to decline participation. Everyone was provided with a summary of the research proposal and signed consent prior to the onset of the research. One person declined participation completely. Remaining members of the network were given a survey with 4 specific questions and a randomly organized written list of all members of the network following each question. This bound network consisted of all classroom teachers, special education

teachers, interventionists, unified arts teachers, principals, guidance counselors and paraeducators who provided consent and work at the school (all instructional staff, with the exception of the individual who declined to participate). Surveys were distributed in person at a staff meeting to all participants other than paraeducators. Paraeducators were given the surveys at a separate meeting, because they do not attend regularly scheduled staff meetings. Each participant was provided a packet of the four questions and name lists, with their unique identification at the top of the papers. Once completed, packets were placed upside down on the center of the table. Staff members who were not in attendance at the meeting, were provided a packet and they returned them to the researcher. 100% of the surveys were completed and returned.

Table 3

Survey Questions for Social Network Analysis Research:

Type of Question	Question
Advice seeking	During this school year, to whom have you turned for advice about events or issues which arose at the school?
Instructional Support	During this school year, to whom in your school have you gone for help in instructional planning?
Emotional support	During this school year, to whom in your school have you gone to when you were frustrated or upset about something you observed or experienced at work?
Friendship	During this school year, who have you gone out with socially outside of work?

Data were aggregated into an excel spreadsheet and a matrix was generated identifying participants by unique identification and who they selected, by first names, in their responses. The data were then analyzed using UCINET software to identify patterns of response. UCINET generates sociograms using NetDraw and the sociograms represent relationships within the school network (Borgatti, 2002). Based on the results of the social network analysis, only members from the *classroom teachers* and *special educators'* groups were interviewed. This will be explained in greater detail in the results section of this paper.

Qualitative Research

Observations occurred during the months of March 2018 through May 2018 as a means of obtaining data about informal interactions among members of the network. Observations are a way to collect data about what people actually do and compare this to what they say they do. For the purpose of this study, understanding who people choose to interact with, sit with, and engage with during meetings provides an opportunity to compare informal interactions to the network relations obtained through SNA and the formal organizational structure. Observations were conducted during full staff meetings, and unit meetings which include half of the staff per meeting. During the observations the focus was on interactions between staff members including where they sit and whom they choose to sit in proximity to.

Table 4

Observation Schedule

Observation	Frequency
School staff meetings with choice of seating	6 observations 20 minute observations
Monthly Unit Meetings	1 Unit Team (gr. 5-8) 20 minute observations

After completing an analysis of the SNA data, interviews were conducted and information gathered to understand more about the relationships among colleagues within the network. Interviews were conducted with three classroom teachers and three special educators who were selected based on the results of the SNA. These individuals were chosen because they were central to all four networks. Many staff members identified these individuals in their responses to the survey questions, indicating they are the most connected people within the school.

Interview questions were developed to seek greater understanding about the areas of advice seeking, instructional support, emotional support, and friendships within the networks. Another area that was explored through the interview process was the concept of *trust.* When analyzing a network and exploring the informal networks within an organization, trust plays a significant role in the development and maintenance of relationships and in the ability for an organization to accomplish its goals. Interview questions were designed to elicit information about how teachers identify the people they want to talk to about the specific topics and how trust factors into their decision making.

Follow up questions were asked to probe more deeply and to encourage additional information from the respondent.

Questions include:

1. During our initial interview you identified the teachers you reach out to when you are seeking advice related to your teaching and instruction. I am interested in understanding how you selected those individuals. Why did you choose them? What do these particular individuals offer you?
2. When you think about the people you seek out professionally at your school, how would you describe how they made you feel when you initially met them? Is there anything about their non-verbal communication that influences your working relationship?
3. During our initial interview you identified the teachers you reach out to when you are needing some emotional support, possibly you are feeling frustrated or angry about something at work and you need to vent to someone or process through the situation with someone. I am interested in understanding how you selected those individuals. Why did you choose them? How do they support you? Why do you choose these people?
4. How would you describe your relationships with others in your school? What are the professional roles of those you are most connected to? Do you have colleagues that you consider a friend and if so, how did these develop?
5. Describe for me the nature of your relationships with people whom you work with but do not choose to seek out.

6. How does trust factor into your relationships with others? How important is this to you, as you work with others?
7. Is there other information you would like to share with me about your professional relationships with others at school that provide deeper insight into the inner workings here?

Interviews lasted between 35 minutes and one hour in length, conducted individually at a location selected by the interviewee, at a time that was mutually agreed upon by both parties. They were recorded, transcribed and coded to identify key topics, trends and information that emerged in responses. This information was analyzed in coordination with the SNA and observational data to develop the findings of the research.

Analysis

SNA data were analyzed using UCINET software (Borgatti, 2002) and analysis describes the distributions of relations among actors rather than describing distribution of attributes of actors. One key piece of information that was analyzed is whether there are correlations between any two (or more) different networks. Networks were created based on each of the four SNA survey questions, so there were four informal networks to analyze. It is likely that at schools there are multiple relationships between people. One piece of data analyzed was whether, when tie strength in one network is compared to the tie strength in another, does the probability of tie strength in one network predict the tie strength in another? Is there a correlation between two different networks that contain the same members? The correlation used to conduct this level of analysis is a QAP Correlation. A QAP Correlation calculates measures of nominal, ordinal, and interval association between the relations in two matrices, and uses quadratic assignment

procedures to develop standard errors to test for the significance of association." (Hanneman et al., 2005, Chap. 18, Correlation Between Two Networks with the Same Actors section, para 3).

In addition to the SNA data analysis, qualitative interview and observational data was also analyzed. Throughout the observational and interview time period, memos were written to provide a narrative artifact to document thoughts, observations, impressions (Maxwell, 2013). The interview results were coded and compared to determine if there were patterns that emerged including any that indicated homophily preference within the network. Identifying patterns and clustering allows trends in responses to emerge and be analyzed (Miles et al., 2014). Observation data was used in much the same way, and in addition to what has already been mentioned, the observational data was analyzed, and compared and contrasted with the information provided during the interviews and SNA data collection process. There are a variety of ways data can be analyzed and it was important to be thoughtful and intentional in order to draw accurate conclusions from the information collected. This research study will contribute to the body of research using a mixed methods approach, including SNA, to study teacher collaborative practices (Daly, Moolenaar, Bolivar & Burke, 2010; Goddard, Hoy & Hoy, 2000; Louis & Marks, 1996; Moolenaar, Sleegers, Daly, 2012).

CHAPTER 4: RESULTS AND ANALYSIS

School staff at the Vermont PK-8 School in this study were provided information regarding the research proposal. All instructional staff members were given verbal and written details about the study and were provided the opportunity to opt out of the survey completely, have their name omitted from the survey list, and to opt out of being interviewed, should their name be selected for an interview. Staff members included in this research study included classroom teachers, unified arts teachers (art, music, physical education, and Spanish), interventionists (academic and behavior), special education teachers, paraeducators, guidance counselors and building administrators. One person opted out of all components of the study. All other instructional staff members completed the survey and had their names included on the lists associated with the survey questions.

Surveys were distributed, completed and collected during a staff meeting to all participants other than paraeducators. Paraeducators met with the researcher separately and completed the survey during this meeting. Every participant name was matched with a unique identification referencing their professional role followed by a number (ex: S1 = Special Educator #1). Written on each survey was the participant's unique identification, not their name. For dissemination purposes, a post-it with the person's name was on the sheet and the researcher handed out the sheets, removing the post-its as the surveys were distributed. The post-it notes were immediately shredded. This ensured that when surveys were collected there was no way to identify who completed which survey.

Social network data was collected from the survey questions. The four questions asked on the survey included: During this school year, whom have you gone to for

support with instructional planning? During this school year, to whom have you turned for advice about events or issues which arose at the school? During this school year, to whom have you gone when you were frustrated or upset about something you observed or experienced at work? During this school year, who have you gone out with socially outside of work? Each question was on its own sheet of paper and following the question was a complete list of instructional staff at the school who had provided consent for their name to be included. Survey data was aggregated into a spreadsheet that was formatted in a matrix to be analyzed using UCINET software (Borgatti, 2002). A sociogram, a visual representation of the data, was created using NetDraw to visually represent each network created based on the results of each survey question. Four distinct networks were created and are depicted and discussed in detail further in this section.

In this study, a process called node filtering was used to remove certain classes of nodes from the network. Node filtering is used when one wants to determine the importance of a group of nodes or when there are peripheral nodes and not contributing meaningfully to the network (Borgatti et al., 2018). For this study, the classes of "Administrators" and "Guidance" were removed from all networks using node filtering because they were personally identifiable, as there were only two members of each group and these individuals were not directly involved in instruction. During the interviews, every person interviewed identified that they went to these people because they were *supposed to* versus seeking them out voluntarily. Because the focus on this research was on who people voluntarily seek out, these classes of nodes, four nodes in total, were not included in the sociograms and the data analysis. This decision will be discussed in the

research analysis, as it directly relates to the main research question related to the formal organizational structure.

Question 1: How Do the Informal Advice Seeking, Instructional Support, Emotional Support and Friendship Networks Compare to Each Other?

Sociograms provide a visual representation of a social network, in a manner that visualizes the size, patterns and strength of relationships in a way that is different than listing numbers and statistics do. Statistical charts and numbers present information in a way that allows the reader to understand the quantitative relationships of data. The four informal networks generated through this study are depicted through sociograms. Each sociogram contains nodes (representing the individuals in the network) and ties. A tie in a network indicates a survey response linking the two individuals. For example, Node T11 sought advice from Node T15 as identified by the black line connecting them in Figure 4, the Advice Seeking Network. Nodes are represented by blue squares and ties represented by black lines connecting the nodes to each other. Every network has nodes on the left side of the sociogram that are alone and not connected to the rest of the network. These represent individuals who did not identify anyone in their response to the survey question and for whom no one identified them. These are isolates. The advice seeking network has three isolates, as compared to the friendship network, which has fifteen. The sociograms represent the SNA data visually and provide information about the density of the networks. When respondents identify many inter-organizational connections, or answer survey questions that describe many social relationships, the network is considered tight, dense. The sociogram is visually compact. For example, when comparing the advice network with the friendship network, the advice network

looks visually denser than the friendship network. The SNA results reflect this, which will be discussed later in this chapter. These examples provide a compelling explanation for why using sociograms and social network analysis offers data in a way that straight quantitative analysis cannot.

Figure 4

Advice Network without Principals and Guidance Counselors

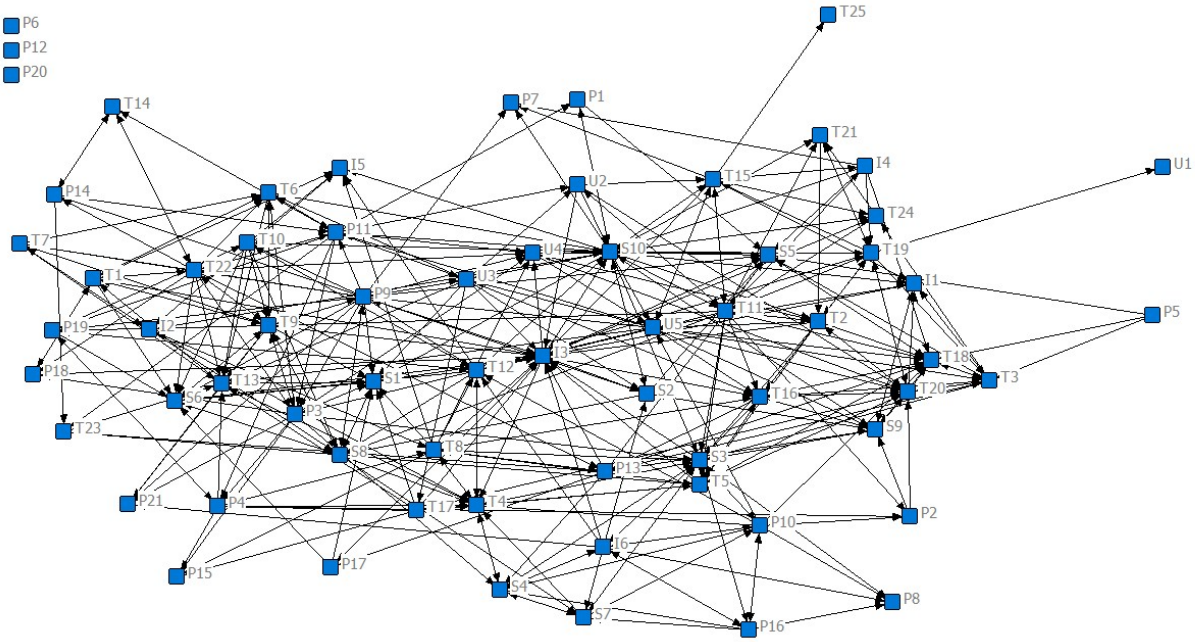


Figure 5

Instructional Support Network without Principals and Guidance Counselors

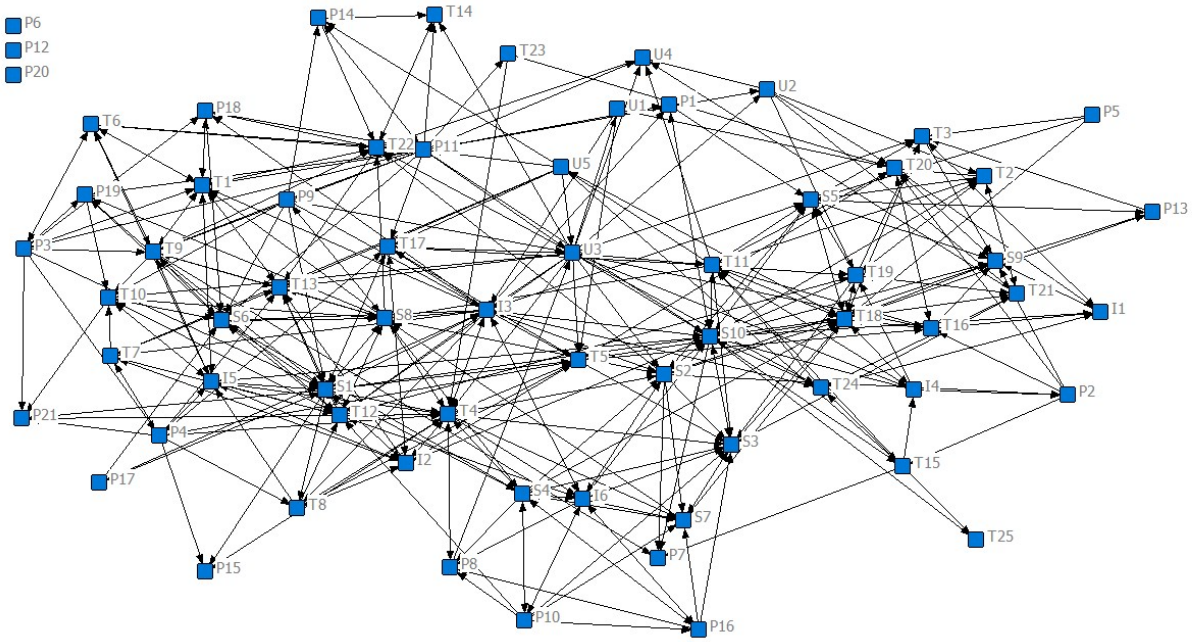


Figure 6

Emotional Support Network without Principals and Guidance Counselors

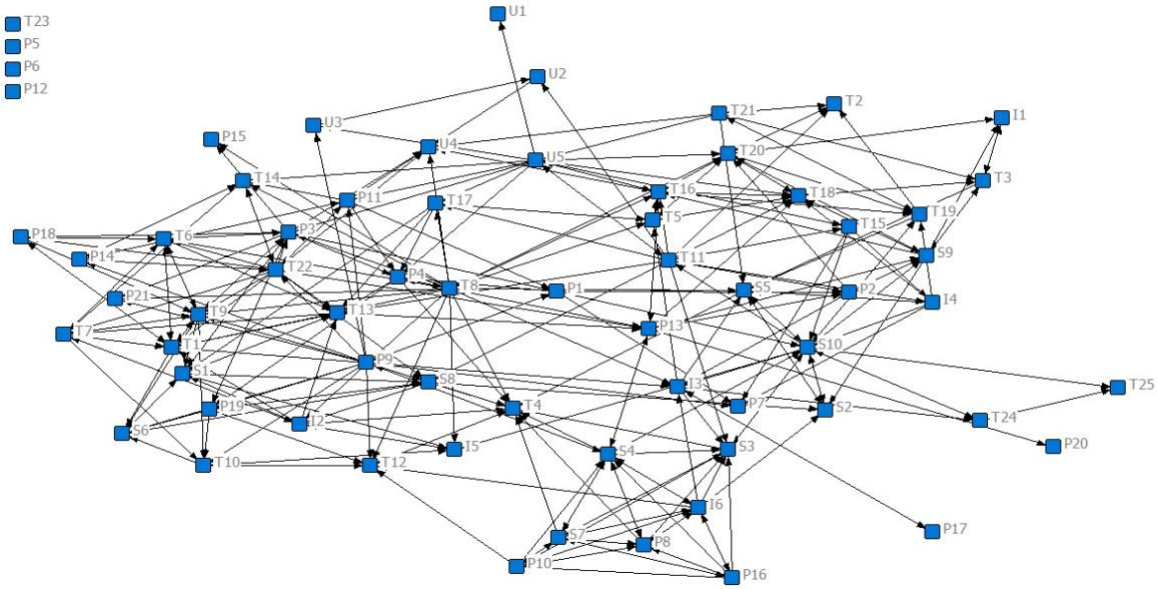
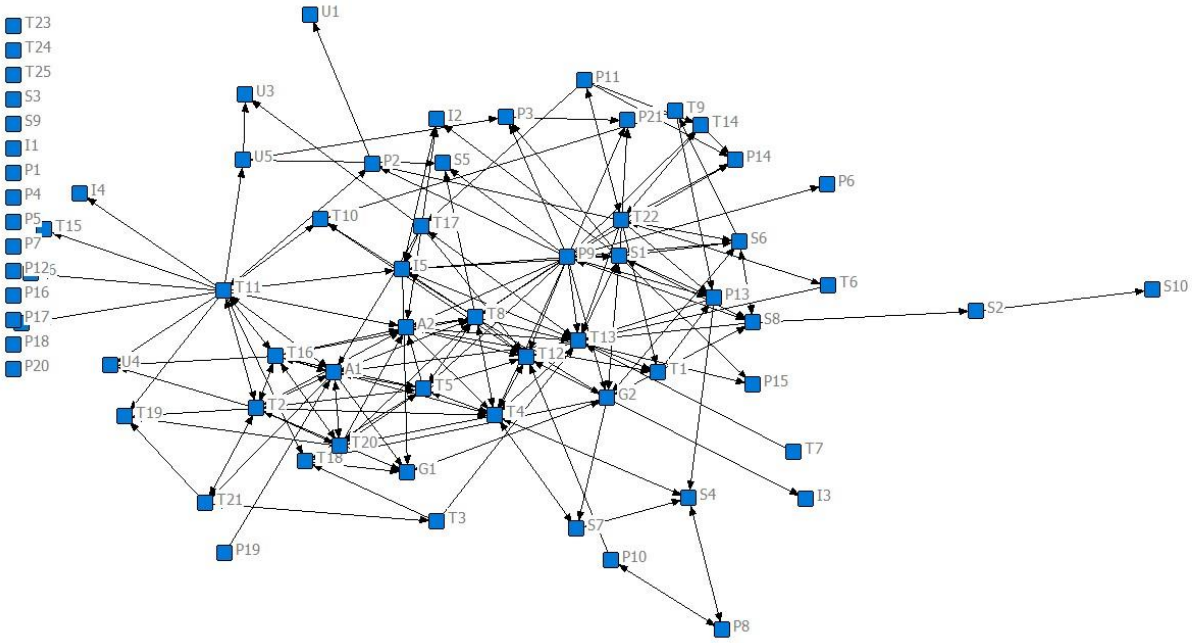


Figure 7

Friendship Network without Administration and Guidance Counselors



While the sociograms visually depict the density of social networks, as well as the extent to which isolates appear, procedures like a quadratic assignment procedure (QAP) correlation assesses the strength of relationships between networks. A QAP correlates two whole matrices or networks to each other. This analysis determines whether there is a correlation between each of the networks and provides data to compare each of the four networks. Pearson's *r* is calculated to determine significance. As is common in other statistics, a *p*-value (Pearson's *r*) of less than .05 (5%) is considered to be significant, thus supporting the hypotheses that the two networks are related (Borgatti, 2018). Further, using a QAP Correlation measure offers a way to compare networks and assures that any special characteristics of the data, like autocorrelation, are known, and

accounted for (Daly, 2015). Table 5 depicts the QAP Correlations between each of the four networks and illustrates that the strongest correlation is between the advice seeking network and the emotional support network with a QAP Correlation of 0.606 and the weakest correlation was between the instructional support network and the friendship network, with a QAP Correlation of .271. With p-values of 0.002, all results are significant.

Table 5

Network QAP Correlations

Network 1	Network 2	QAP Correlation	P Value
Advice	Emotional Support	0.606	0.002
Advice	Instructional Support	0.561	0.002
Instructional Support	Emotional Support	0.500	0.002
Friendship	Emotional Support	0.386	0.002
Advice	Friendship	0.321	0.002
Instructional Support	Friendship	0.271	0.002

In addition to using a QAP Correlation to compare networks to each other, another way to compare the four networks is to determine the density of each network. Density is a cohesion measure that measures the number of ties in the network and is expressed as a proportion of the total number of ties possible. Density provides information about the connectedness or knittedness of the network and the stronger the density the more connected the nodes are to each other within the network. Density is

calculated by: n(n-1)/2 where n = the total number of nodes. It is interpreted as the probability that a tie exists between any pair of randomly chosen nodes. A density of 1.00 means that every node in a network is connected to every other node. The network is as tightly knit as possible. A density of 0.00 indicates that all nodes are disconnected and no node is connected to any other nodes in the network. Table 6 indicates that the densest network is the advice seeking network (density is 0.107) and the least dense is the friendship network (density is 0.041). The advice seeking network is between two and three times more dense than the friendship and instructional support networks. These densities will be discussed further.

Table 6

Density of Individual Networks

Network	Density
Advice	0.107
Instructional Support	0.100
Emotional Support	0.082
Friendship	0.041

The density figure can be converted to a percentage to provide information related to the total percent of possible ties. The higher the decimal, the higher the percentage and the more dense the network is. The advice seeking density of 0.107 reflects that 10.7% of all possible ties are present in this network and reflects the strongest density of the four network data sets. The friendship density of 0.041 reflects that 4.1% of all possible ties are present in this network and is the least dense of the four networks in this study.

Question 1 Analysis

There exist substantial differences in internal connectedness of each of the four focal networks in this study, as measured by the sociograms, density statistics and number of isolates. In SNA, isolated nodes without connections are called isolates. In the advice, instructional support and emotional support networks, there are only 3-4 isolates per network. Fifteen isolates in the friendship network represents the number of people who have not gone out with anyone else socially outside of school at any point during the school year in which the research was conducted. Of these people, nine were paraeducators, three were first year teachers, two were special education teachers and one was an interventionist. Every classroom teacher and unified arts teacher identified at least one person whom they had been out socially with over the course of the school year. This is important because both evidence from the field and educational research identify social relationships as important to the success of school improvement initiatives and new practices (Moolenaar & Sleegers, 2015). Going out with co-workers outside of the work day is an indicator of comfort, trust, and personal relationship. When considering a school's networks, knowing that fifteen instructional staff members-- just over 20% of the group-- do not have relationships with others that would lead them to socialize outside of school is helpful information for building leaders. If they are interested in ensuring strong, positive social relationships with everyone, they will need to create the opportunities at work.

The second piece of information obtained from this data is that in the advice seeking, emotional support and instructional support networks, there are only three to four isolates. This is significantly fewer individuals than in the friendship network and

indicates that almost everyone has at least one other person they go to for professional or emotional support/advice. While the nature of these ties and connections will be analyzed later in this chapter, the fact that only approximately 5% of the instructional staff are not connected with others indicates that information flow will reach almost everyone.

There is additional information available regarding those who are isolates in the network. There were 21 paraeducators involved in the research study, so the nine that did not identify someone whom they went out socially with represent 42.8% of all paraeducators. This suggests the paraeducators are less personally connected with the other instructional staff in the school. The three teachers who were isolates were in their first year as teachers in the school, and the fact that they did not identify anyone they went out with socially, indicates that they may not, yet, have formed close personal connections with colleagues. These data offers school leaders some direction for who are more marginalized within the staff. New teachers may need support to facilitate the development of relationships, or the school might consider opportunities for personal relationships to be developed with new staff members. In addition to this, considering ways to build opportunities for paraeducators to feel a part of the community will help build relationships. These personal relationships are harder to develop, but are stronger and more durable allowing stability and consistency over time (Moolenaar & Sleegers, 2015).

Another way to compare networks is using QAP correlations which were described earlier. The QAP correlation results indicate a significant ($p < .05$) relationship between all networks and all correlations themselves are significant at a $p < .002$ level.

The strongest correlations were between the advice, instructional support and emotional support networks. There were more ties within these networks, indicating more people were connected to each other and seek each other out than in the friendship network. The correlation in the friendship network was weaker, although still significant, and had fewer ties. This information provides us with evidence that people tend to seek out advice, instructional support, emotional support and have friendships with the same people across networks. However, there are more connections when people are seeking advice, and instructional and emotional support, than there are between friends. Therefore, there are fewer friendship ties, but friendship is a factor and linked to each of the other networks. People choose to connect with friends, but their professional support and advice networks extend beyond their friendships.

A further description of the four focal networks is possible by examining cohesion, which represents what might be thought of as the "clumpiness" of the network (Borgatti, Everett & Johnson, 2018). The tighter the network, the more ties there are between nodes and the more connected the nodes are the higher the level of cohesion. One measure of cohesion is density and provides useful information to understand the network. The densest network found in this research is the advice seeking network, with just three isolates. The second densest network is the Instructional Support network and the third densest is the emotional support network, with friendship representing the least dense network. As stated in the results section, density can be converted to percentages representing the percentage of ties that exist out of the total number of ties possible. Therefore, if every node was connected with every possible other node, the density would be 1.00, representing 100% of total ties.

When analyzing the density of the networks studied, while the advice network is slightly denser than the instructional support network, the difference is negligible. The results in Table 3 indicate that within any of the four networks, there are not more than 10% of the total possible ties present. In a smaller network, it is more likely that the people will know each other and have a relationship. In very large networks (>500 members) it is more difficult for there to be a high density because people will likely not know or interact with many of the others in the network. García Hernández et al.'s study (as cited in Ergun and Usluel, 2016) found that in a middle sized organization, those with approximately 200-400 members, expected density would be between 40% and 70%. The higher the number of members in the network, the lower the density is expected to be. In this study, the networks have low density with each network having less than 10% of the total possible ties, indicating limited interconnectedness

When considering a school setting with approximately seventy members involved in instruction, if members of the network only seek out 8-10% of people for advice or instructional support, is this enough? Earlier in this chapter it was found that in the instructional support, emotional support and advice seeking networks there were three to four people who were not connected to the network, so about 95% of the people identified going to at least one other person. Density tells us that the people in these networks seek out less than 10% of the people possible.

Loosely interconnected networks can be impactful in schools. Daly, Moolenar, Bolivar & Burke (2010) conducted SNA research on the relationships within schools and how these impacted reform efforts. They found that the ability of educational teams to make decisions and focus on improving instruction was directly related to their access to

expertise and instructional knowledge. In addition to this, Mohrman et al., (2003) found that change begins and is maintained through interpersonal relationships rather than initiatives, plans and direction. The interactions and commitment from people are what lead to long-lasting change. These findings demonstrate that reform efforts, innovation, and change are maintained by the inter-personal connections within a network. The networks in this study are not organized in a way that supports the fluid transmission of information and the capacity to positively respond to changes in practice.

Networks with greater density indicate more people are connected to each other. To influence change and have meaningful outcomes, people need to work together and leverage experts in the field with strong instructional knowledge. It is important to consider that the higher the level of cohesion, the greater the level of trust within the network and the more likely people will be willing to work together (Moolenaar & Sleegers, 2016). This trust influences productivity and innovative practices. Therefore, a well-connected network leads to greater trust and greater collaboration between members of the network. In the field of education, Daly et al. (2010) found that denser networks have healthier collaborative partnerships between teachers and have higher outcomes for students. Teachers also felt like they had more input into decision making and more ownership and control of their work. The grade levels with less dense teams focused more on following structures and compliance and felt like they did not have much input regarding decision making and educational practices.

When comparing the density numbers obtained in this study with those obtained by the Daly et al. (2010) and Moolenar et al. (2011) studies, the density numbers in this study were lower across all networks. This indicates that in this study, there are few

connections between teachers, providing a smaller number of opportunities for information to be easily transmitted and to allow people access to high quality information and resources. The network is not dense enough to facilitate system-wide dissemination of information. This information is useful for school leaders as they consider how to provide structures and opportunities for relationships to develop between staff members, in order to support their reform efforts and effective partnerships between teachers.

Question 2: How Do Informal Social Networks Influence Staff Interactions, as Communicated by Educators?

The social network data provided quantitative data regarding the structure and organization of the informal school networks, but did not provide information related to the reasoning and decision making that led to the network configuration. Qualitative analysis of interview data was performed to supplement these findings, to provide deeper insight and illuminate key patterns of behavior.

Everyone interviewed shared that one's professional role as a classroom teacher, paraprofessional, special education teacher, etc., did not influence who they sought out for advice, with one exception. Teachers routinely sought advice from building principals and guidance counselors based on their roles. As was discussed under the previous question, many people identified principals and guidance counselors as someone they had gone to for instructional support, advice and emotional support. During the interviews, individuals identified that they went to these people specifically because of their role in the school. The formal organizational structure directly influenced those decisions. Interviewees also shared that they did not seek out advice from those whose role indicates

a particular area of expertise, such as a reading specialist, special education teacher or behaviorist. They identified that their perception of a person's expertise outweighed the expertise the person's role indicates they have. Below are illustrative comments from interviewees that together speak to the way collaborative networks for teachers are more associated with perceived skill than job role. Each of these interview quotes indicates that the colleagues they seek out for advice or support is not bound by the person's positional title. Respondents commented about seeking out people they trust or they perceive have expertise, even if they do not work directly with them. Teachers are also sensitive to not hurting a colleague's feelings by seeking out someone else.

T13: "*Professional role is not a factor for me."*

S3: "*The people I'm seeking out and trying to bounce things off personally, professionally, whatever, are people who I guess kind of imbibe the same things I do…doesn't matter what their role is." "...and honestly, reputation has a big part, especially someone who's newer in the building. There are people who just everybody respects and everyone knows that they're some of the best teachers in the building."*

S1: "*Professional role doesn't matter. It depends what I am looking for."*

T4: "*...I don't necessarily seek people out because of the leadership position they're in…" ".....I do think people are delicate about some of those things, because we certainly don't want to undermine anyone or make anyone feel uncomfortable…"*

Teachers reported two key factors that influenced who they sought for advice: trust and friendship. Trust was the most commonly cited requirement for soliciting

advice from a colleague and every respondent noted trust as a factor when determining who they would contact for either instructional support or professional advice. Interviewees, as noted in the quotes below, were very clear about the importance of trust. In all responses, teachers clearly stated that this was a necessary element of their decision-making about who they would seek out for advice. They cited safety, lack of judgment, ability to be vulnerable, and confidentiality as experiences they had and needed to have when engaging with a colleague at a time they need support or advice.

T12: "*Trust is pivotal. It is huge."*

T4: "(*Trust) is hugely important…somebody who I felt like I felt safe with on a personal, emotional and professional level. And, I think that I've certainly experienced people break my trust here. I've had people break my confidentiality. And then when that happens it is a break in that relationship and it is a burn the bridge so to speak. It is hard, just like with any relationship, to rebuild something because it takes work from both sides and it means they have to have a really open conversation about what happened in order to move forward."*

T13: "*Trust is one of the top things I think because we want to be able to be fully open about what you're feeling and you want to make sure that it's not going to get repeated. You want to be sure you're not going to get judged. So, yeah, I mean, I wouldn't talk to anybody that I didn't think I could trust."*

S3: *"I think trust is very important because you go to people wanting, with deficits, you know, and shortcomings that you feel you have, and you need*

help and so you need to have some degree of trust to know that they are going to support you in an appropriate way."

S1: "*When you feel like you can trust somebody then you can feel more vulnerable."*

A close connection to a colleague, a feeling of closeness and comfort, and similarities in beliefs and thinking, were also cited by interviewees when determining who they would seek out for advice. Below are examples of how teachers described their relationships with colleagues. Their statements indicate how significantly they influence the organization of each of the networks. Respondents seek out others whom they feel comfortable with, even if they had expertise in the area they were seeking advice in. They connect with others who share similar beliefs and they feel a natural, authentic connection. This was consistent through all responses.

T12: *"The group that I seek out is always there and always seems to be available or makes that time and it feels genuine...just feels open and I like it. Like a natural relationship; like it should be."*

S10: "*I feel comfortable going into their room...I'm very comfortable with them. You know, I've let me guard down and they've let their guard down and we talk randomly…"*

S1: *"We have similar beliefs and similar philosophical beliefs and you are kind of on the same page that way." "...you know that whatever is said is going to stay in the room. And that, whether you are venting or crying or sharing, you know, a great story, or a funny story...they are always there."*

T4: *"Sometimes it's just a person that you connect with or that you know I feel like I have several people in the building who I feel very comfortable with who I hold similar values and who I respect."*

Meeting observations were a part of the qualitative portion of this research. The purpose of these observations were to identify patterns with regard to where people choose to sit during staff meetings. These observations were intended to provide an additional data point to see if professional role was a factor in who teachers chose to sit with. These observations were conducted during the months of March 2018 – June 2018 and did provide additional information about how people self-select who they choose who to sit with when gathered for a meeting. Six meetings were observed, one of which required people to sit in assigned seats, so this data is omitted from the data presented below. Five of the meetings were full staff meetings and one was a unit meeting with half of the teaching staff present. Three other unit meetings were scheduled for observation, but were cancelled prior to the meeting date. Table 7 provides data identifying the percent of people at each of the six meetings who either sat with others teaching at the same grade level or who share the same professional role. This data indicates that more than half of the teachers chose to sit with someone they work with or someone who works in the same position as they do. The homophily principle identifies that people tend to gravitate to those familiar to them, so the fact that for the six meetings observed an average of 64% of staff members sat with someone they work directly with or share a position with is not unexpected.

Table 7

Meeting Observations

Meeting	Total Meeting Attendees	Number of staff who sat with people teaching the same grade or professional role	Percent who sat with same grade level or professional role
1	42	22	48%
2	20	10	50%
3	35	23	66%
4	42	30	71%
5	39	33	85%
6	42	26	62%
		TOTAL AVERAGE	**64%**

The data in Table 7 shows that an average of sixty-four percent of the time, teachers select to sit with someone they work with directly at the same grade level or who share the same professional role, such as being a special education or unified arts teacher. The percentages ranged from 48% to 85%, indicating that in every instance (with the exception of 48%) more than half of the teachers chose to sit with others they worked with or shared similar roles.

Question 2: Analysis

The interviews conducted during this study provided qualitative, contextual and explanatory data for the research. This study aimed to learn about the informal networks in the school and compare these to the formal organizational structure created by the hierarchy of roles within the school. There were a few key findings in this area. Teachers interviewed for this study overwhelmingly stated that the professional roles of individuals did not matter when they considered who they wanted to connect with professionally or personally. What mattered to all six interviewees was what they personally considered someone's expertise and/or reputation and those they trusted. Related to this finding is

that perceived expertise did not always match professional role. An example of this is a teacher who would seek out instructional advice regarding a reading approach from another teacher in a similar role to her, rather than the reading specialist. A teacher might seek advice from one special educator, but not another, based on their personal assessment of the individual's expertise in the area they needed support with. The level of trust, connection and relationship outweighed professional expertise. This was confirmed in every interview and has significant implications to the field. Teachers in this study were clear that they would turn to someone they trusted over someone with positional authority whom they did not trust.

Gibbons (2004) found in her research that during times of stability, people seek out those with professional expertise but during a time of change, people turn to and rely on people they have personal relationships with to a much greater degree. The school in this study would be categorized as going through a time of change and reform, with both changes in leadership and instructional practice occurring simultaneously. These factors will impact reform efforts, network configuration and trust levels at the school. Advice seeking, instructional, and emotional support networks all show low density, indicating that at the time of the research people were reaching out a relatively small number of people, supporting Gibbons (2004) research findings. Those interviewed stated that they had a few people they trusted, so this might contribute to the low density seen in the networks.

Underlying everything, across many questions and all interviews, was the concept of trust. Teachers reported that they would only seek advice from those they trust. They shared that they would not choose to be vulnerable and ask for support or help from

anyone they did not trust. They also shared that without trust, nothing would happen within the school setting. The only way that people changed, adjusted their practices, or had buy-in for reform efforts was through a trusting relationship with those making the request for the change in practice. Trust influences initiatives, collaborative practices and a willingness to try something new at work. In addition to this, low trust and weak relationships may undermine authority and buy-in to a reform effort or an expectation made by an educational leader to change instructional practices. Professional role and status within the formal organizational structure is not enough to influence change. There must be a high enough level of trust within and throughout the system or people will not engage in the work. These findings are consistent with the research literature about trust, relationships and social capital. For example, Liou, Y.H. and Daly, A.J. (2010) found that trust is an essential facet of relationships and social capital and directly influence a person's willingness to exchange information based on their determination of calculated risk. If someone does not feel they are safe to share information with someone, they will not and this greatly influences the transmission of information within a system. Low trust leads directly to low levels of information sharing.

These findings provide further evidence that the influence of the informal network, the relationships that exist within the school that are independent of professional role and formal organizational structure, is very strong and highly influential. Teachers choose to interact with others they trust, and influences the flow of information within the organization. If a principal champions a reform effort and the teachers do not trust her, the reform effort is much less likely to be successful than if the principal had the trust of her teachers. This information provides evidence for instructional leaders that, for them

to be influential in their work and to create a culture of continuous improvement, the first need to build a culture of trust within the school. This is a necessary step in order to reach long term outcomes and create lasting change.

Question 3: To What Extent Does Professional Role Influence the Structure of the School's Informal Networks and Teacher Interaction Patterns?

A QAP Correlation was completed to compare the individual networks to professional role (teacher, special educator, paraprofessional, administrator). In social network analysis QAP correlations are obtained to compare networks to each other while also being able to focus on a specific characteristic of the nodes, called an attribute. Each network-- advice seeking, instructional support, emotional support, and friendship-- contains the same members and each person has an attribute identified as "professional role". The professional roles in this study include: classroom teacher, unified arts teachers, interventionist, special education teachers and paraprofessionals and each member of the network is assigned one role based on their position within the school. This question sought to determine the level of influence a teacher's professional role has on the school's informal networks and the way in which teachers interact with one another. Table 8 provides this data.

Table 8

QAP Correlation: Individual Network and Professional Role

Network	Advice	Friendship	Instructional Support	Emotional Support	Node Attribute—Same Prof. Role
Advice	1.00	0.321	0.561	0.606	0.041
Friendship	0.321	1.000	0.271	0.386	0.111

Instructional Support	0.561	0.271	1.000	0.500	0.040
Emotional Support	0.606	0.386	0.500	1.000	0.071
Node Attribute—Same Prof. Role	0.041	0.111	0.040	0.071	1.000

QAP P-Values

Network	Advice	Friendship	Instructional Support	Emotional Support	Node Attribute—Same Prof. Role
Advice	0.000	0.000	0.000	0.000	0.032
Friendship	0.000	0.000	0.000	0.000	0.000
Instructional Support	0.000	0.000	0.000	0.000	0.035
Emotional Support	0.000	0.000	0.000	0.000	0.001
Node Attribute—Same Prof. Role	0.032	0.000	0.035	0.001	0.000

In Table 8 each network is correlated with professional role and the correlations and p-values are provided. Column 5 provides the correlation between the network and the node attribute of professional role (teacher, paraprofessional, interventionist, etc.). The QAP correlations between any network and professional role are all less than those obtained when the networks were correlated with each other, as provided in Table 2. Line 5 of the QAP Correlation chart in Table 8, *"Node Attribute—same Role,"* provides the QAP correlations between the networks and professional role. Each correlation is less than 2 indicating that there is not a significant correlation in any network between a teacher's professional role and the professional role of those whom a teacher identified as

responses to the survey questions (Borgatti et al., 2018). The following example will help explain this further.

Data from Table 8:

advice network x node attribute--same role = .041 = 4% = 4% of the advice seeking network is correlated to role

The percentage outlined above (4%) is very low and does not indicate there is a correlation. Using this formula, the highest percent would be in the friendship network in which eleven percent of the responses are with others who share the same professional role. This is still very low and does not indicate a significant correlation. In other words, no professional group seeks out others within that professional group any more than they do anyone else.

Another way to answer this question is to analyze the different networks by comparing the density of professional roles within each network. By analyzing the density of a professional group within a network and comparing these within a network and between networks, information about the influence of professional role within the networks is obtained. Tables 9-12 provide information about the different professional groups and the density of the members within that group, within each of the four identified networks: instructional support, friendship, advice seeking and emotional support.

Table 9

Instructional Support Density by Professional Groups

Group number and Group Name	Density
Group 3: Special Educators	0.389
Group 2: Unified Arts	0.250
Group 4: Interventionists	0.133
Group 1: Classroom Teachers	0.128
Group 5: Paraeducators	0.043

Table 10

Advice Density by Professional Groups

Group number and Group Name	Density
Group 3: Special Educators	0.267
Group 1: Classroom Teachers	0.150
Group 2: Unified Arts	0.150
Group 4: Interventionists	0.133
Group 5: Paraeducators	0.062

Table 11

Emotional Support Density by Professional Groups

Group number and Group Name	Density
Group 3: Special Educators	0.267
Group 2: Unified Arts	0.200
Group 1: Classroom Teachers	0.123
Group 4: Interventionists	0.100

Group 5: Paraeducators	0.064

Table 12

Friendship Density by Professional Groups

Group number and Group Name	Density
Group 3: Special Educators	0.122
Group 1: Classroom Teachers	0.113
Group 4: Interventionists	0.067
Group 2: Unified Arts	0.050
Group 5: Paraeducators	0.024

When examining the density of each network by professional group several notable patterns emerge. As explained earlier in this chapter, the density of the networks in this study were each less than .10, indicating low densities. These data provide slightly different results. In every network, the special educator professional group had the highest density representing that special educators seek out other special educators at a frequency that is higher than the other professional groups. Having said this, the only network representing what would be considered a moderately high density, is the special educators' cohort in the instructional support network (.389) (Table 9). In every network, Group 5, the paraeducator group, had the lowest density, indicating that paraeducators seek out other paraeducators for advice/support less than all other professional roles. The remaining professional roles, classroom teachers, unified arts teachers and interventionists show no pattern within or between the networks. When examining the

overall density patterns between the networks by professional role, the density of the friendship network is lower than the other three networks.

Question 3 Analysis:

The results of this study found that the friendship network was more highly correlated by professional role than the other networks were when solely looking at professional role.

Table 13

QAP Correlation by Professional Role

Network	QAP Correlation by Role
Friendship	0.111
Emotional Support	0.071
Advice	0.041
Instructional Support	0.040

Table 13 re-states the QAP Correlation by professional role presented earlier in Table 8. In the friendship network, if everyone within a professional role was friends with everyone else within that same professional role, and this was true across all five professional roles, the QAP Correlation would be 1.0. The data collected in this study found that in the friendship network, approximately 11% of the nodes were friends with others within the same professional role. This is the highest correlation by professional role, with instructional support having the lowest correlation with a 0.040 QAP Correlation, or a 4% correlation. When comparing networks, there is a stronger tendency for the members of the network to go out socially with others who have the same professional role, although none of the networks are strongly correlated. This information

continues to support that for this group of participants, there is not a strong correlation between role and personal relationships.

When comparing the networks by professional role the data can be analyzed by studying each professional group within the networks. The density of each group of educators can be determined and compared by network. The density of a group indicates how connected the teachers are and how often they interact with and solicit advice and support from others who share the same position as them. In this study, the greatest density of professionals by role were special educators, across all networks. The paraprofessional group has the lowest density of all groups across all four networks. This tells us that within these four networks, special educators seek out other special educators more often than other professionals seek out others with the same position as them. Paraprofessionals seek out other paraprofessionals less than any other group. While it is unclear why special educators identify other special educators as members of their networks at a higher rate than others there is a clear trend identified in this research. In every network, this group of educators sought out each other more than any other group. It is possible that the special educators share a more specialized professional role that provides them greater access to each other. This would be an area of study in further research, but was outside of the scope of this study.

Given that paraeducators, in general, have the least educational background and their role is to provide educational services to students under the direction of a special educator or classroom teacher, it is understandable that they would not seek each other out at a high rate for advice related to their work. It is more likely that they would reach out to their supervisor or teacher they work with respect to their work than other

paraeducators who are likely doing different work. Paraeducators in this organization do not engage in a lot of professional learning together so it is also less likely that they would know each other well and have the opportunity to form friendships with each other. The formal organization in this case might influence the formation of informal networks. Paraeducators work hours that reflect their actual time working with students, so they are not afforded time to collaborate and network outside of student contact time. This restricts the ability for informal networks to develop. They have lunch breaks at variable times based on the schedule that is created for them, so they eat with a limited number of others. At this particular school, the paraeducators are not assembled for building specific professional development so they do not have an opportunity to develop relationships via this mechanism, either. It is clear there are a number of factors that influence the lack of relationships within the paraeducator network that are relatively easy to understand and offer explanation regarding the reasoning behind the lack of cohesiveness with this professional group.

Question 4: What Do Instructional Support, Advice Seeking, Friendship, and Emotional Support Networks Convey About the Overall Organization of The School Staff?

In a social network, the term degree represents the number of edges on a node, or the number of nodes adjacent to another node. Degree represents the number of people a member of the network selected in response to the question measured by the network. These can be broken down into in-degree or out-degree. Out-degree represents the responses an individual makes identifying someone as a selection to the question. If a person responded to the survey question by circling 4 people on their sheet, their out-

degree would be 4. In contrast, a person's in-degree number represents the number of individuals in the network who selected them in response to the question. In this study, using in-degree was determined to provide the information most relevant to answer the research questions. This is a way to effectively measure relationships within a network by identifying which teachers others in the school seek out for advice and support. By calculating average degrees for each network you determine the average number of responses for all of the nodes within a network. A higher in-degree number indicates that people have reached out to more people in that particular network. A lower number indicates that, on average, people seek out fewer people in that network. Table 14 represents the average degrees, or connectivity, within each of the networks.

Table 14

Average Degree by Network

Network	Average degree
Advice	7.493
Instructional Support	6.972
Emotional Support	5.718
Friendship	2.859

These data show that the advice seeking network has the highest average number of responses (7.493). The table also shows that advice seeking, instructional support and emotional support networks have between 5.718 (emotional support) and 7.493 (advice seeking) people they identified as people they have gone to in the last 6 months for support in these areas. The friendship network is the network with a lower average

degree, with the average responses for those who were identified as a friend being 2.859. This is noticeably less than the other networks.

Table 15 explores a related construct; namely in-degree centrality by node. This provides data depicting how many members of the network identified this individual as someone they sought support or advice from.

Table 15

In-Degree Centrality by Node

NODE	INSTRUCTIONAL SUPPORT	ADVICE	EMOTIONAL SUPPORT	AVERAGE IN-DEGREE CENTRALITY
G2	18	32	25	25.000
A1	20	27	25	24.000
G1	15	31	25	23.667
A2	11	23	19	17.667
S10	19	16	9	14.667
T18	17	14	9	13.333
S1	16	14	8	12.667
S3	14	16	8	12.667
I3	10	19	9	12.667
T4	12	14	11	12.333
S6	14	13	8	11.667
T13	11	12	9	10. 667
T9	11	12	8	10. 333
T12	11	12	8	10. 333
S8	12	11	8	10. 333
T20	9	12	8	9. 667
S5	9	11	9	9. 667
T5	12	8	6	8. 667
T1	10	6	9	8. 333
S4	8	9	8	8. 333
U4	7	10	7	8.000
S9	10	8	5	7. 667

I5	**11**	**7**	**5**	**7.667**
T16	**6**	**10**	**6**	**7. 333**
S2	**11**	**5**	**5**	**7.000**
S7	**9**	**6**	**6**	**7.000**
T6	**5**	**8**	**7**	**6. 667**
T22	**10**	**6**	**4**	**6.667**
T10	**10**	**4**	**5**	**6.333**
T11	**7**	**8**	**4**	**6. 333**
T19	**8**	**6**	**5**	**6. 333**
T2	**7**	**7**	**4**	**6.000**
T3	**7**	**6**	**4**	**5. 667**
I2	**8**	**4**	**4**	**5. 333**
I6	**7**	**4**	**5**	**5. 333**
P3	**3**	**6**	**7**	**5. 333**
T17	**9**	**2**	**4**	**5.000**
T8	**6**	**4**	**4**	**4. 667**
I1	**5**	**6**	**3**	**4. 667**
P8	**5**	**4**	**5**	**4. 667**
P14	**4**	**5**	**5**	**4. 667**
P19	**4**	**6**	**4**	**4. 667**
P21	**5**	**6**	**3**	**4. 667**
T14	**5**	**3**	**5**	**4. 333**
T15	**5**	**6**	**2**	**4. 333**
P13	**2**	**5**	**6**	**4. 333**
P18	**5**	**4**	**4**	**4. 333**
T7	**5**	**3**	**4**	**4.000**
T21	**6**	**4**	**2**	**4.000**
T24	**5**	**5**	**2**	**4.000**
P4	**2**	**4**	**6**	**4.000**
P7	**4**	**4**	**4**	**4.000**
P10	**3**	**4**	**4**	**3. 667**
P11	**2**	**5**	**4**	**3. 667**
U3	**4**	**4**	**2**	**3. 333**
U5	**2**	**5**	**3**	**3. 333**
I4	**6**	**2**	**2**	**3. 333**

P15	**3**	**5**	**2**	**3. 333**
P9	**2**	**4**	**2**	**2. 667**
P16	**3**	**3**	**2**	**2. 667**
U2	**2**	**3**	**2**	**2. 333**
P1	**3**	**2**	**2**	**2. 333**
P2	**1**	**3**	**3**	**2.333**
T25	**2**	**1**	**2**	**1. 667**
P17	**1**	**2**	**1**	**1. 333**
T23	**1**	**2**	**0**	**1.000**
U1	**1**	**1**	**1**	**1.000**
P20	**0**	**0**	**1**	**0. 333**
P22	**1**	**0**	**0**	**0. 333**
P5	**0**	**0**	**0**	**0.000**
P6	**0**	**0**	**0**	**0.000**
P12	**0**	**0**	**0**	**0.000**
AVERAGE	**7.493**	**6.972**	**5.718**	

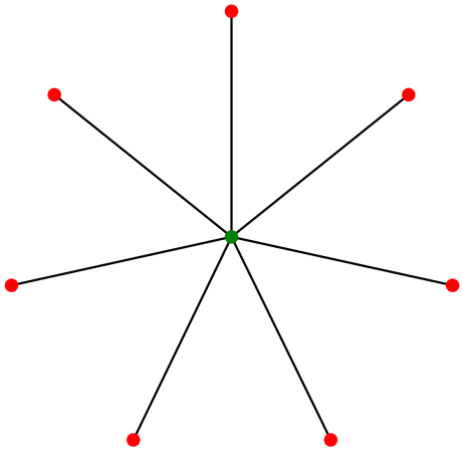
In the far right column of Table 15 the average number of in-degree ties for each person in the advice seeking, instructional support and emotional support networks is provided. At the bottom of the table is the average in-degree centrality for each of the three networks. This data illustrates that the most central members of each network are fairly consistent between networks. The highest in-degree centrality of any node is G2 which had 25 ties, and the lowest average in-degree centrality was 0, representing three isolated people in all three networks, representing a lack of connection to anyone in any network.

Centrality is another way to analyze the networks and provide information about the overall organization of the school staff. Centrality is a class of theoretical constructs

that characterizes a node's position within a network (Borgatti et al., 2018). It refers to the extent to which a network is dominated by a single, or small number of nodes. In a maximally centralized graph (see Figure 8), the network looks like a star with a node at the center that has ties to all other nodes and no other ties exist between any of the other nodes.

Figure 8

Maximally Central Network

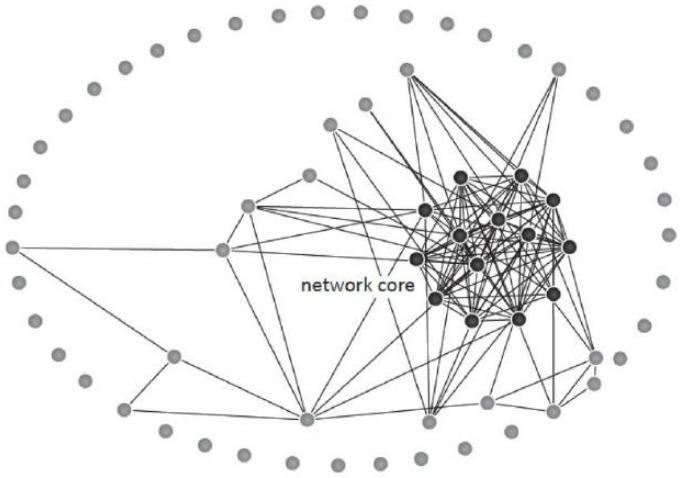


A second structure that emerges from centrality measures is Core-Periphery Structure, which looks clumpy in nature, having one primary cluster with more centrally centered nodes connecting to periphery nodes which are further out and less connected within the network (Borgatti, 2018). The denser, more central nodes, are those with a higher centrality and represent the core of the network. The nodes outside of the core that are less dense, have less centrality and represent the periphery of the network. Nodes in the core are more connected to other nodes within the network and those on the periphery

are connected to fewer members of the network (Borgatti, 2018). In Figure 9, there is a clear core of the network with darker nodes, that are visually denser than the lighter, less connected periphery nodes, with more space between members of the network.

Figure 9

Core-Periphery Structure



Degree centrality is the simplest measure of centrality and measures the number of ties any given node has, and can be measured as in-degree ties and out-degree ties. In-degree ties represent the number of ties that others in the network directed to a particular node. Out-degree ties represent the number of ties that a node directed to other nodes in the network (Borgatti, 2018). While both in-degree and out-degree centrality are useful in understanding a network, only in-degree centrality is measured for each person in the network, to answer this research question. Understanding the people that the most members of the network seek out provides useful information to understand the core of

each network. It provides information about who the key stakeholders are within a network and how and between whom most information will flow.

The friendship network was an outlier with regard to centrality, with the average number of degrees (2.859) being significantly less than the other three networks. Therefore, information on degree centrality was only measured on the advice seeking, instructional support and emotional support networks. There are many fewer ties within the friendship network and since friendships are not directly tied to who teachers seek out for professional advice or support, this portion of the results will focus solely on the advice seeking, emotional support and instructional support networks.

Figure 10

Advice Network: Degree

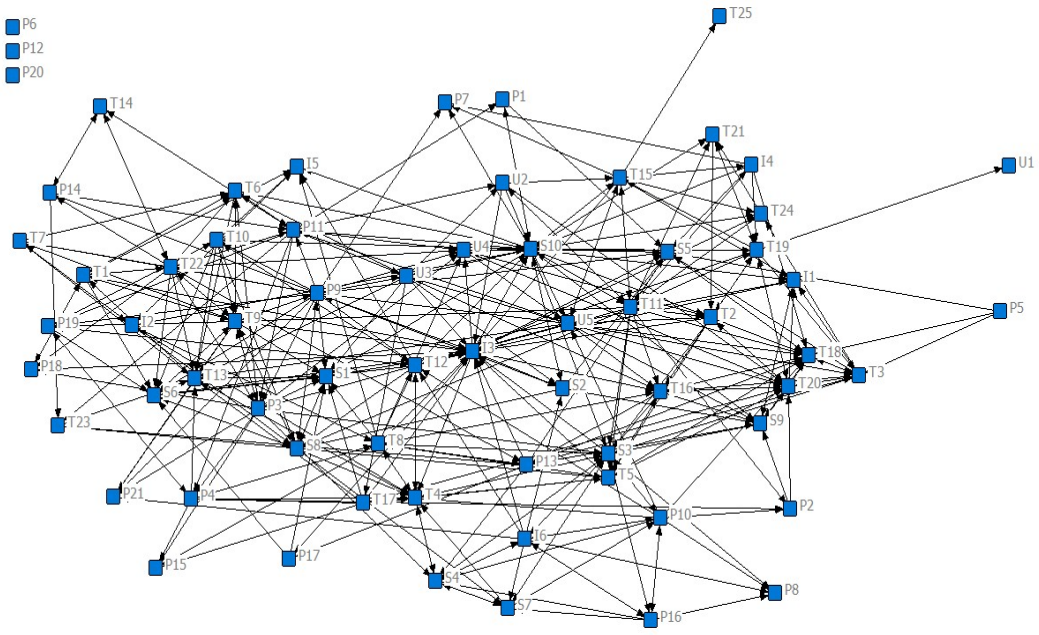


Figure 11

Instructional Support Network: Degree

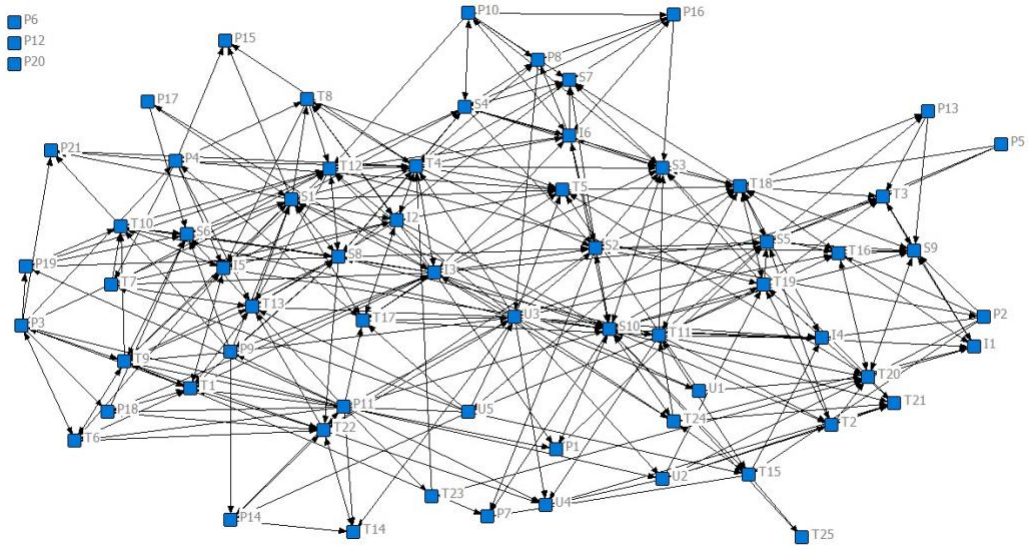


Figure 12

Emotional Support: Degree

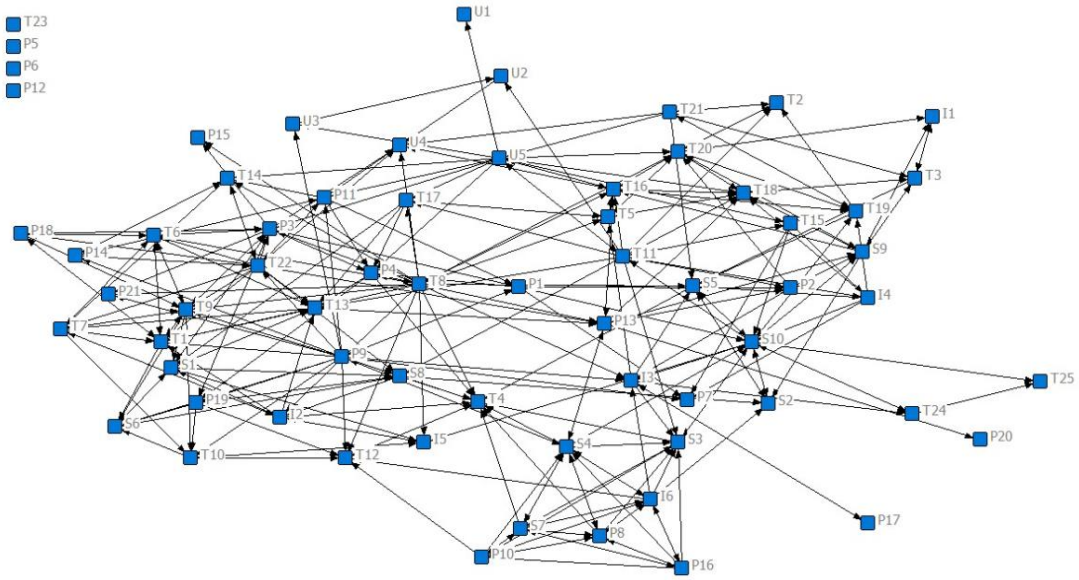
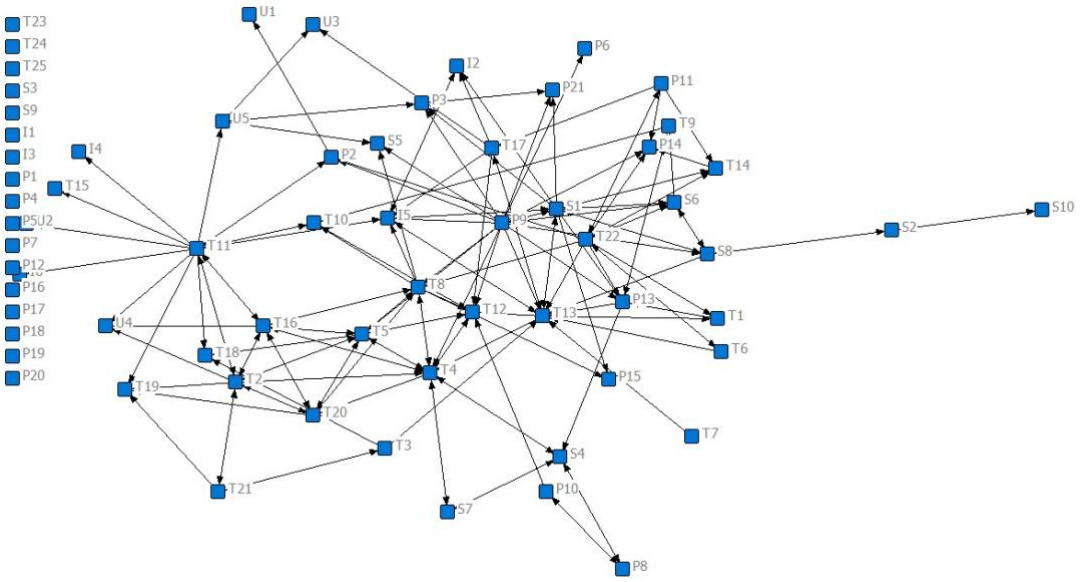


Figure 13

Friendship: Degree



In examining the four sociograms depicted in Figures 10-13, the degree data from Table 15 is represented graphically. The similarities in average degrees between the advice, instructional support and emotional support networks are seen in the visually similar core-periphery structures of the networks. Each of these networks represent which members of the network have ties to other members.

Figure 10 represents the advice seeking network. One of the observations of this network is that, while there are three isolates, there are only two nodes, nodes T25 and U1 that have only one tie. All other ties are connected to more than one other member of the network, which indicates that teachers are not reliant on only one person to obtain advice from. The more connected nodes are to each other, the more likely information will flow throughout the network and the more stable the network is. In looking at this network there are many lines going through the center of the network, indicating a high number of ties between members.

Figure 11 represents the instructional support network and also has three isolates and has one node, T25, only connected to one other member of the network. The key difference when comparing Figure 8 to Figure 7 is the number of ties present. Figure 8 is not as visually dark as Figure 7 and represents many fewer ties between teachers. This lightness indicates that teachers seek out others for instructional support less than they seek out others for professional advice.

Figure 12 represents the emotional support network and it appears more "loose." There are four isolates and three nodes with only one connection to the rest of the network. There are more nodes further away from the core of the network indicating less centrality within the network (Borgatti et al., 2018). There is more white space present in the central part of the network indicating the presence of two cliques. Nodes U5, T16, T4 and S4 are the brokers who link the two cliques, represented by the clusters on the left and right side of the sociograms. These people are important because they bridge connections between the cliques, indicating if they were removed from the network, there would not be a flow of emotional support between the two groups (Borgatti et al., 2018).

When looking at the friendship network, in Figure 13, there is a stark visual contrast to the other networks. There are seventeen isolates, represented vertically on the left side of the network sociogram. These isolated nodes have not gone out socially with anyone from work during the previous 6 months. While also a core-periphery structure, the friendship network is visually much more "loose" with fewer ties present connecting nodes. There are also nine nodes with only one connection to the rest of the network. It is easy to see that this network is smaller than the rest with far fewer ties connecting the members of the network.

Question 4 Analysis

Table 15 presents the average degree by network for this research study. The advice network has the highest average degree. This number reflects that the members of this network sought advice from an average of 7.493 other members of the network. When looking at the average degree for instructional support and emotional support, the average degrees were slightly lower, but aren't markedly different from the advice network. The friendship network, however, is noticeably different, with an average degree of 2.859. This reflects that the nodes in this study identify fewer other nodes within the network that they have gone out with socially outside of school over the course of the school year. On average, the members of the network went out with fewer than 3 others from the 72-member network over the previous 9 months.

It is important to consider the importance of this in the overall understanding of a network and how the information can be used to inform school leadership and school members about the flow of information and trust levels within a school. Friendships within a system, and this was specifically probed related to going out with others outside of work, indicate a level of trust, and connection within an organization. When considering the "feel" of any workplace, when people come in to work, do their jobs and leave with minimal connection to others, the workplace has a certain "feel." When people arrive early and stay late because they choose to, and you can hear laughter and chatter before and after work hours, and you see people who work together outside of the workplace, this presents a very different type of feeling.

When considering communication or information flow within an organization, if the network is heavily dominated by a select few individuals, it is likely that, for

something to carry weight or meaning, or for an initiative to take hold, it must be responded to positively by these people. The reverse is also true, that if there is a negative slant taken by one or more dominant people, this will significantly adversely impact the perception of this topic by the majority of the network. A network dominated by a few is a more volatile and less stable network than one that has a more diffuse structure. When a network has a larger number of nodes with many ties to other nodes, there is a greater sense of stability to the organization and greater likelihood that more nodes have greater influence over the network. This creates a sense of balance and stability within the network which is more likely to be receptive to new ideas and stronger communication. Granovetter's (1973) strength of weak ties theory plays out in the data obtained in this study. This theory states that ties that connect acquaintances (i.e., people who are not close friends or family) lead to more creative and novel information flow between people. When people from different tight cliques connect with others who they are not as close to, novel information is transmitted and innovation and new ideas develop. Many weak ties in an organization create a flow of information that provides stability and confidence.

When analyzing Table 15 a few network characteristics are noted. Nodes A1, A2, G1, and G2 are clearly the most central nodes of the three networks identified. These nodes represent the building administrators and guidance counselors and these roles within the formal organizational structure are designed to be nodes that other members of the network seek advice or direction from. They are also easily identifiable, as there are only two individuals representing each professional role. In order to understand the flow of information within the informal support and advice networks, it was decided to exclude these individuals from analysis. An important finding, is that during the

interviews, teachers reported a duty or expectation that they seek advice from these people. This presents a different communication and self-selection pattern than instructional staff have with each other. Teachers shared that they felt an obligation to seek advice from those they perceived to be higher up in the organization, but felt more leeway and flexibility regarding who they turned to within the network of others in a similar role as them.

Therefore, for this section of the discussion principals and guidance counselors will not be included, as they do not provide information about the flow of information within the informal instructional networks. What we do know is that people do seek out advice and support from these individuals, as is expected within the formal network. Therefore, for this individuals, the informal networks reflect the formal organizational structure accurately. Members of the network seek out advice and support from those in the organization who are supposed to provide it.

In looking at nodes S10 through T17 in Table 15 the results appear more complex. As a reminder, in-degree centrality, the number in the far right column of the table measures the average number of responses that were provided for that individual person. In the case of Node S10, nineteen teachers identified this person as someone they went to for instructional support, sixteen teachers went to this person for professional advice and nine identified going to this person for emotional support. The more people who identify someone as someone they seek out to communicate with, the more central they are to the organization. When looking at the teachers who have an overall average in-degree centrality of eight or higher, there are seventeen total and only two of these are not a classroom teacher or a special educator. These people will have the most influence

on a system and are considered central, as they will heavily influence the success of an initiative, idea or leader's performance. People listen to these people's perspective within an organization and their opinions carry heavy weight.

Of the sixteen nodes that have an average in-degree centrality between five and eight, all professional roles are included, indicating a more diffuse communication flow that is more free flowing across the school, although nodes are connected to fewer nodes. Thirty-five nodes have an average in-degree centrality of under five, indicating that many nodes seek advice or support from, on average, fewer than five others. When looking at the professional roles of these thirty-five nodes, twenty of them are paraprofessionals, indicating that most paras are not tightly connected to a large number of other nodes. This reflects what would be expected when analyzing the formal structure of the organization, in that paraeducators typically work school hours, with only a few teachers and special educators and take their direction from these individuals. They would have no other reason to seek advice or support from others in the organization, and the results of this study indicate that most do not.

Results of this study show that there is a range of in-degree centrality responses. Twenty-five percent of the members of the networks (excluding the "A" and "G" group) had an average in-degree centrality of eight or higher, and there were not clear outliers dominating the network. It is likely that the seventeen nodes who had more than eight (and this is an arbitrarily selected number, as the data was divided into quadrants), will have greater impact on the network than those with an average in-degree centrality of less than four, but there are enough nodes with higher in-degree centrality to support the opportunity for communication and information flow within the network.

In the informal networks studied there are a range of number connections between nodes, and while none are dominated by a small number of nodes, there are seventeen members with eight or more connections, and there was not a select group of nodes that dominated at the top of this group. Thirty-five members, over 50% of the network, have an average in-degree centrality of four or less. This data provides interesting information about the networks. First, there is a high likelihood that information can pass through the advice, instructional support and emotional support networks given the number of nodes with eight or more connections to other nodes. The challenge is that each network has almost half of its members with four or fewer connections to other members of the network. While the majority of these nodes are paraprofessionals, who only work with a select few nodes, it is important to be aware of the fact that many nodes do not have a lot of connections to others. This lower level of connection can make people feel less committed and invested in their work, as relationships are important to helping people feel like they belong. The leaders of this school will want to be aware of this.

This chapter provides a description and analysis of the study findings. The four networks provide information about the school as a whole. There are influential members of each network that have the ability to significantly influence the work of the school. A principal who knows who these people are in their school has the ability to leverage their influence in ways that benefit the school community. These are people who others trust and respect and with their support, a school has a greater chance of realizing the continuous improvement efforts, curriculum implementation efforts and other initiative outcomes. In addition to this finding, for the teachers in this study, professional role was less a factor in who they sought for professional advice and instructional support than the

level of expertise a teacher has. Trust and expertise were stronger factors in someone's determination of who they would reach out to in time of need than the professional role they held.

CHAPTER 5: CONCLUSION

In this final chapter, four primary areas will be explored. First, there will be a comprehensive summary of the results of this study, followed by implications to the field based on the current literature. Next, the study's limitations will be discussed including the possible impacts on this research study. The chapter will conclude with recommendations for further study.

Summary

Informal networks at this K-8 school provide valuable information regarding the inter-personal relationships among the teachers. Key findings summarized in this section include how professional roles influence advice seeking and professional support patterns, the differences and similarities of the four networks studied, and the role of trust within the organization.

Results of this study demonstrate that a teacher's professional role is not a significant factor among those that seek out their input for instructional support. Teachers value expertise over professional role, which is an interesting variable to consider when analyzing how a school functions. Teachers noted that expertise varied between professionals and that perceived specialization in a professional area might not be connected to an individual's position. For example, a classroom teacher might ask another classroom teacher for advice about reading rather than going to a reading specialist if she felt like the classroom teacher had greater expertise and would offer her the information she was seeking.

Analysis of the density of each of the four networks, indicated that none would be considered dense. The densest network, advice seeking, was 0.107, indicating that

teachers sought advice from an average of 10% of the total staff in the network. This is a not a large percentage and reflects low density without a high number of connections between staff members.

Results from in-degree centrality data, which identifies the teachers that others went to for advice or instructional support, provides useful information to consider. When removing the principals and guidance counselors from the network there were sixty-eight teachers in the network. There were eleven teachers who twelve or more people identified going to for advice. There were seven teachers who twelve or more people identified going to for instructional support. Five of these are the same people. If a principal knew who these five people were, it would provide her with valuable information about who the most influential staff members in the building were. More people are connected with these five members than anyone else in the school and the perspectives, opinions, thoughts, and ideas from these five people are heard and shared more than anyone else's. When a principal knows who these individuals are she is able to use this information to support her work. Including these individuals in decision making and hearing their thoughts about ideas and reform efforts can go a long way toward a successful outcome. These influential voices can either make or break the success of change efforts, as their support level will be directly related to the outcomes. If they have buy-in, others will, and if they don't, the probability of success decreases significantly.

In contrast to the aforementioned tightly connected network members, there were seventeen people who went to fewer than four others for advice, and five of these individuals were paraprofessionals who went to zero other people. When looking at this same data for instructional support, twenty-one people went to fewer than four others,

and four paraprofessionals did not seek out anyone for instructional support. When analyzing informal networks, it is important to consider those members who are disconnected from others. A principal would benefit from having the knowledge that four paraprofessionals do not identify anyone that they go to for advice or support with their work. How are they being effective in their work? How are they learning what to do and communicating with others about expectations? Do they interact with anyone? A leader has the opportunity to explore this further to better understand the nature of the on the ground work happening in the school.

The data derived from the social networks tell part of the story, and the interviews offered additional information. Throughout the qualitative interviews teachers reported that trust mattered across every situation. Teachers would not choose to interact with anyone they did not trust. When analyzing key terms across interview questions, in all six interviews trust was the word that emerged most. At the end of the day, professional role or expertise mattered, but not as much as trust. A teacher might recognize someone as having a lot of knowledge, but if she did not trust this person, she would choose someone else to seek advice or support from. This information is incredibly valuable for a school leader. When comparing this data with the network data, one might interpret this to mean that the people at the school who most people seek out for advice or support are also the most trusted by their colleagues. Building on these relationships, learning more about who these people are, and including them in decision making about improving culture and climate in the school might be a wise move. The more cohesive and trusting a staff is, the more likely they will work toward a common goal and yield more positive outcomes for students.

Implications for the Field of Education

Research on teacher collaboration in schools, which as previously reviewed, identified a number of benefits upon student outcomes (Bolman & Deal, 2003; Coombs-Richardson & Rivers, 1998; Fullen & Pomfret, 1977; Thousand & Villa, 1992; Welch, 1998,). When teachers work together, students achieve at higher levels, as has been replicated across studies. Teachers, however, do not consistently, comfortably, or willingly always engage with colleagues in collaborative practices (Bailey et al., 1993; Bondy & Brownell, 1997; Friend & Cook, 2017; Welch, 1998). Research provides insights into a number of reasons for this, including interpersonal challenges and differences in perceptions and values regarding instruction and practices (Bailey et al., 1993). Welch (1998) identified that the history of isolation in the field is ingrained and institutionalized influences teachers' mindsets about collaborating with colleagues. Friend and Cook (2017) noted that resistance to new practices, such as working with colleagues, occurs as a response to impending change. They noted that when the pressure to change is removed, so is the resistance.

This body of research is directly related to the findings of this study. When a building leader has a clear understanding of the informal social network of their school, they are able to make intentional decisions about how to organize teachers at different grade levels to facilitate a high number of collaborative opportunities. A principal who knows who the most central members of their school's network are can leverage their strong influence when implementing change efforts. Including these people on leadership teams or key instructional or curricular teams will likely have a positive impact on change efforts and allow for greater buy-in from the greater faculty.

Another factor influencing collaborative practices is the level of trust between people and within an organization. Louis (2006) found that trust is a necessary ingredient for collaboration and cooperation between individuals and within a system. Tschannen-Moran (2001) found in their research that the level of collaboration present between individuals and groups is directly related to the level of trust they have with each other. They also noted that teachers who do not trust a colleague will not release their autonomy in order to collaborate. Bryk and Schneider (2002) found that during a time of change, trust between teachers and administrators is less than that between teachers. The magnitude of this gap will directly impact the degree of change realized within an organization so it is to great benefit for those leading the change effort to have a clear understanding of the level of trust within the system. Hattori and Lapidus (2004) found that innovation requires both collaboration and high levels of trust, so if either of these components are missing, innovative practices and authentic change will not occur. Finally, Sherchan and Nepal (2013) found trust to be an important element of a social network. Trust within a community is a source of power and provides the mechanism for growth. The role of trust in an organization cannot be understated.

The results of this study offer an additional dimension to the current body of research. First, it confirms that trust is a necessary component of collaborative practices. Interviewees cited this as the most important factor in determining who they would turn to for advice or support and they clearly stated that they would not seek others out if they did not trust them. A school's success and ability to collaborate, innovate, and grow depends on a systemic level of trust. In addition to confirming the importance of trust, the social network analysis of this study provides additional information about the structure

of a network and the nature of relationships in a school. The densest network in this research was the advice seeking network, in which there are a higher number of people who reach out to others than in other networks and the number of connections teachers have with each other is also higher. The second densest network was the instructional support network, in which people identified who they had gone to when they had questions or were seeking out information about their instructional practice. Both networks included the same teachers with the most connections to others. The same teachers were identified by their colleagues as those they sought out for professional advice and instructional support. Having said this, the networks themselves are not very dense. The networks do not have a high number of ties and the ties are not tightly connected to each other and teachers do not have a high number of ties with each other. This data combined with the information about trust indicates that there is a connection here. A network's density is linked to trust. If people are connected to each other and there are strong ties, indicating that many people are connected to many other people, information and communication flows easily and collaboration and innovation are possible. In the absence of these characteristics, a school will have a much more difficult time engaging in continuous improvement and innovative practices, which is the case in the school studied. School leaders, leadership teams, and teachers would benefit from having a clear and accurate understanding of this, as they engage in the change work in American schools today. The best programs, models and practices will not yield the desired effects if they are not implemented in a school community with high levels of trust and connection.

Study Limitations

There are a few key limitations to this study. Seventy-two staff members participated in this study and seventeen were males, representing 23.6% of the staff population. One limitation of this study is that it is unknown whether gender influenced the findings in a significant way. Research from the National Center for Education (n.d.) Statistics found that in 2015-16 the gender balance in public elementary schools was 11% male and 89% female (, so this research does not represent the same distribution of the general population and is therefore not a representative sample. It is impossible to know if there are potential gender biases that influenced the findings of this study.

A second limitation of this study is that this research was conducted at one school in rural Vermont and it is not clear how the results might be generalized to schools in different communities. Every school is unique in that it is situational, representing its own community, population, diversity, local and state laws, and a myriad of other factors. It is important to not overgeneralize the findings, but to consider them as a finding for this school in this study. The methodology is sound and easily replicable and the findings will always reflect the school(s) being studied.

It is impossible to assess how people interpreted the survey questions for the social network research. It is not uncommon for people to read a question and have a different interpretation of what it is asking. Prior to the research, random people where queried about the questions and revisions were made to increase clarity and consistency of interpretation, however, it is unknown how the actual respondents interpreted the questions. If people interpreted the questions differently, the overall findings of this research could be inaccurate or misrepresentative of the actual patterns of behavior of the

staff interviewed. This would significantly influence the network configurations and lead to different outcomes.

Respondents were asked to respond to the survey questions looking back six months. This can be a subjective timeframe and relies on a person's commitment to deeply considering their connections with staff over the past six months. This presents an area in which there may be a high level of subjectivity in responses. Someone might not have put much thought into their responses and omitted people from the list, or included others they may not have actually interacted with. Others may have taken more time with greater thoughtfulness and been more inclusive in their selections. Human will, commitment to fidelity, and honesty, are impossible to manage through a survey such as this one and these factors may have significant influence on the results. There is evidence that this may have been a factor in this research because in the friendship network there are some one-directional ties. If people went out with others from work after school, these should always be two-directional. It is unclear the extent to which this influenced any of the network configurations, but it is likely it is a factor.

A final limitation to note is connected to the interviews conducted for the qualitative portion of this study. Interviews were conducted with six teachers who work at the school. All teachers knew the researcher in different ways. Some had worked closely with her, others were less familiar and one had a child at the same grade level as the researcher. It is unclear how the nature of the relationships influenced the responses. There was no clearly identifiable influence, but there is a possibility that responses were influenced by the familiarity between the interviewer and interviewee. As was noted in the research findings, there were clear themes in the responses, but aside from these, the

influence is unclear. If the influence was significant the responses could be invalid and provide less contribution to the study.

This study's findings include a few limitations for consideration. It is unclear the extent to which any of them influence the results, so a reader will want to consider the factors presented above.

Possible Areas for Future Study

This study provides a foundation for future research in a number of areas. The findings of this study indicated that the teachers in this school did not directly equate someone's professional role with their expertise. Further research in this area to better understand what this means and what factors influence a teacher's decision making would be valuable. Teachers' roles are not always correlated with their expertise and this has possible implications for building leaders and for future policy development. Current state teacher licensure regulations often require an educational degree or coursework indicating proficiency to teach content (Massachusetts Department of Elementary and Secondary Education, n.d.; Vermont Agency of Education, nd). It is possible that expertise is developed through other means and allowing for a provision of this might open up a wider pool of teaching applicants for positions in public schools.

This study focused on exploring one aspect of four different networks. A research opportunity would be to select one network and to explore it more deeply. For example, if one were to want to learn more about a professional advice network, one survey question could be asked to create the network. Additional questions would be asked to explore different dimensions of the network and factors influencing the teacher's responses. How teachers make decisions is multi-faceted and SNA offers a different lens

to explore one network more holistically. An area that is filled with opportunity to explore is curriculum implementation through a social network lens. As found in this research, trust is a necessary component of advice seeking and instructional support networks. Teachers will not choose to engage with others they do not trust, therefore, in a cliquey or loose network with low density, information will not pass freely throughout the system. Determining curriculum implementation effectiveness may be as dependent on the quality of curriculum as it is on the attitudes of key teachers toward it and how they communicate their support, or lack thereof to colleagues. Obtaining information about an instructional support network, comparing this to student outcomes after a curriculum implementation, and conducting interviews regarding attitudes and feelings about the curriculum would provide incredibly useful information about the inner workings of schools.

This researcher intends to focus future research on two primary areas. The first area to study more fully is the link between an instructional support network and curriculum implementation. SNA provides a mechanism to understand who people seek out for instructional support more deeply than was explored in this study. This information, combined with researching curriculum implementation by those in the network would provide valuable information for educators. A research and evidence-based curriculum in the hands of teachers who are not willing to implement will likely not be as effective. Educational leaders can leverage the central people in a network to support this work and future research in this area will be incredibly valuable.

The second area to study more fully relates to the concept of trust in a school. The findings of this study directly link trust to the collaborative practices between teachers, as

well as the formation of the networks. Without trust a school will not operate at optimal levels and student outcomes will be adversely impacted. Directly studying this through SNA research and connecting this research to interviews with teachers and student outcomes will provide powerful information for educational leaders and teachers.

Mixed method studies that include SNA provide information that can transform the field of education. Educators have historically looked at curriculum in isolation and a lot of educational research has removed the will of teachers from the equation. This research and other SNA research recognize that removing the people from the study is a significant limiting factor of prior research. In order to positively influence educational practice and outcomes for students it is important to recognize the important role of trust, relationships and efficacy of the teachers educating children every day. Including this in research moving forward will open up the body of work driving educational decision making today.

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Appendix A: Social Network Survey Questions

Each survey question was on a separate piece of paper. At the top of the paper was the teacher's unique identification number and space for the date. Under each question were four columns containing the names of the teachers in the school, randomly organized.

1. During this school year, whom have you gone to for support with instructional planning
2. During this school year, to whom have you turned for advice about events or issues which arose at the school?
3. During this school year, to whom have you gone to when you were frustrated or upset about something you observed or experienced at work?
4. During this school year, who have you gone out with socially outside of work?

Appendix B: Interview Questions

1. During our initial interview you identified the teachers you reach out to when you are seeking advice related to your teaching and instruction. I am interested in understanding how you selected those individuals. Why did you choose them? What do these particular individuals offer you?
2. When you think about the people you seek out professionally at your school, how would you describe how they made you feel when you initially met them? Is there anything about their non-verbal communication that influences your working relationship?
3. During our initial interview you identified the teachers you reach out to when you are needing some emotional support, possibly you are feeling frustrated or angry about something at work and you need to vent to someone or process through the situation with someone. I am interested in understanding how you selected those individuals. Why did you choose them? How do they support you? Why do you choose these people?
4. How would you describe your relationships with others in your school? What is the professional role of those you are most connected to? Do you have colleagues that you consider a friend and if so, how did these develop?
5. Describe for me the nature of your relationships with people whom you work with but do not choose to seek out.
6. How does trust factor into your relationships with others? How important is this to you, as you work with others?

7. Is there other information you would like to share with me about your professional relationships with others at school that provide deeper insight into the inner workings here?

Appendix C: Personal Statement

This research was conducted within the school district where I am employed. This factor, combined with the fact that I am a system-level administrator within the district, are important to note. Everyone involved in the research study knew me to varying degrees and there is no way to accurately understand the impact on the study. Every possible step to openly communicate information about the study and to offer opportunities to decline participation and to ensure confidentiality was taken. People were told verbally and in writing that their decision would have no impact on them professionally or personally and there would be no way their responses would be connected to them.

Even with these safeguards, the impact of the intersection of my positional power as the assistant superintendent in the organization with the data obtained, remains unknown. From a more objective lens, this school met the parameters I was looking for with regard to size and grade level served, while no other school within our region met these criteria. The rural nature of Vermont leads to the presence of many small schools and there were none within an hour drive that met the size guidelines I was looking for. More subjectively, I know this school and the people who work there well. I connected with them about my research and took the time to personally answer any questions they had. I was able to personally facilitate the drop off and pick up of surveys easily. My connection to the school likely contributed to the high response rate and willing participation.

While there remain unknown influences, I believe my research to be sound and this study's results to be valid. The information obtained was logical and the data

supported and extended current literature. This study has motivated me to view my work differently and to approach novel situations and reform efforts from a different place. Thus far, the response has been positive and it is clear how important trust is within a school and throughout a school system. Having this new knowledge and applying it directly to my work is significant and I intend on building on this to transform my leadership and the way our school system operates. It is an incredibly exciting time to be in the field of public education in the United States.