Indexing Professional Culture: A Social Network Analysis of Three Pre-Kindergarten Centers

By

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To my parents, Michael and Judy, for always taking me seriously.

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CHAPTER 1

INTRODUCTION

The last two decades in the United States have seen tremendous growth in early childhood education, and particularly in public pre-kindergarten programs. In 1995, Georgia began offering a publicly funded universal pre-k program, the first of its kind in the nation (Raden, 1999). Since then, Florida and Oklahoma have begun offering universal pre-k programs, and 42 states offer some type of pre-kindergarten program for 4-year-old students. The total number of 4-year-olds enrolled in public pre-kindergarten programs, excluding Head Start programs, has increased from almost 700,000 in the 2001-2002 school year to nearly 1.3 million in 2014-2015 (Barnett, Robin, Hustedt & Schulman, 2003; Barnett et al., 2016).

Enrollment trends and news reports suggest that early childhood programs, pre-kindergarten in particular, will continue to grow for the foreseeable future. After public pre-school funding took a dip in 2011-2012 with subsequent loss of seats, pre-kindergarten funding and enrollment have bounced back quickly to new high levels (Barnett, Carolan, Squires, Clarke Brown, & Horowitz, 2015). In his 2013 State of the Union address President Barack Obama called for an increase in programs to support children from birth through age 5 including "making high quality preschool available for every single child in America" (The White House, Office of the Press Secretary, 2013). A 2014 Gallup poll found that 70% of Americans support using federal funds to make high quality preschool programs available to all children (Jones, 2014). Pre-kindergarten programs aimed at 4-year-olds comprise the largest percentage of public preschool programs across the United States and programs for 4-year-olds receive most of the funding allocated to public school programs for pre-k programs.

Despite the push for more access to high quality public preschool and pre-kindergarten programs, there is little consensus about what defines a program as high quality. Since the 2001-2002 school year, the National Institute for Early Education Research (NIEER) has been collecting data about public pre-school programs and reporting their findings in their State of Preschool Yearbooks. This review includes comparisons by state of structural features of public preschool programs such as requirements for eligibility and setting of the program(s) offered. The NIEER also rates the preschool programs on 10 quality standards. These quality standards are heavily focused on structural elements as well and include items such as whether the teacher has a BA or higher, the assistant has a CDA or higher, the availability of vision and hearing screening and referrals, and a staff to student ratio of 1:10 (Barnett et al., 2016). One item asks if the program has comprehensive curriculum standards.

The National Association for the Education of Young Children (NAEYC) has its own 10 standards for early childhood program accreditation. The NAEYC standards focus heavily on children's learning and development and cover many broad areas including the physical environment, relationships, curriculum, families, and the assessment of children's progress (National Association for the Education of Young Children, 2008). Two recent federal competitions for early learning funding, Preschool Development Grants and the Race to the Top Early Learning Challenge (RTT-ELC), have called for high quality programs but neither offers a comprehensive definition of high quality in early childhood education (U.S. Department of Health and Human Services and U.S. Department of Education, 2013; U.S. Department of Health and Human Services and U.S. Department of Education, 2015). The Race to the Top competition suggests that alignment of standards across multiple programs within a state and increased points on Quality Rating and Improvement Systems (QRIS) systems should be a focus for funding

recipients. From the range of standards considered by these different entities, no shared model for high quality preschool and pre-kindergarten has emerged.

Statement of the Problem

Without a common model of high quality early childhood education, states and districts are tasked with creating their own vision and designs for high quality pre-kindergarten programs and supporting staff to implement them. In order to implement a new high quality program, the new model must be brought to the teachers and other staff members in new or existing pre-kindergarten settings. Teachers and staff must learn the expectations for their work, including the vision for instruction and goals of the program. The requirements for the development of model pre-kindergarten programs are similar to the requirements of systemic reform for instructional improvement or change.

Systemic reform at the school or district level is the current most common model of school reform or innovation in K-12 settings (Bryk, Camburn, & Louis, 1999; Cohen, 1995; Desimone, 2002; Newmann, Smith, Allensworth & Bryk, 2001). Systemic reform involves getting an entire community engaged in the development of change or innovation in instruction. During reform efforts, much attention is given to the specific kinds of innovation, such as increasing or improving literacy or math practices, but little attention may be given to the way that educators work together to implement the innovation. Although change is always occurring in schools, focusing the instructional change towards specific actions or goals is challenging

School and district-wide model development, intervention, and innovation often involve bringing new ideas to teachers and other school personnel. This means that teachers must learn in order to change their practices. This learning, which usually occurs within the school itself as part of teachers' daily work, emerges through teachers' interactions with the work of the school and

teaching environments and their interactions with their teaching colleagues (Coburn, Toure, & Yamashita, 2009; Stein & Coburn, 2008).

As efforts are made in pre-kindergarten settings to design and model high quality programs, there is a growing need to attend to the aspects of the local context that may influence the ways that teachers and staff make sense of the model. Factors that affect the professional relationships and interactions within the local context(s) of model or reform implementation are critically important to the sustainability of ambitious instructional change and improvement (Coburn, Russell, Kaufman, & Stein, 2012). Local factors include school history and demographics as well as available resources and support, and the culture of the school itself. Research over the last two decades has shown that school factors, including teacher buy-in, school vision, shared values, and competing efforts all influence the way that change occurs in a school (Bryk et al., 1999; Newmann et al., 2001). In addition, studies of curriculum scale-up efforts have found that teachers whose use of and engagement with the ideas of a new curriculum were supported at their school had more success in implementing the curriculum overall (Elmore, 1996).

When it comes to the implementation of a new model or curriculum, educators' use of and engagement with new practices may depend on the professional culture at the school. It is important for researchers and leaders in practice to develop an understanding of the professional culture in a school in order to consider what mechanisms in the local school setting might affect processes of development and change (Daly, 2010). However, the components of professional culture and the interactions among these components are not well understood. Research is needed to explore the professional cultures of a variety of schools to investigate the interdependence between teachers' individual and shared beliefs and practices and the patterns of social

interactions within the professional community, and to guide attention to the relationships, structures and ideas that reflect the professional culture and provide insight into the ways that teachers and other educators work together. In particular, the relatively brief history of teachers and other professionals working together in public pre-kindergarten programs means there has been limited opportunity to explore the professional culture in these settings. However, as pre-kindergarten has expanded into the public-school setting, some centers have been developed that focus exclusively on this age group. These new centers offer the opportunity to explore the professional culture among pre-kindergarten educators in settings that are focused exclusively on the public education of 4-year-old students.

Purpose of the Study

The purpose of this study was to explore the broad question: What is the professional culture among groups of pre-kindergarten professionals? The study explored multiple components of professional culture in three pre-kindergarten centers established as part of the same local initiative. Specifically, this study indexed the *content* and *form* of professional culture within each of the three pre-kindergarten schools, created a quantitative depiction of professional culture at each of the three schools, and compared the professional cultures across the three schools. In the first, quantitative phase of the study survey data collected from teachers, assistants, instructional coaches and directors were used to explore the social structure and beliefs within three pre -kindergarten schools. The second, qualitative phase was conducted to illuminate the findings of the quantitative pictures of professional culture in the three pre-kindergarten schools in more depth. In this exploratory follow-up, interviews were conducted with twenty individuals across three sites to help explain similarities, differences, and patterns identified in professional culture using quantitative data.

CHAPTER 2

REVIEW OF THE LITERATURE

Professional Culture

Defining Professional Culture

A broad definition of professional culture incorporates three major elements that arise from origins in anthropology, organizational psychology, and sociology: shared values, beliefs, and assumptions; shared norms and practices; and social relationships and interactions (Deal & Peterson, 1999; Hargreaves, 1994; Staessens, 1993; Waller, 1932). These three aspects of professional culture are naturally developed through repeated exchanges and work, and also evolve over time (Hargreaves, 1994; Schein, 2010). Schein describes some of the artifacts of the professional culture including espoused beliefs and values, group norms, climate, and formal philosophy, which are the observable elements of the culture. In the long term, it is those artifacts that serve as a stabilizing force among group members, even as the individuals in the community change. It is clear that Schein believes that identifying the cultural artifacts among localized instances of groups of professionals, such as the teachers and staff in a school or district, could be important for understanding the local professional culture.

One way that the elements of professional culture have been organized is into two components, what Hargreaves calls the *content* and the *form* of the professional culture (Hargreaves, 1994). The *content* of a professional culture is made up of the values, beliefs, norms, and practices that are shared among members of culture. This is the 'what' of a professional culture: what teachers say and do and what they believe to be true about themselves and others. (Bryk, et al, 1999; Hargreaves, 1994; Hargreaves & Fullan, 2012; Waller, 1932).

The *form* of the professional culture is the pattern of social relationships and interactions that occur or exist among members (Cobb & McClain, 1996; Hargreaves, 1994; Hargreaves & Fullan, 2012; Louis & Marks, 1998; Waller, 1932). Similarly, Susan Kardos and her colleagues acknowledge the same three major components of professional culture (shared values and beliefs, shared norms and practices, and social relationships and interactions) and also divide them into categories of content and form. However, they also assert that the interdependence between the content and the form is critical to the formation and interpretation of professional culture (Kardos, Johnson, Peske, Kauffman, & Liu, 2001). Kardos and colleagues' conceptualization of professional culture is useful because it combines all of the artifacts or elements in a dynamic social system with on-going mutual influence. This complex view of professional culture offers a picture of the elements of professional culture as the social foundation for the work that teachers do together and an understanding that this culture necessarily changes over time.

Drawing on the work of anthropologists, sociologists and educators over the last century, as well as Hargreaves and Kardos' work, professional culture is defined, for the purposes of this study, as the social foundation of a community of professionals, in this case educators, comprising the values, beliefs, norms, and patterns of social interaction that are shared among community members and that guide their work.

This definition is important because of what it includes, and what it does not. The starting place for this definition of professional culture is a work community, among individuals engaged in professional work. In the context of teaching, the work community is based on the school site at which teacher and educators are placed. Teaching is considered professional work, and therefore it is appropriate to call the community of teachers and educators a professional

community. Some other definitions or references to professional culture emphasize the search for an ideal version of professional culture, with the goal of defining and/or prescribing how other schools can create professional cultures. However, the definition that arises out of Hargreaves and Kardos' work does not implicitly require a prescriptive end-goal for the study of professional culture. Rather, the definition supports consideration of important questions of interest for researchers and areas of consideration for leaders in practice as they work towards supporting groups of educators.

The goal of this work is to begin with the definition as a starting place for the exploration of components of professional culture: what leaders might look for and pay attention to in their schools. To explore this question, it is important to start with the work that has already been done on professional education, to build on the existing knowledge base, both conceptually and methodologically

Professional Culture in Education

Existing research on professional culture can be divided into studies focused on content and those focused on form -- those that focus on shared beliefs, norms, and practices and those that focus on social interactions among teachers. The bulk of the existing research on professional culture in schools has attended to the content of professional cultures by observing or asking about the beliefs and values that teachers hold, and determining the extent to which these beliefs are shared. One group of studies includes case studies of schools, many of which have been successful in improving student achievement school wide or implementing reform (McLaughlin & Talbert, 1993; Strahan, 2003). The professional community and professional learning community literature falls almost exclusively into this group, examining successful examples of teachers working together. However, the culture of less positive and less successful

teacher communities is not well studied, and is often explained or inferred to be the opposite of successful schools.

Qualitative and descriptive research has also provided information about how individual and small groups of teachers interact with one another. Observations of teacher interactions and interviews with teachers can provide rich information, but are usually limited to specific settings and the relationships within that setting. Horn and Little (2010) observed teachers' interactions in voluntary, after-school meetings to identify conversational routines and practices that improved or constrained teacher learning and changes in teachers' practices in secondary schools. This study, while it offers rich detail about interactions in these voluntary weekly meetings, cannot speak to the regular patterns of teachers' interactions with one another in multiple settings across the school year. Another study, of foreign language teachers in Italy, characterized a professional culture of regular interaction and sharing of pedagogical ideas and content (Lampert, Boerst, & Graziani, 2011). There, joint efforts among teachers as part of the professional culture were the basis for improved instructional practice, and new teachers were expected to become a part of the sharing culture.

Finally, some research on professional culture in education has focused on identifying and labeling types of professional cultures. This work, done primarily in K-12 schools, designates professional culture as one kind or another, based on broad patterns. More than twenty years ago, Staessens (1993) described the professional culture in schools as fitting into three types: the family-school, the school as professional organization, and the living-apart together school. While conceptually useful, these distinctions were not taken up by researchers. Around the same time, however Hargreaves (1994) labeled four types of professional culture in schools: collaborative culture, contrived collegiality, individualism and balkanization. The latter

three are always characterized negatively, and the first is considered the type of professional culture for which schools should aim.

Collaborative culture is defined by Hargreaves as a culture in which teachers openly exchange ideas and experiences, and work together to develop their practice. In this type of professional culture teachers choose to engage in the type of collaborative work that Hargreaves argues lead to successful implementation and change. Contrived collegiality is characterized by some of the same group work and coaching that are typical of the collaborative culture, but the impetus is external. In contrived collegiality, educators work together because they are mandated to by external regulations and administrative requirements, and not because they buy-in to the work. A culture of individualism is characterized by the isolation of teachers, where joint work rarely takes place and teachers do the work of their classrooms in isolation, as described in Lortie's "egg-crate" model of teaching (1975). A culture of balkanization, the final type described by Hargreaves, is one in which groups of teachers have formed within the professional culture, usually by subject or grade level team. To have a culture of balkanization, a school must have strong sub-groups, and very little interaction across them. In addition, the members must strongly identify with their subgroup and work in the interest of the group politically. Hargreaves emphasizes that it is not just the development of groups within a school that leads to the negative aspects of a balkanized professional culture, but the strict division and tension between groups that are particularly problematic.

These four types of culture were taken up both by Hargreaves in later work, and by others who have researched aspects of teaching and professional culture, and are still seen in current work. However, there is little work to describe the means of achieving a collaborative culture, and empirical work suggests that multiple types of leadership including varied formal

structures and informal interactions that could support collaborative and positive professional cultures.

Studying Professional Culture in Early Childhood Education

Turning to early childhood educational contexts, there is little work that addresses the concept of professional culture among early childhood educators. The extant literature about the importance of local school contexts and elements of professional culture is heavily focused on K-12 education, and does not include pre-kindergarten educators. The existing work on teachers' beliefs at both the elementary and secondary levels covers a broad range of beliefs and subjects, but the work done on teachers' beliefs in early childhood is often limited to a single subject area or type of belief (Brown, 2005; Bullock, 2011; Kotaman, 2010; Trivette, Dunst, Hanby &Meter, 2011). It is unclear how applicable the knowledge gained from studies about social networks at the elementary and secondary levels will be to pre-kindergarten teachers and settings, and how representative the earlier work on early childhood teachers' beliefs will be to other subject areas and types of beliefs.

Public pre-kindergarten programs, in particular, have historical and structural differences that might lead to differences from K-12 settings. Public pre-kindergarten programs do not share their history with elementary and secondary schools and are a relatively recent phenomenon. In addition, the specific needs of pre-kindergarten classrooms and students mean the structures, including staffing arrangements, are not the same as is typically seen in K-12 schools and classrooms.

In the last two decades, public pre-kindergarten programs have expanded across the United States, with increased enrollment of about 500,000 since the 2001-2002 school year (Barnett et al., 2003; Burnett et al., 2016). Some of these programs are based in community early

childhood programs and centers. Additional classrooms have been added in public school settings, most often in elementary schools; those public schools typically include only a small number of pre-kindergarten classrooms.

As public pre-kindergarten programs have expanded, they have also become more visible. Public funding and public visibility have also translated into increased accountability for public pre-kindergarten programs. While pre-kindergarten programs are not subject to federal standardized testing requirements, 42 states now have publicly-funded pre-kindergarten programs, which means they are subject to state policies and review (Barnett et. al, 2016). In addition, research evaluations of public pre-kindergarten programs have been undertaken in many states, including Oklahoma, Tennessee and New Mexico (Gormley & Phillips, 2005; Hustedt, Barnett, Jung, & Goetze, 2009; Lipsey, Farran, & Hofer, 2015). Despite this rapid expansion and visibility, prekindergarten teachers and their work remain understudied.

Pre-kindergarten classrooms have organizational structures that make them different from classrooms in typical K-12 school environments. In elementary school settings, teachers work together in grade level teams, while teams are organized by subject area and/or grade levels in secondary schools. In pre-kindergarten, on the other hand, there are usually only 1-2 teachers teaching pre-kindergarten in an elementary school setting. In those cases, it seems likely the professional culture of the pre-kindergarten staff would be influenced by the professional culture of the elementary teachers and staff.

However, there are also early-childhood-focused centers under the aegis of a public-school district with a large number of pre-kindergarten classrooms at a single site. These centers are more similar to private early childhood centers in structure, but may require public school credentialing for teachers. With larger numbers of individuals in each position, teachers and

assistants could, in this environment, interact in separate subgroups, with little interaction across roles. Professional culture has not yet been studied in the public pre-kindergarten centers, nor in the other types of early childhood centers to which they are most similar.

In addition, many of these centers may be newly opened. In new centers, there is not always an existing culture. Instead, the professional culture must develop entirely around the pre-kindergarten teachers and staff. However, being a new school is not unique to the early childhood centers. New schools are also being opened up as charter and magnet schools in the K-12 contexts, and turn-around schools are often re-opened with entirely new leadership and teaching staff, effectively operating as new schools. It is unclear from existing literature how long it might take for a new professional culture to emerge and stabilize in either pre-kindergarten or K-12 settings.

In pre-kindergarten settings, support personnel play an important role and thus are critical in an examination of professional culture. Due to state adult to child ratio requirements, teacher assistants represent at least half of the classroom staff and usually work directly alongside the teacher throughout the instructional day. An examination of the professional culture of pre-kindergarten cannot be considered complete without the inclusion of support personnel such as these educational assistants (Mitchell & Sackney, 2007; Mowrey & Farran, 2015). However, studies that include both teachers and assistants in early childhood and K-12 education are limited. Empirical knowledge about the role and work of assistants in mainstream education comes primarily from survey data and brief observations. Both teachers and assistants report difficulty in the delineating the role of the assistant and managing the relationship between the teacher and assistant (Butt & Lowe, 2012; French, 1998; Ratcliff, Jones, Vaden, Sheen & Hunt,

2011). Including assistants in work on professional culture provides an opportunity to expand the body of knowledge about their role in early childhood classrooms and centers.

The professional cultures in pre-school settings are likely to be different than in their K-12 counterparts. The addition of teaching assistants to the teaching team is likely to lead to different patterns of social interactions as teachers spend significant time with the assistant in their classroom, but how exactly they will be affected is unclear. In addition, less is known about the beliefs of pre-kindergarten teachers than about K-12 teachers

Neither the content nor the form of professional culture has been studied extensively as separate components in pre-kindergarten, much less in combination. More empirical work is needed on professional culture in early childhood settings to build on and extend the body of K-12 work and provide evidence about factors that might contribute to different professional cultures across multiple pre-kindergarten program sites. The expansion of pre-kindergarten programs and the increased number of pre-kindergarten teachers working together in larger centers and schools means that pre-kindergarten cultures are developing both within and outside of existing elementary culture contexts. Understanding the professional culture in pre-kindergarten centers, and any differences from elementary contexts, affords the opportunity to understand more about the local contexts in which models of pre-kindergarten instruction are being implemented and improved.

In the study of professional culture in education, generally, and in pre-kindergarten in particular an approach is needed that will allow and encourage the systematic study of social interactions among educators as well as the ideas and beliefs which exist within them. Network theory and social network analysis provides both the conceptual and methodological framework to make this possible.

Social Network Theory and Methods

Social network theory and social network analysis offer a rich approach for understanding professional culture. Social network theory explicates more deeply the ways in which individuals are connected to one another, providing insight into the types of relationships that are most likely to influence individuals to change. In social network theory, relationships are the fundamental unit of analysis.

Applying Social Network Theory

Social network theory establishes the network as a functional central model for understanding and mapping social structures. Social structure is the regular pattern of interactions among people in a group or organization (Carolan, 2014; Knoke &Yang, 2008). Social network theory assigns import to the social structure of a group or organization, to the individual's role in that social structure, and to the interdependence of individuals to consider social influence and predict behavior. In social network theory, the social structure is the mechanism through which information and ideas are shared or passed among individuals (Kadushin, 2011).

Social network analysis. The pattern of relationships within a group of individuals is aggregated into a network structure, and each individual has a position within that structure (Breiger, 2004). Analyses can be conducted at the level of the individual in the network, the relationship between two individuals or elements, and across the entire network. This means that social network theory and analysis afford the potential to look not just at individuals and their environment, but also the dynamic interplay between individuals, as well as between individuals and their environment, to consider the flow of information, ideas, and resources. This is

important because the flow of information, ideas, and resources represents the interrelationship between the content and the form of professional culture

Network theory utilizes structure and position in a network to understand the benefits and limitations of the overall structure of a network, and of the individual. From the social network perspective, patterns of social relationships can be used to understand the way that resources and ideas are transmitted or shared among individuals within and across communities. In terms of professional culture, this means that network theory provides ways to think about how the content of the professional culture might be influenced by the formal and informal structures in the professional culture.

Network Research in Education

In K-12 education, researchers have already begun to use social network analysis as an approach to mapping and quantifying network structure and individual position within educational communities in order to understand the ways in which teachers and leaders work together. The recent expansion of social network theory and methods into work on schools and professional teaching has greatly extended the capacity to visualize, analyze, and compare the structures of interactions and collaboration among educators as they implement or change their vision for instruction (Daly, 2010; Moolenaar & Daly, 2012), The body of social network analysis in schools includes research on elementary and secondary teachers and principals as well as the relationships between school-based personnel and central office administrators in a range of educational reform, innovation, and change contexts. (Daly, 2010). Within these types of studies, many aspects of social networks and their structures have been used to explore the professional work and professional culture of educators.

Qualitative network analysis. Some researchers have used qualitative methods to explore and illuminate social networks among teachers. Coburn and Russell (2008) analyzed teachers' individual networks in eight elementary schools in two districts engaged in the scale-up of a new math curriculum through interviews and observations of teachers. They found that teachers changed how they sought advice during mathematics reform when coaches were introduced into the schools. Schools showed changes in their social networks depending on how their coaching roles had been initially implemented. In schools where teachers received active coaching, the teachers' interactions with the coaches and with their colleagues explored their new curriculum and instructional strategies in greater depth than the teacher-coach and teacher-teacher interactions at schools where there was no active coaching. In other words, the way teachers interacted to make sense of the new math curriculum was qualitatively different as the structure of their social network changed.

Others have used quantitative methods to map social networks in workplaces, schools, and districts visually in order to identify important individuals who could reach many others in support of a curriculum or initiative. Hawe and Ghali (2008) mapped high school staff networks to uncover the best individuals to lead a health education promotion. They found that being connected to others was critical for leaders, but being connected to individuals who were otherwise isolated or barely connected to the network was especially important. Being connected to these marginalized others expanded the reach of the leaders in their health education efforts. A study of primary teachers engaged in a literacy reform effort also used maps to locate important individuals (coaches) and to visualize the patterns of interactions across formally designated groups in a comparison of two case study schools (Atteberry & Bryk, 2010). They found that individuals who served in coaching roles were more central than teachers, even if they had not

necessarily started out in more central positions. This means that the formal role of individuals in networks may affect network structures and are important to consider in professional culture.

Several other studies have used quantitatively derived maps of schools to launch their exploration of networks, and to make patterns within and across groups visible to readers. In their investigation of elementary schools, Spillane and colleagues found that teachers were densely connected to their grade level teams within schools (Spillane Hopkins & Sweet, 2015). Penuel and colleagues found the same organization into grade levels at one elementary school, but also identified another school where the teachers were grouped in networks by their status as new or veteran teachers instead (Penuel, Riel, Krause & Frank, 2009). In other words, both formal roles assigned (grade level) and informal clustering by experience were important in previous studies to the ways that teachers and educators interacted in the professional culture.

Additional research using networks in education has focused on network properties and characteristics, often to understand the adoption and implementation of instructional reform efforts.

Network reciprocity and homophily. One important aspect of professional culture that can be accessed systematically through social networks is whom others are connected to in the network. In social network analysis, this is indexed through two different measures: *reciprocity* and *homophily*. Reciprocity provides information about the extent to which individuals report connections to the same people who report connections to them. Homophily, on the other hand, explores the extent to which individuals are connected to others like themselves and is also known as the "birds of a feather" measure. Both measures can contribute to understanding professional culture by providing information beyond just the number of connections.

Wasserman & Faust (1984) argued that reciprocal relationships are foundational for systemic change in professional communities. Reciprocal relationships provide benefit to both members, as both parties can learn and change together. However, studies of reciprocity in networks have had mixed findings about the relationship between reciprocity and other elements of professional culture. Moolenaar and Sleegers (2010) found that reciprocity was not related to teachers' perceptions of their school's innovative climate, but it was negatively related to teachers' ratings of trust. In these schools, density seemed to be more important that reciprocity, as denser networks provided opportunities to interact and for trust to develop. In contrast, in a study of school principals and central office administrators, Finnigan and Daly (2012) found that the proportion of reciprocal ties was related to trust. Despite these mixed results in the connection between reciprocity and other aspects of professional culture, understanding the extent to which ties are mutual in educator networks is an important part of a descriptive picture of professional culture.

Across networks, homophily is explored by dividing individuals into groups by an attribute (such as formal role or grade level taught) and then assessing the extent to which ties occur within and across these groups. In the education literature, homophily has been used primarily to explore interactions across grade level and subject teams. One study of math reform explored homophily as a reason for teachers to seek others in their network out. They interviewed teachers and asked for reasons that the teacher selected other individuals for interaction. They found that homophily, along with proximity, was a major reason that teachers gave for their selections. Other studies have calculated homophily from the network's structure itself. A study of head teachers in Uganda found that the head teachers had frequent ties with others who were of the same gender and at the same type of school as themselves (Hite, Hite,

Mugimu, & Nsubuga, 2010). The sharing of resources among head teachers in Uganda followed an opposite pattern (*heterophily*), where head teachers at small, low-performing schools received resources from those at larger and better-performing schools in a form of mentorship. Both patterns of homophily and heterophily are informative for understanding the professional culture of schools because each can provide information about which individuals are interacting across the networks, and what patterns are formed in the structure through within and cross group interactions.

Network density and clustering. Studies of educator networks have also identified the importance of network features of density and clustering to the functioning of the professional culture at schools. In more densely connected networks, teachers interacted with greater frequency or with a greater number of individuals and had increased opportunities to collectively make sense of the reform. Penuel and colleagues compared the network structure and clustering within two schools implementing the same reform in seemingly similar contexts, with dramatically different results (Penuel et al., 2009). Each school implemented literacy reforms school wide including selecting the same curriculum and hiring support teachers. However, one school achieved 30% growth in test scores in the first three years of the initiative, and the other had only 3% growth in the same period. Their analysis found that the density and fragmentation of the network mattered. At schools where networks were denser and less fragmented into clusters, teachers had greater access to resources. Expertise was less available at the less successful school as the network had fractured into discrete groups.

In a comparison study of five schools making changes in literacy in a single district, the structure of lesson planning, reading comprehension, and recognition networks either constrained or improved grade level teams' ability to make sense of the reform and implement it successfully

(Daly, Moolenaar, Bolivar & Burke, 2010). The relationships in these networks were indicators of the ways in which teachers came together, or did not, to discuss the reform initiatives and bring the ideas into their daily work. They found that densely connected grade level teams, who had the opportunity to interact with one another on a frequent basis, reported feeling more empowered and better able to focus their group work on the literacy reform. When Daly and colleagues looked at the density and fragmentation of networks within a district office, a group of principals, and across the two groups, they found that information and ideas were shared within dense network groups much faster than when they had to cross into the larger and sparser network (Daly & Finnigan, 2012). Together, these studies demonstrate that density and work in clusters, are critical elements of social networks that may influence the way that educators work together in schools, and that it is important to include information about both in examining professional culture.

Network shape. Another aspect of the form of professional culture that has been indexed using social network analysis is the overall shape of the network. The shape of the network illustrates the extent to which there is a central group of individuals, with others left on the periphery, and is measured using a core-periphery analysis. For professional culture, the periphery is especially important because individuals in the periphery are less well connected and may receive less information or have fewer opportunities than those in the core. One study of district leaders and school principals engaged in change effort to avoid No Child Left Behind sanctions found that the district personnel were all at the core of the network, and principals were in the periphery. In that case, the shape of the network, with a strong core and distinct periphery, made it difficult for change efforts and resources to move from the district to the schools.

Identifying subgroups in school network. Another advantage of social network analysis is the ability to consider where cohesive subgroups lie within a school. Subgroup analysis has been used to capture the culture or the nuances of change within a single school. In education research, grade levels and subject area teams have been the focus of subgroup analysis in education thus far (Borgatti, Everett, & Johnson, 2013; Daly et al., 2010).

In their study of teachers' interactions around improving literacy instruction, Penuel and colleagues utilized both whole network and subgroup analyses to identify the structures within schools that were supportive of changes in literacy practice (Penuel, et al., 2009). They discovered that although two schools were similar in the density of their overall networks, the internal structures were quite different, with more communication across subgroups in the school that made significant growth in student scores. Since the subgroups in the schools were defined primarily by years of teaching experience, the lack of communication in the less successful school was representative of the divide between new and experienced teachers. The result was limited access to resources by the new teachers who most needed the support and expertise of teaching peers.

Similarly, Frank (1996) found that teachers' professional discussions in a high school almost exclusively occurred within subgroups, also limiting the exchange of information and resources across the network. Determining that there are internally cohesive but externally differentiated subgroups within a network might indicate that efforts to influence and change of practices should be at the subgroup level (Borgatti et al., 2013).

Examining change processes at the subgroup level of a school site might make visible how members of the subgroups respond to instructional improvement efforts, and hence lead to a better understanding of overall network behavior and outcomes (Frank & Yasumoto, 1998). If

professional culture is always analyzed at the whole network level, important details about the ways in which teachers work together and take up new ideas are lost. In early childhood settings, social network analysis offers the potential to explore the extent to which subgroups have formed based on formal position; it is possible to see whether separate groups of teachers and assistants form in a school made up entirely of pre-kindergarten educators.

Tracking networks across physical sites. Social network analysis has also been applied to networks of teachers and schools across boundaries to extend the arena of school improvement efforts from a single school to a cluster of connected teachers or schools, either within or across school districts. The ability to extend the network to include new individuals, either within a single program or district, or across districts, may increase the resources and expertise that individuals have access to, thus increasing their social capital. While multiple site networks have not been extensively researched, they are increasingly relevant to the ways in which teachers interact and educational reform takes place. Education reform efforts have expanded from a single site focus to a focus on larger district and regional processes of systemic change. In such cases, networked learning communities, across schools, have been suggested as a scaled-up version of professional learning communities (Jackson & Temperley, 2007). One study, of networked school communities in Canada, found that there was an increase in the expertise that teachers could access and integrate when they were connected to other school communities (Jackson & Temperley, 2007).

Individual centrality within networks. A few studies have also started to explore the status and change of individuals' position within education networks. These studies have most often been focused on individuals in leadership positions, such as principals and coaches. For example, Atteberry and Bryk (2010) found that coaches selected from a faculty of teachers were

likely to already be in central positions as teachers in the school advice networks. However, after switching roles, all of them also ended up in central positions as coaches. A contrasting study, by Penuel and colleagues found that in some cases ineffective coaches lost rather than gained centrality over time in their school network (Penuel et al., 2009). A third study, which focused more on the position of the principal, found that in most schools, the principal had more prominent positions in both language arts and mathematics advice networks than teachers (Spillane & Kim, 2012). However, this work has only begun to explore the positions of the individual networks, and the importance of roles in formal and informal structures, the importance of which is described in the following section.

Exploring the alignment between formal and informal structures. The social relationships in schools develop from formal organizational structures as well as informal interactions (Daly, 2010; Spillane, Kim & Frank 2012). Schools set up formal networks such as grade level teams and subject teams and prescribe mentoring relationships within the school. Formal networks are often at least semi-permanent and are established by role, education, experience, or policy initiatives. To thoroughly describe and examine professional culture in schools, it is not enough to consider the formal networks set up by the school. Studying teachers' networks and how they connect allows for the possibility to compare and contrast these two types of relationships (Daly, 2010).

Some work has already been done to start exploring the relationship between formal and informal structures in teacher communities. Penuel and colleagues studied the formal organizational structures and informal networks in two elementary schools working to improve data-driven decision making (Penuel et al., 2010). They found that one school had informal structures that aligned tightly with their grade level structure and supported a single vision for

the initiative. The other school had less alignment, with informal leaders in large distinct subgroups. This difference between formal and informal structures at the school led to different groups of leaders in the different structures, with competing visions championed by the leaders. Penuel et al. found that the tighter alignment of the formal organizational structures and informal networks to the same vision and goals in the first school was most beneficial to school improvement efforts. For a complete picture of the form of the professional culture it is important to include both formal and informal relationships at the school site, as well as network subgroups and interactions across site-based networks.

Resources within networks. In addition to the structural elements of social network analysis, network theory emphasizes the importance of ideas and resources within networks. In social network theory, the movement of ideas, beliefs, and practices across networks is often considered in terms of the flow model: as the diffusion of ideas or resources or as the accessing of social capital. Both of these ideas have been taken up in social network based education research. Frank has used social network theory to describe the spread of new technology around school districts. He used a diffusion model to explore the ways that teachers look to their friends, those close to them in social networks, for guidance in when and how to use new technology (Frank, Zhao, Penuel, Ellefson & Porter, 2011). He found that it is not just the source of the information and expertise that matters, but also the match to the needs of the receiver that impacts whether a change or implementation of the technology will occur. This supports a complicated view of the process of change as diffusion.

Other education studies have focused more on the social capital model, to understand how teachers and other educators use their interactions at work to increase their social capital, and how that social capital can lead to innovation within schools and districts. In their work on

school wide literacy reform efforts, Penuel and colleagues (2009) considered the interactions among professionals as the primary way to exchange ideas and resources with one another and to improve practice over time. They found that social network analysis, through the mapping of network connections, could facilitate the understanding of the distribution of access to resources and expertise within schools.

Another study, looking at leaders, addressed the importance of access to others with resources and expertise in networks (whether formal or informal) in order for improvement or reform ideas to move throughout a school or district. Daly and Finnigan (2010) identified sparse networks among school and district leaders as an impediment to sharing information across the district, hampering the development of a common understanding of the reform efforts at work. They further highlighted this lack of communication as a specific challenge for successful implementation of the reform. Without communication within the network, some individuals may not have access to the necessary resources and expertise.

Both the diffusion and social capital models of flow within networks emphasize that there is movement of ideas and resources across networks. These studies have emphasized the importance of going beyond the network structures, individual positions, and alignment between formal and informal structures to look at the content of professional culture within the networks. Using only network analysis does not take advantage of the rich potential of network theory more broadly. Rather, a more complete conceptualization of professional culture using network theory incorporates both the structural aspects of network analysis as well as resources within the network- the content of the professional culture, uncovered through examination of individual and collective beliefs within the networks.

Uncovering Beliefs That Suggest Professional Culture

In order to look beyond the structural elements of the social networks and develop a more complete understanding of professional culture, the beliefs held by members of the network must be included. While often described as beliefs in the literature, the beliefs individuals express about themselves and others in a local school context ideas are more along the lines of what Dewey describes as "moving ideas" (1909). These ideas are referred to as moving ideas because they are the local perceptions and ideas that motivate individuals to act and interact: they move people. Moving ideas are resources within social networks: affective, cognitive ideas including attitudes and dispositions towards the self and others that can be both influenced by, and an influence on social network structures.

Two types of beliefs are especially important resources in professional culture. Beliefs about the self are beliefs that might motivate one to act, including self-efficacy and autonomy (Pajares, 1992). In contrast, beliefs about others are the types of beliefs that might motivate or move people to interact. Examples of beliefs that function as moving ideas that are used frequently in the educational research literature are explored below.

Beliefs about the Self

Teacher self-efficacy. The concept of self-efficacy arose from the field of psychology and is described as the belief in one's own capacity to achieve goals or to have control over motivation and behavior (Bandura, 1997). Tschannen-Moran, Hoy, and Hoy (1998) emphasize the context-dependent nature of teaching and teachers' efficacy beliefs. Their illustration of teacher efficacy points to the development of efficacy beliefs through cognitive processing and a cyclical process, with teachers' behaviors as a result of their self-efficacy leading to performances, which then connect to new sources of information about their efficacy. The new

sources of efficacy information include both individuals' personal experiences as well as observations and narratives of the experiences of others (Bandura, 1997; Tschannen-Moran et al., 1998). From this perspective, teacher efficacy is not a static characteristic of a teacher, as it is constantly both influencing and being influenced by the teacher's behavior, and their perceptions of the actions and experiences of those they encounter. However, teachers' efficacy beliefs are relatively stable over time, and require significant efforts to change (Bandura, 1997; Tschannen-Moran et al., 1998). Empirical literature also indicates that teachers' efficacy beliefs are generally high, except in situations of school dysfunction or intense negative change (Kleinsasser, 2014).

Along with beliefs about their own efficacy, individuals hold beliefs about the flexibility and agency afforded to them in professional settings. If self-efficacy is a measure of the individual's capability and control over behavior, then autonomy is the construct used to measure individuals' beliefs about how much freedom and control they have to carry out those behaviors.

Autonomy. Autonomy and the ability to make decisions is one of the hallmarks of a profession (Pearson & Moomaw, 2005). Autonomy has been defined in multiple ways, but a common view of autonomy is "decision-making power and the freedom to think and act" (Friedman, 1999, p. 58). In this view, autonomy is the control that individuals have over their thoughts and actions. Autonomy has been viewed as a source of empowerment and motivation for teachers (Pearson & Moomaw, 2005). The freedom to make decisions about one's own work is not afforded to every worker, but professionals are characteristically provided the flexibility to organize their own work. For teachers, autonomy is multi-faceted. It can be divided into organizational and pedagogical components (Friedman, 1999). That is, teachers' autonomy is

related to their freedom of action with respect to their classroom pedagogy, as well as to their other professional activities.

Autonomy is also related to the norms and practices governing individuals' privacy and interference and as a form of empowerment and agency for teachers within their schools, (Little, 1990). Ingersoll (1996) used data from the 1987-1988 Schools and Staffing Survey (SASS) to study the relationship between collective faculty influence on policy, teacher autonomy in the classroom, and conflict within the school. He found that faculty influence and teacher autonomy were highly interrelated. In addition, both faculty influence and teacher autonomy had inverse relationships with teacher-student and conflicts among staff. This means that schools with higher levels of individual and collective autonomy had lower levels of conflict within the school.

Empirical work on autonomy has consistently reported a positive relationship between teachers' autonomy and their job satisfaction, retention, and commitment to teaching (Guarino, Santibañez, and Daley 2006; Ingersoll, 1997; Ingersoll & May, 2012). Teachers who perceive a higher level of autonomy at work are more likely to be satisfied with that work and to plan to continue teaching. In addition, teacher autonomy has been found to be positively correlated with self-reported self-efficacy (Lu, Jiang, Yu, & Li, 2015).

In general, teacher autonomy appears to be relatively stable at a moderate level over time. An analysis of the Schools and Staffing Survey items on teacher autonomy indicated that in 2003-2004 most teachers (66%) perceived that they had a moderate level of autonomy in their classroom and school, and a small group perceived a low level of autonomy (18%) (Sparks & Malkus, 2015). However, by the 2011-2012 school year, the study found that fewer teachers were rating their autonomy as moderate (61%), and more were rating their autonomy as low (26%). However, factors in the school context can impact teachers' perceptions of autonomy,

positively or negatively. Participatory decision-making and the building of school level collaboration structures were identified as positive predictors of teacher autonomy (and self-efficacy) in one study of 111 primary schools (Lu et al., 2015). Participatory decision-making is often created through formal structures of interaction. This means that the structures of interaction in professional culture may also play a role in the beliefs of individuals and groups at schools.

Evidence about both autonomy and self-efficacy suggest that beliefs about one's self are subject to change based on the environment and experiences of the individual, and may be related to other features of the professional culture, including aspects of the formal and informal network structures. This suggests that these beliefs about the self are dynamic, and influenced by the time that an individual spends in a given setting.

At the same time, the individual also holds beliefs about the others with whom he/she works, and those beliefs can have an impact on how the individual interacts with those others in their community. These are the beliefs that the individual holds about the efficacy of others in their network, which may be influenced by the network structure and their accessibility to others, as well as their trust and beliefs in the competence of others who are playing different roles in the network, such as teachers, assistants, coaches, and leaders in pre-kindergarten.

Beliefs about Others

In addition to beliefs about themselves and their constraints, teachers and school staff have beliefs about others with whom they interact, which in turn affect their motivation to move towards interactions and help to shape the overall professional culture among the group.

Collective efficacy. Collective efficacy is defined as the perceived capability of a system, or school, as a whole (Bandura, 1997, p. 469). It emerged from the social cognitive tradition of

self-efficacy developed by Bandura (1997; 2000) as an extension to a group or organizational context. Goddard, Hoy, and Hoy (2000) based their model for the development of collective efficacy on their existing model for self-efficacy, with minor changes.

Empirical results have demonstrated that collective efficacy is correlated with but still conceptually different from self-efficacy (Goddard & Goddard, 2001; Kurz & Knight, 2004; Skaalvik & Skaalvik, 2007). Teachers' perception of their own capability is related to, but not entirely the same, as their perceptions of the capability of the faculty at their school (Kurz & Knight, 2004). While collective efficacy is likely to be influenced by many of the same sources of information as self-efficacy, it is also dependent on the teacher's social knowledge and interactions with others. Collective efficacy may play an independent role in guiding professional interactions and therefore within the professional culture overall.

Prior research supports this reasoning, and provides evidence that collective efficacy may shape other aspects of professional culture needed for instructional improvement. Teachers' professional commitment is predicted by their collective efficacy beliefs in much the same way as it is predicted by self-efficacy (Coladarci, 1992; Ware & Kitsantas, 2007) and faculty trust (Lee, Zhang, & Yin, 2011). Collective efficacy appears to be different from both self-efficacy and other aspects of professional culture including trust.

Trust. Merriam-Webster defines trust as "the belief that someone or something is reliable, good, honest, effective, etc." (Merriam-Webster's online dictionary, n.d.). In the context of teaching and professional culture, trust is related to the other members of the community; it is always described as trust in a person, or group of persons. From this definition, it also follows that trust is at least in part socially constructed. Repeated interactions with a person or group will influence the trust that builds towards that person or group, and

understanding the pattern or structure of social relations can inform both an understanding of current beliefs about the trustworthiness of others, as well as the ways in which social relations might be encouraged in order to develop trust in the future.

Within schools, there are four major types of relational trust for teachers. These include teacher-student trust, teacher-parent trust, teacher-principal trust, and teacher-teacher trust. In particular, teacher-teacher trust and teacher-principal trust are the most foundational in terms of professional culture. Sometimes these two types of trust are combined into a single type, called *faculty trust* (Hoy & Tschannen-Moran, 1999). Relational trust among faculty members develops through the perception of respect, personal regard, and personal integrity of one person by another (Bryk & Schneider, 2002). However, Bryk and Schneider also point to a fourth component that is critical for the development of trust among faculty members: evidence of competence in their role. Faculty trust can then also be considered as confidence in the competence of individuals in different roles within a faculty. For example, in the early childhood context, it is not just trust among teacher or between teachers and the principal that is important. Rather, trust among all of the different role groups including school leaders, teachers, and assistants is critical to understanding the overall trust around the school.

Trust among school faculty has been shown to influence elements of professional culture including shared norms and practices and teacher professionalism. In their study of Chicago elementary schools, Bryk and colleagues (1999) found that, above and beyond school context factors and teacher characteristics, higher levels of teacher-teacher trust were predictors of positive norms and collaborative practices. Faculty trust has also been found to be correlated with collective efficacy, positive instructional strategies, and was identified as a significant predictor of teachers' commitment to their students (Lee, et al., 2011). In analyzing and

predicting positive classroom practices with students, Wahlstrom and Louis (2008) found that faculty trust was an important predictor of teachers' positive classroom practices, including flexible grouping and focused instruction.

These findings suggest that trust might serve as a foundation for building the aspects of professional culture through confidence in the competence of others. Trust may support positive classroom practices and as such be a mechanism for instructional improvement. In a study of five high schools, trust was also identified as a key factor related to teachers' willingness to implement a continuous change model of improvement (Louis, 2007). Conversely, when the shared norms and practices to which trust contributes, such as collective responsibility for all students, and the public sharing of practice were controlled for, trust no longer predicted classroom practices on its own (Wahlstrom & Louis, 2008). This finding supports the idea that trust is a moving idea, which motivates the individual to act and interact with others.

Indexing and studying educators' beliefs about themselves and others provides an insight into the content of the professional culture, and some of the personal factors that affect individuals' behavior.

Conclusions and Research Questions

Professional culture is a complex and multi-faceted construct, which encompasses the shared norms, beliefs, and practices as well as patterns of social interactions within a community of professionals, in this case early childhood educators. Prior conceptualizations of professional culture have been divided into two main components, content and form. However, seeing these two components as discrete is problematic: it implies that the content and form of professional culture develop independently of one another. Social network theory suggests that beliefs and practices develop in a social environment, and are both affected by and influential on that

environment. In this way, content and form are emergent, dynamic, and interdependent. Social network theory also builds on the interrelationships among environment, social structure and individuals' ideas and beliefs. So far, little has been done to systematically study both the content and the form of professional culture together in empirical studies. Instead, most of the prior literature has focused on only one component at a time: either content by examining teachers' beliefs and the shared norms and practices or form through the structure of school networks. By definition, professional culture includes both the content and the form, and as such it is important to study both of them in tandem.

Examining individuals' beliefs within the network is one way to gain insight into the content of the professional culture. These beliefs can include perceptions of one's self, such as self-efficacy and autonomy, or beliefs about colleagues, such as trust and autonomy. This review suggests that beliefs such as self and collective efficacy are distinct from one another, and that they are stable over time, if individuals stay in the same environment. However, that does not mean that beliefs are not responsive to changes in social context. The evidence suggests that self- and collective efficacy, trust, and autonomy are related to teachers' self-reports about working conditions and job satisfaction and that changes in working environment can be related to changes in beliefs. This work has demonstrated that many beliefs are related to one another, to varying extents, and that they may be responsive to context. What seem to be lacking in the current literature are explicit connections to social structure and interactions (to the form of professional culture). The work has only started in the last few years to tie specific beliefs to social structure or patterns of interactions across a school on a larger scale.

The application of social network analysis to education in the last ten years has expanded the possibilities for mapping and analyzing social structures. The extant literature on social

interactions among teachers and other educators has been largely qualitative: focused on small numbers of teachers within specific contexts. These studies have provided rich description of a small number of interactions, but have not examined patterns across multiple relationships or entire school populations.

Adding social network analysis methodology to educational research has afforded greater opportunities to visualize and analyze the structures of social interactions across entire schools. Taking this larger perspective also allows the researcher to shift the focus of inquiry to patterns of interactions across one or more relations. At the same time, social network analysis allows for the examination of subgroups within schools and for the use of individual characteristics to define subgroups. This means that is possible to compare individuals by formal and informal position within multiple relational networks and to identify patterns across individuals. Finally, social network data can be combined with other data, including individuals' beliefs to describe the professional culture of a school. Descriptive statistics and statistical models can then be used to explore both the individual components of professional culture and their interrelations.

There is a continued need for research-based knowledge about professional culture in all types of schools, including knowledge about the multiple complex factors and interrelationships that contribute to professional culture. Public pre-kindergarten centers offer a novel and potentially distinctive setting to study professional culture because their history and organizational structures are not the same as existing K-12 settings, and these programs have expanded in public school settings over the last two decades. Given the especially limited knowledge of professional culture in early childhood education settings, there is also a strong need to index and describe professional culture among pre-kindergarten educators as these programs expand.

The current study investigated the network structure and individual and collective beliefs in public pre-kindergarten centers in order to describe their professional culture. Specifically, the goals of this study included the documentation of network structures and individual and collective beliefs, the identification of patterns and differences in network structures and beliefs across pre-k schools, and the analysis of the interrelationship between formal structures and informal networks in the schools. Quantitative pictures of the professional cultures with examples from each school address four central questions:

1. What are the characteristics of the collaborations and mentorship networks among the professional community of educators in three pre-kindergarten centers?
2. To what extent does the informal network structure align with formal structures within the pre-kindergarten schools?
3. What do the individual and collective beliefs of the professional community of educators suggest about the professional culture within each of the pre-kindergarten centers?
4. How are the professional cultures of each pre-kindergarten school similar or different and how is understanding those similarities or differences enhanced by interviews with individuals at each school?

CHAPTER 3

RESEARCH DESIGN AND PROCEDURES

Research Sites

This study took place in three pre-kindergarten early learning centers in a medium-sized city in the Southern United States. These centers were opened in the fall of 2014 by the school district as part of a local initiative intended to expand access to high quality pre-kindergarten classrooms within the community. They are administered under the auspices of the school system.

The proposal to expand pre-k in the district was announced in January of 2014, and these pre-kindergarten-only schools were the first phase of the plan (Garrison, 2014c). The plan involved the opening of 27 pre-k classrooms in three centers for the 2014-2015 school year, paid for through local public funding. The next phase was intended to expand pre-kindergarten at additional sites through 2018, with the original classrooms and teachers serving as models for innovation to build knowledge about best practices that could then be applied to additional classrooms. (Garrison, 2014d).

Initially, two elementary school sites were recommended for conversion to pre-kindergarten centers. Each school was located in a neighborhood close to low-income families and accessible through major transportation routes (Garrison, 2014c). These school sites were originally scheduled to house a total of 13 classrooms (or about 260 students), but were later expanded to 23 classrooms (about 460 students). Still later in the planning process, a third pre-kindergarten site was added (Garrison, 2014a). This school was built in vacant space in a community center established by a group of local non-profits that support immigrants and

refugees in the community (Garrison, 2014b). This new school could house four additional classrooms, or about 80 additional students.

The budget request allocating funds for the pre-kindergarten centers was approved in April of 2014, with the final budget approved in late May, less than three months before their scheduled opening (Metro Nashville Public Schools, 2014b). Between April and August of 2014 each of the existing site's facilities had to be updated to serve the needs of 4-year-old students, including renovations to the restrooms and water fountains. The third school had to be completely constructed before students could attend.

Also in this brief period, school administrators, teachers, assistants, and staff were hired. The focus was on hiring individuals with experience in early childhood education settings who could help launch successful model pre-kindergarten schools (Metro Nashville Public Schools, 2014a). When the school directors were hired, two of the three did not have public school administrative credentials, but rather experience leading community-based early childhood education programs.

The instructional program was developed in a short period of time as well. The pre-kindergarten schools intended to focus on building students' skills in literacy, math, and the arts, as well as their social-emotional skills (Johnston, 2014). In order to begin classes in August, materials and resources were selected and ordered to support the chosen curriculum, *Creative Curriculum* (Dodge et. al, 2016). All of the materials had to be organized and placed in classrooms as they arrived. A detailed timeline for the opening of the pre-kindergarten schools is provided in Table 1.

The pre-kindergarten expansion plan also envisioned the pre-kindergarten schools as innovative centers for the identification and adoption of best practices in early childhood

education, which could then serve as model schools for other pre-kindergarten teachers and classrooms in the district. To support these goals, a partnership was created between the three pre-kindergarten schools and a research team at a local university. The research team was

Table 1

*Timeline of the Development and Opening of the Pre-Kindergarten Center*s

Month	**Events**
January 2014	Superintendent proposed plan to expand pre-kindergarten starting in 2014-2015 with the opening of two new pre-k only school centers
February 2014	School board approved the pre-k center plan
March 2014	Third pre-k center added to expansion plan
April 2014	Pre-kindergarten registration began Budget for 2014-15 school year, including pre-k centers, approved
May 2014	Director hired to oversee all three pre-k centers Partnership with research institute at local university announced
June /July 2014	Pre-k school directors hired Pre-k teachers, assistants, and staff hired
August 2014	Pre-k centers open for the school year New school not yet finished so students start school at larger of the two updated schools
September 2014	First round of student assessments by research team
October 2014	Third pre-k school completed and opened

contracted to assess students individually twice a year as well as to conduct classroom observations (Contract 2-218740-19 Annex 57 Attachment A). The data collected by the research team were then supposed to be used in individual classrooms to develop high quality instructional practices to increase student learning; these data were to be used within and across the schools to identify strengths and common goals for improvement.

As a result of the partnership with the research institute, the instructional coaches and teachers in the three pre-kindergarten centers were provided with detailed descriptive data about child behaviors and teacher practices in the classroom, with the expectation that these data would be used to set goals and to support changes in practices. The emphasis on data use is atypical for schools in general and pre-kindergarten in particular, but presumed to be critical to this initiative to develop a high quality model pre-kindergarten program.

The quick pace of the initiative to open the pre-kindergarten centers, the complex nature of starting three new schools simultaneously, and the intensive partnership with researchers all led to some uncertainty as the schools were opened. The environment for the staff at the three schools was somewhat unsettled as everyone worked to launch the new initiative together. For example, classroom and instructional materials continued to arrive and be organized in July and August as teachers were preparing for and meeting their students. At the time of this study, the pre-kindergarten centers had been operating for nearly two years, and the daily work of running pre-kindergarten classrooms had stabilized, making it an opportune time to study the professional culture among the staff at the three schools.

It is important to note, however, that at the start of the second year there was turnover at all three pre-kindergarten centers. Two of the directors left: one was promoted and one moved out of state and had to be replaced. The replacements were appointed either right at the start of

school or, for one of them, after school had been in session for more than a month. The smallest center had no teacher turnover – all four of its teachers and educational assistants returned though it did have turnover in its director. One of the centers lost 5 of its 10 teachers – some moved to other schools and several were promoted to be coaches and were no longer in the classroom. The last, largest center, replaced 3 of its 13 teachers. Thus, during the second year, when this research was being conducted, the three centers were staffed with both experienced and inexperienced directors, coaches and teachers.

Research Participants

There were 27 pre-kindergarten classrooms across the three schools, including several blended classrooms and one self-contained classroom serving children with significant special needs. This study included all of the teachers and educational assistants in the 27 classrooms, plus school directors, instructional coaches, and additional exceptional education teachers and assistants who supported students in blended or mainstream classrooms for a total of 75 participants. In this group, 73 individuals were female (97.3%). The numbers of staff at each school, by position, are shown in Table 2. To protect the confidentiality of the participating school sites, each is identified with a letter.

Table 3 displays descriptive information about the participants in the sample who completed the electronic survey and for whom all data are available. The validity threshold for participation in social network analysis is often considered to be between 80 and 85% of the network (Costenbader & Valente, 2003; Penuel, et al., 2010). Overall, the participation rate was above that threshold, as was participation at individual Schools A and B. School C had a slightly lower response rate, with assistants who did not respond.

Table 3 also indicates the modal age range, mean years of experience, and range of experience overall and at each of the three schools. The mean years of experience at Schools B and C (the larger schools) was nearly six years greater than at School A, however this difference was not statistically significant. This difference aligns with the modal age range for the staff, which is younger at School A than Schools B and C.

Study Design

This study was an exploratory case study (Yin, 2009) of three pre-kindergarten schools. In this design, quantitative data were collected first and then a second qualitative phase of data collection followed. The first phase of data collection consisted of an extensive social network and beliefs survey of teachers and other instructional staff in the pre-kindergarten centers while the second phase consisted of face-to-face interviews of select personnel. Volunteer participants were interviewed following the completion of the surveys.

Table 2

Study Population by Position and School

	School A (n= 11)	School B (n=36)	School C (n=28)	Total (N=75)
Directors	1	1	1	3
Coaches	1	4	3	8
Teachers	5	15	12	32
Educational Assistants	4	16	12	32

Table 3

Descriptive Information About Response Rates and Study Participants

	All Schools	School A	School B	School C
Possible Responses	75	11	36	28
Number of Responses	68	11	34	23
Response Rate (%)				
All	90.67	100.00	94.44	82.14
Leaders	100.00	100.00	100.00	100.00
Teachers	90.63	100.00	93.33	83.33
Assistants	87.50	100.00	93.75	75.00
Modal age range (%)	25-34 (44%)	25-34 (91%)	35-44 (41%)	25-34 (39%)
Mean years of experience	11.73	6.36	13.06	12.33
Range years of experience	1-42	1-22	1-42	1-31

Measures

Professional Culture Survey (Phase I)

Teacher reports about their relationships and beliefs were collected using a researcher-created electronic survey administered to all participants in the spring of 2016. In addition to questions about the participants' social networks, the staff survey included additional items related to teachers' beliefs or perceptions about a number of topics. These scales were based on existing scales from the literature, but were adapted for the early childhood context and put on 7-

point scales to equate the response system for participants across different sections of the survey. A complete paper and pencil version of the survey is included in Appendices A through H. The sections of the survey and their origins are described below.

Demographics. Participants self-reported their age, current position, years of experience as an educator, years in their current position, and years at their current school at the beginning of the survey (Appendix A).

Social networks. The first section of the survey was derived from existing surveys of network relationships used in studies of social networks in education (Moolenaar, Sleegers, & Daly, 2012; Penuel et al., 2009; Pitts & Spillane, 2009; Spillane &Kim, 2012). It asked participants to use roster-based matrices to rate the frequency of their interaction with all other participants across all centers with respect to two relations: collaboration and mentoring. Full rosters have been found to work better than free recall elicitation techniques with respect to social and personal networks (Brewer, 2000). For whole network studies and when networks have well-specified boundaries, the use of rosters is recommended, as they allow participants to recognize individuals rather than remember them (Marsden, 2005).

No limits (minimum or maximum) were placed on the number of ties that any individual could report using the full roster method, in order to encourage participants to report any and all ties. Each individual was asked to report about their collaboration and mentoring relationships with individuals in all three of the early learning centers. For this study, collaboration was defined as sharing ideas, resources, and planning work together. Finally, mentoring was defined as seeking trusted advice, feedback and support for work. The frequency of relationship was marked for each individual, ranging from "never" to "daily." See Appendix B for social network directions and items.

Self-efficacy. To measure teacher and staff self-efficacy, an adapted version of the short form of the Teacher Sense of Efficacy Scale (TSES; Tschannen-Moran & Woolfolk Hoy, 2001) was used. This and all other scales were also placed on a scale from 1-7 in order to align the multiple scales for ease of use by participants. Prior work on the TSES has identified three factors: efficacy in student engagement, efficacy in instructional strategies, and efficacy in classroom management. Reliability has been established for this measure in elementary schools (Cronbach's alpha =.90). A few items have been adapted to be relevant to the pre-kindergarten setting of this study. [1] See Appendix C for the complete version of the scale used in this study. The reliability for the adapted scale used in this study was sufficient to use it as a single scale (α=.94). Moreover, exploratory factor analyses indicated no evidence of the separate factors as seen in elementary school contexts.

Collective efficacy. The collective efficacy scale (Appendix D) was adapted from the 12-item Collective Teacher Beliefs scale designed by Tschannen-Moran and Barr (2004). Factor analysis of this scale has identified two six-item subscales: collective efficacy in instructional strategies and collective efficacy in student discipline. Reliability for the original version of the scale was established in middle schools, with a Cronbach's alpha of .97. The wording of a few items within each of the subscales was modified to be appropriate for pre-kindergarten teachers and staff. In addition, two of the items from the student discipline scale were removed because they were not relevant to the pre-kindergarten context. The internal reliability for the modified form of the scale used in this study was high (α=.95).

[1] For example, the item that reads "How much can you use a variety of assessment strategies?" on the original scale was changed to ask "How well can you support students with a variety of learning styles?

Autonomy. The autonomy scale is based on similar items measured by the National Center for Educational Statistics (NCES) in their annual Schools and Staffing Survey (NCES, 2011, p. 35). The items on this scale fall into two categories. The first six items focus on the autonomy within the classroom, including selecting materials and teaching strategies and determining the role of teachers and assistants. Teachers and assistants completed the first part of the scale in reference to their *own* classroom, while coaches and directors were asked about their autonomy in classrooms throughout the school. The second six items focus on overall autonomy within the school, and were completed by everyone using the same directions. These items include autonomy with respect to establishing curricula, determining the content of professional development programs, and evaluating and hiring new teachers. The reliability coefficient (Cronbach's alpha) for the set of 12 items in this sample was .92. The complete set of autonomy items is available in Appendix E.

Trust. The trust scale used was derived from the Faculty Trust in Colleagues subscale of the Comprehensive Teacher Trust Scale developed by Hoy and Tschannen-Moran (2003). Reliability and validity have been established in elementary, middle and high schools. The reliability coefficient (Cronbach's alpha) for the eight items on the Faculty Trust in Colleagues scale was .93 (Hoy& Tschannen-Moran, 2003). Items on this scale have been adapted for pre-kindergarten to focus on teachers and assistants, as well as the trust between them. In addition, two items were duplicated to report separately for teachers and assistants, for a total of 10 items. The reliability coefficient for the teacher and assistant focused version of the scale was .94. Appendix F contains the complete adapted version of the trust scale.

Coaching. The researcher-created coaching scale consisted of nine items that asked individuals to report on the coaches' activities and support for teachers and other staff. Items for

the coaching scale were adapted from similar items on the Kansas Coaching Project's Coaching Survey (Center for Research on Learning, 2008). Participants indicated the extent to which they agree with statements, from strongly disagree to strongly agree including: *The coaches have a deep understanding of the instructional practices they share* and *The coaches' activities focus on supporting teachers' implementation of practices* (see Appendix G for the entire scale). Reliability within this sample was .93

Leadership. The researcher-created leadership scale was made up of eight items that asked staff members to rate the leadership team at their school. Items for this section were derived from similar items from a number of sources, including the Tennessee Teacher Perception Survey (Tennessee Department of Education, n.d.). While the existing school leadership items focus on the school principal, the items were adapted to include the pre-kindergarten school directors (principals), as well as multi-classroom leaders/coaches in the schools. Reliability for this scale was .94 for this study. The complete scale is available in Appendix H.

Interviews (Phase II)

Semi-structured interviews were conducted face-to face with a subsample of participants across the three sites. Interview participants included both new and experienced teachers, educational assistants, coaches, and directors. Twenty interviews were conducted, representing approximately 27% of the population. Individuals were chosen for interviews through a combination of purposeful sampling by position, the results of an initial mapping of the networks at the three schools, and availability. Interviews lasted between 30 to 73 minutes each, and were audio-recorded with the permission of participants.

Separate interview protocols were developed for each position within the ELCs. The protocols were structured similarly but the wording and order of questions within domains was adjusted based on their relevance to that group of participants. The interview protocols were divided into three major topic areas: participants' experiences at the ELCs, their professional interactions, and their data use. Grand tour and tour questions asking about participants' experiences were used to open the interview in order to build rapport and encourage participants to share their ideas (Doody & Noonan, 2013; Leech, 2002; Whiting. 2008).

As recommended by experienced qualitative researchers (Leech, 2002; Rubin & Rubin, 2012), more specific questions were asked in the middle of the interview to narrow the focus of the interview to the three major domains of interest. The questions in the middle of the interview also featured probes: other questions that the researcher interviewer could use to get additional details from the participants. Interviews also included some references back to survey responses and patterns of interactions, as a form of member checking and exploring the quantitative findings. The end of the interview once again opened up broader questions, giving participants an opportunity to reflect on their overall experience working in the Early Learning Centers, and to share any additional thoughts that they believed to be relevant.

The questions about individuals' experiences explored their beliefs about the goals and values of the centers, as well as some of the structural elements that might vary from one center to another. The questions in the professional interactions section of the interview were designed to elicit more depth about the interactions across formal roles, as well as role-specific expectations and challenges. Finally, the data use section was intended to elicit details about the processes and structures surrounding the pre-kindergarten partnership data collection, which are

not included in the analyses presented here. For the complete interview protocols, see Appendices I-L.

Interviews were conducted individually, in a semi-structured format in order to get information about the experience, professional interactions, and data use patterns of directors, multi-classroom leaders (coaches), teachers and educational assistants in the Early Learning Centers. The interviewer took limited brief notes during the interview, and asked each participant for permission to audio record the interview. The interviewer previewed participants' responses to the ELC Survey before interviewing participants, to identify patterns and responses in the network data and participants' beliefs that might be relevant.

In addition to notes taken by the interviewer during the interview session, the audio recordings of the interview were replayed and a brief summary memo written within 72 hours of each interview session to identify important themes and suggest potential interesting threads for future interviews and member checking. Interviews were completely transcribed and uploaded to digital format for coding and analysis.

Data Analysis

The first goal of data analysis was to examine and characterize the structure of the social networks within and across the pre-kindergarten centers. Then, the alignment between the formal structure of the schools and the informal structures of the social network was investigated. Next, the individual and collective beliefs of the educators at the three pre-kindergarten schools were explored. Then the belief scales were combined into composite factors that could be used as indexes of professional culture at the schools. Finally, the interviews from Phase II of data collection were used to illustrate the quantitative picture of professional culture at each of the three pre-kindergarten schools.

Research Question 1: What are the characteristics of the collaboration and mentorship networks among the professional community of educators in pre-kindergarten centers*?*

This research question explores the structures and characteristics of the collaboration and mentorship networks in the pre-kindergarten centers, as reported by teachers, educational assistants, coaches, and directors.

Descriptive information about the networks was prepared using IBM SPSS Statistics Version 23 and UCINET software (Borgatti, Everett, & Freeman, 2002). SPSS offers a wide range of options for data organization and statistical techniques, while UCINET allows for the visualization of network maps and the ability to calculate network measures as well as measures of individuals' positions within networks. In order to analyze the data in UCINET, survey responses must be organized into matrices for each relational network, with the same number of rows and columns as members of the network, with the cells filled with a numerical indicator of the frequency of the relationship (called a 1-mode network). For the collaboration and mentoring networks, the matrices indicated the frequency of the relationship between each possible pair of individuals in the sample with a numerical value.

Matrices that included all participants across the three sites were created for the collaboration and mentoring relationships. Demographic data and information such as classroom assignment collected in school rosters were also input into network attribute files and connected by participant ID, and then used in network maps and analyses.

Next, the relations were mapped and visualized using NetDraw, the mapping program included in UCINET (Borgatti et al., 2002). This allowed for initial review and impressions of the network structures. Each network was individually mapped at each of the three centers. For all of the visualizations, attributes such as formal position, age, years of experience, and location

in building were used to enhance the graphs and inform future explorations of the network characteristics. Attributes were used to highlight certain information in the maps and add to the description of patterns within the maps. For example, individuals (represented as nodes on the maps) were given different shapes based on their formal position, to explore the extent to which interactions occur within and across groups.

In addition, correlations were run to assess the associations between the relational matrices for the collaboration and mentoring networks. To correlate all the matrices, the non-parametric quadratic assignment procedure (QAP) correlation method was used. QAP correlation procedures were necessary because the relations were embedded within the same network of individuals. The ties in the multiple networks come from the same individuals and were thus not independent. In a case like this one, Pearson correlations will underestimate the standard errors, thus calculating incorrect correlation coefficients (van Duijn & Huisman, 2011). QAP correlation first calculates the Pearson correlation coefficient for each cell in the matrix, then randomly permutes the rows and columns hundreds of times, and generates a new correlation coefficient each time.

Finally, the proportion (between zero and 1) of the randomly generated coefficients that are larger than the original coefficient is used to determine if the relationship is due to chance. If the proportion is low (less than .05), then the relationship is considered unlikely to have occurred by chance (Borgatti, et al., 2013). While it was anticipated that the networks within a school were correlated, the size of the correlations provided insight into the extent to which the two types of relations (collaboration and mentoring) were measuring unique interactions among network members. Correlations between the two types of networks that were high (generally if r=.60 or higher) suggest a strong association between the two types of relationships and are

evidence that the two types of interactions may not be distinct for members of the network (Daly et al., 2010).

To explore the qualities of the networks, whole network-level measures of the size, cohesion, shape, clustering and homophily of the network were calculated for each of the relational networks at each of the schools, a total of six networks, and are described below.

The first characteristic described for each of the networks was *size*. Size was calculated as the number of participants in the relational network, including both survey respondents and non-respondents (Carolan, 2014). Another important description of size is the number of possible ties, or connections to other individuals. Since there was no limit on the number of choices a respondent could make, the number of possible ties is calculated as the number of network members minus 1, as no relationship to the self is counted (Carolan, 2014).

*Cohesio**n*** is the connectedness of the network, and was assessed using *density*. Density is the ratio of existing ties in a network to the number of possible ties. It is interpreted as the likelihood that any two individuals in that network are connected. Another measure of cohesion within the network is *average degree*. *Degree* refers to the number of ties for an individual (either those they report (termed "out-degree") or those reported by others (termed "in-degree"). *Average degree* refers to the average number of connections for each person in the network. Average degree is calculated as the total number of ties in the network divided by the total number of members in the network. Average degree can be interpreted as the average number of connections per individual in the network, and provides another look at the cohesion of the network, similar to density. Finally, *dyad reciprocity* measures the extent to which ties from individual X to individual Y are also indicated from individual Y to individual X. Reciprocity

therefore represents the proportion of mutually reported connections, which are often considered to require trust and time to develop (Daly& Finnigan, 2012).

To evaluate the clustering of ties within the networks, I examined the extent to which individuals are connected to others who share the same formal position (*homophily*). At the pre-kindergarten schools, homophily describes the extent to which an individual is connected to others who do or do not share the same role or position in the formal organization (e.g. teacher, educational assistant). Homophily in the networks was calculated using formal role or position to define group participation. The score is calculated by subtracting the sum of the strength of ties within the formal role group (internal) from the sum of the strength of external (outside the formal role group) ties and dividing by the total number of ties. The scores range from -1, which indicates interactions occurred only with others from the same formal role group (*perfect homophily*) to +1, which indicates that interactions occurred only with others of different formal role groups (*perfect heterophily*).

Another measure of clustering within networks that I used to examine the network structures was *transitivity*. Transitivity measures the extent to which small clusters are formed as mutually connected triads within the network. A triad is considered transitive if individuals X, Y, and Z are all connected one other. A highly transitive network has the potential to be divided into many small clusters and those clusters could then be spread far apart from one another, if there are few connections to others in the network. However, many social networks have a high level of transitivity, as when all of the other connections exist, it is natural for the final connection among three individuals to be made (Carolan, 2014).

Core-periphery analysis analyzes the shape of the network by comparing the network organizational structure to an ideal core-periphery shape, in which individuals in the core group

are connected to one another and to individuals in the periphery, while individuals in the periphery are only connected to individuals in the core. A core-periphery analysis can be done using discrete classes for core and periphery groups; however, a continuous model is usually more reflective of the structure of networks, and was used in this study. The resulting indicator, *coreness*, describes the extent to which an individual is part of a centralized core group, on a scale from 0 (periphery) to 1 (core). Average coreness for the network is calculated by obtaining a coreness score for each individual in the network, and averaging it to get the *average coreness* of the network to get an indicator of the fit between the network and the perfect discrete core-periphery structure, which has a completely connected core group of individuals, and a periphery made up of individuals connected only to the core, and not to one another (Borgatti et al., 2013).

Finally, I used network analysis to identify cohesive subgroups within the networks at each of the pre-kindergarten centers. Subgroups may be important in educational settings because individuals are often assigned to work in groups such as subject area or grade level teams. In the pre-kindergarten centers, those teams do not exist, but the schools are potentially organized into classroom-based teaching teams and there could also be grouping based on position, so that teachers interact primarily with other teachers and assistants interact with other assistants. Conducting subgroup analysis is one way to examine the patterns of interactions, particularly among teachers and assistants. Subgroups can also be triangulated with attribute information such as location in the building to describe how the subgroups are organized.

There are many methods for identifying subgroups, either starting from the larger structure to identify component parts, or starting from dyads and moving to larger cohesive groups. For this study, I started from the large structure of the network to identify *cliques* within the network in which each person is connected to every other person. Not every individual in a

network must be part of a clique, and it is possible for a single individual to be a member of multiple cliques. However, the clique analysis does provide an indicator of subgroups within the network that are densely connected. In order to reduce the number of possible cliques in each network; for these analyses, cliques must include a minimum of three individuals. In addition, a clique co-membership matrix was created after the clique analysis to illustrate the frequency of clique co-membership within the network, Hierarchical clustering was then applied to that matrix to provide additional information about the formation of the cliques.

The measures described above are commonly used to describe the qualities or characteristics of networks (Borgatti et al., 2013; Carolan, 2014; Wasserman & Faust, 1994). While there are many options for calculating the cohesion, clustering, homophily by formal role, and shape of networks, the measures above were chosen for their applicability to network data where individuals rated the frequency of interaction with others (*valued* ties) and in which some relationships are not assumed to be bidirectional, such as seeking mentorship (*directed* ties). Together these measures provide a comprehensive picture of the overall network structure (Carolan, 2014).

Research Question 2: To what extent do the informal network structures align with formal structures within the pre-kindergarten schools?

This research question explores the alignment between the formal structure and the informal structure of the pre-kindergarten schools. The formal structure is represented by the formal roles assigned to individuals and the roles and responsibilities. In each of the three pre-kindergarten schools, school directors and coaches were the leaders with the most power in the formal structure, followed by teachers and then assistants. In the informal network structure, individuals with greater centrality are often considered to have the most power, as they are the

ones connected to the most others. To assess the centrality in the collaboration and mentorship networks, normalized forms of in-degree (number of ties reported to that person), out-degree (number of ties reported by that person) and betweenness (extent to which the individual lies between others on a path to connect them) were calculated for each individual in each of the networks.

To examine the alignment between formal and informal structure, the participants were first divided into groups based on their formal role (leaders, teachers, and assistants) across the three schools. Then, the average normalized centrality across the three groups was compared for both the collaboration and mentorship networks. One-way analysis of variance (ANOVA) was used to compare the means of the normalized centrality measures in each network, with Tukey's honestly significant difference (HSD) utilized for post hoc comparisons of statistical differences across the groups.

Research Question 3: What do the individual and collective beliefs of the professional community of educators suggest about the professional culture within each of the pre-kindergarten centers?

This research question explored the beliefs and perceptions of teachers, assistants, coaches, and directors in the pre-kindergarten centers with respect to efficacy, autonomy, and trust, as well as the coaching and leadership at their school sites.

To describe the beliefs at each of the schools, the raw scores for the individual items were aggregated into total scale scores for each of the teacher beliefs/perceptions measures. These aggregated scores were then combined for all of the individuals at a school site and the mean was calculated to create a school-level aggregated mean score for each of the scales. In addition to

the mean, the variance and range of the scores were calculated for each of the measures at each school.

To examine the relationships among beliefs, Pearson product moment correlation coefficients (r) were calculated to identify the direction and strength of associations among individuals' scores across the multiple belief scales across the three school sites. In addition, exploratory factor analysis was conducted to identify possible latent factors underlying the six belief scales and to examine ways to reduce the number of dimensions while representing the underlying beliefs.

Research Question 4: How are the professional cultures of each pre-kindergarten school similar or different and how is understanding those similarities or differences enhanced by interviews with individuals at each school?

The final research question brings together the quantitative results from the first three research questions to create a composite picture of the professional culture at each of the three pre-kindergarten schools.

First, the network features identified in Research Question 1 were compared across the three schools. Next the alignment between the formal structures and informal networks as seen in Research Question 2 were added. Then, the beliefs of each school that were summarized into factors in Research Question 3 were included. As the picture of the professional culture at one school was described, it was then compared to the professional culture picture developed for each of the other two schools.

Finally, data collected in the interviews were used to illuminate the details of the professional culture at each school. After the development of the quantitatively derived picture of professional culture, the interviews conducted at each school were searched for comments and

evidence that described or illustrated the quantitative results. Transcripts and summary memos were uploaded into QSR International's NVivo 10 qualitative data analysis software for review, searching and identification of relevant comments.

CHAPTER 4

RESULTS

Research Question 1:What are the characteristics of the collaboration and mentorship networks among the professional community of educators in pre-kindergarten centers?

As these three pre-kindergarten centers are all engaged in the same enterprise, were opened at the same time and have the same mission, the collaboration and mentorship networks were first examined for the combined network including all three schools. The purpose of this investigation was to explore how closely connected the three schools were as part of the same initiative. Collaboration and mentorship networks were explored separately as they were expected to represent unique types of relationships among network members. Network maps and data were analyzed for weekly or more frequent (daily) interactions related to collaboration and mentorship, described as weekly networks going forward.

Network members included not only those who completed the survey, but all possible members of the three school networks (n=75), as respondents could select non-respondents. The number of non-respondents in this study was low; only seven individuals did not complete the survey. Figure 1 presents the network map for the combined weekly collaboration network of the three schools. In this map, there are only five collaboration connections (or ties) among the three schools -- from leaders at Schools A, B, and C, and to one teacher at School C. The remainder of the weekly collaboration ties were within each of the schools, suggesting almost no weekly collaboration across the schools, despite being part of the same program initiative and led by the same program director. All individuals within a school were connected to at least one

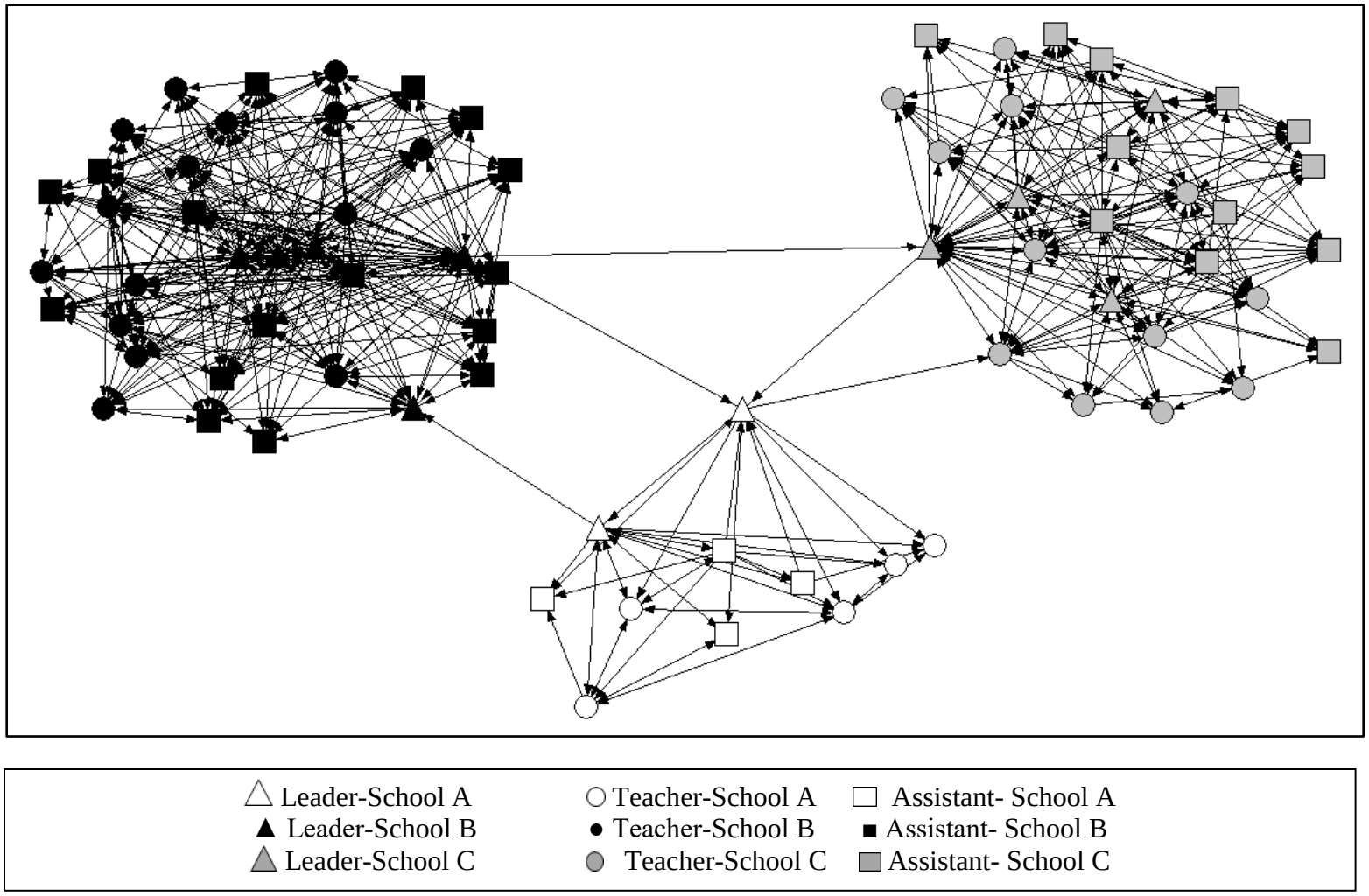

Figure 1. Map of the weekly collaboration network across the three school sites.

person at their school in the weekly collaboration network, so no individuals were isolated from the rest of the network.

Mentorship connections were asked separately from collaborations. The weekly mentorship network, seen in Figure 2, also shows weekly or more frequent (daily) mentorship connections across the three pre-kindergarten schools. This map illustrates a similar pattern to the weekly collaboration network across the three schools. In the mentoring network, School A and School C were connected through a small number of ties among teachers and leaders at each of the schools. No assistants across the two schools were connected, and neither school was connected to School B on a weekly basis. This map also shows a single isolated individual. In this network, there was a single assistant at School C with no weekly or more frequent mentorship connections. It is important to note that this individual was not a non-respondent. Rather, they reported relationships, but they occurred only monthly or less often, and are not shown in this map.

After examining the relations among the three schools as a combined single network, it was clear that most of the regular interaction happened within the three schools, rather than across them. All future network analyses were conducted in parallel for each of the three school sites, including visual maps of the networks. Similarities and differences in networks across the three schools were examined as they might reflect different professional cultures within each school.

Network Maps

The first analyses conducted at the school level were the visualizations of the maps for the weekly collaboration and weekly mentorship networks. Figure 3 shows the weekly collaboration network and weekly mentorship networks at School A, the smallest of the schools.

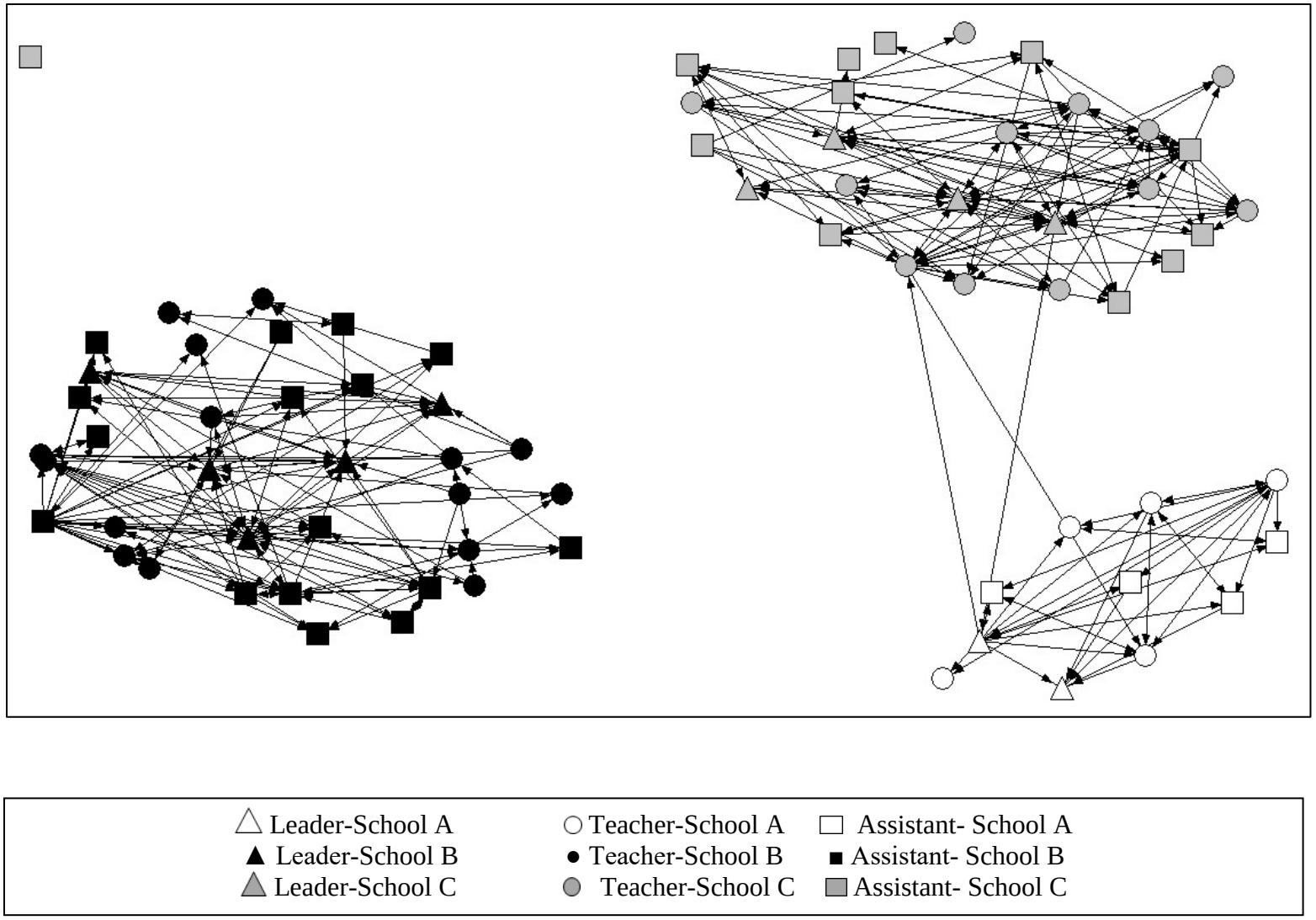

Figure 2. Map of the weekly mentoring network across the three school sites.

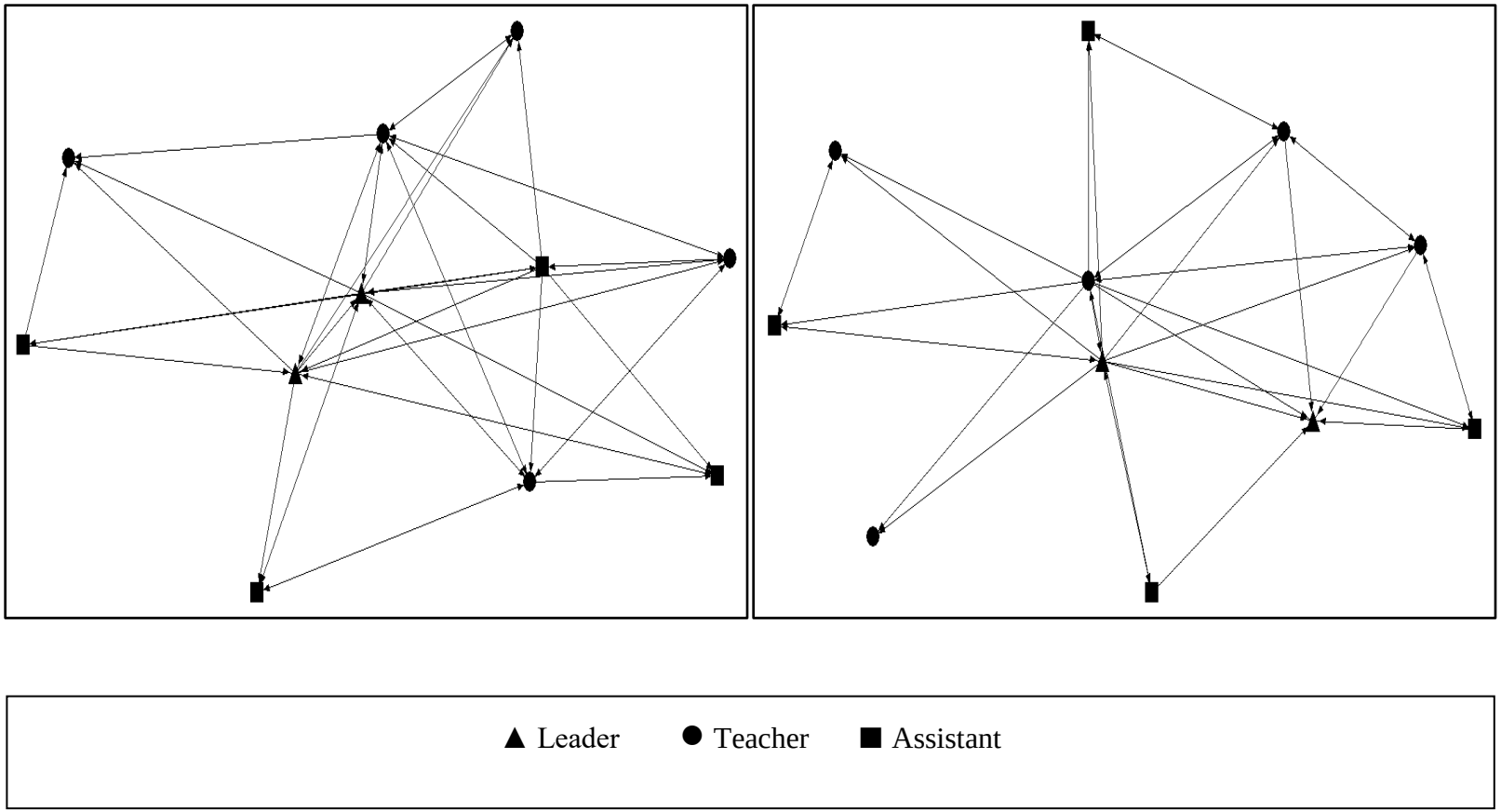

Figure 3. Maps of the weekly collaboration (left) and weekly mentorship (right) networks at School A.

In the weekly collaboration network, there was a single leader who was at the center of the map connecting several small groups of individuals. Several teachers and an assistant also seemed to have many ties to others in the weekly collaboration network. In the weekly mentorship map, a teacher and leader were at the center of the map, with many incoming connections. This suggests that they may be connected to others who are not connected to each other. Note that in this map, all four of the assistants are on the edges of the map. The map of the mentorship network at School A had fewer connections overall than the map of weekly collaboration at School A.

The weekly collaboration map for the larger School B (left side of Figure 4) shows an extensively connected network, with no isolated individuals. The leaders at School B appear to be clustered primarily in the center of the map, suggesting many connections among themselves and to teachers and assistants. The arrows on the weekly collaboration map at School B indicate many mutual, or reciprocated ties among assistants, leaders and teachers. The mentorship network at School B, shown on the right in Figure 4, shows fewer connections than the collaboration network. In addition, many of the lines have arrows pointing in a single direction. This indicates that the mentorship ties are less often reciprocated. At the center of the mentorship network at School B, there are several leaders, with both teachers and assistants adjacent and connected to the leaders. Along the left edge of the map, several pairs of connected teachers and assistants can be seen. The arrows among these pairs almost always point from assistant to teacher, indicating that the assistant considers the teacher a mentor, but the teacher does not consider the assistant a mentor.

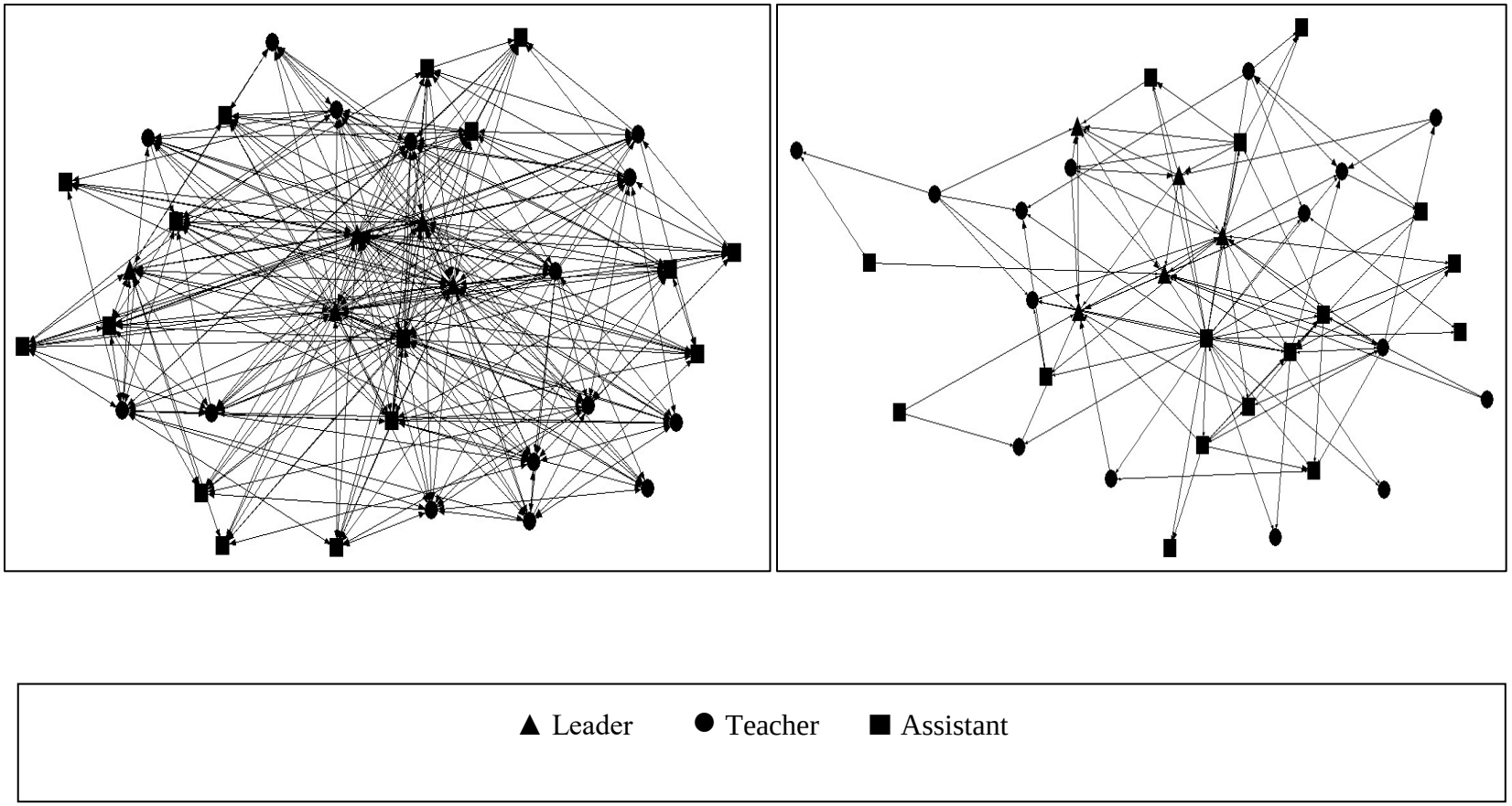

Figure 4. Maps of the weekly collaboration (left) and weekly mentoring (right) networks at School B.

The weekly collaboration network for School C can be seen on the left in Figure 5. In this map of weekly and more frequent collaborations, there is an assistant and a leader at the center of the graph, with other leaders and assistants adjacent and connected to them. Teachers are not as close to the center of the graph as they are in School B. The weekly mentorship map (on the right in Figure 5) shows that as with both other schools, the mentorship network at School C was less dense than the collaboration network at School C. Towards the middle of the mentorship map shown on Figure 5, there is an assistant, with other assistants, leaders, and teachers adjacent and connected to them. Towards the bottom of the map, three assistants can be seen with several mentorship ties reported to them; assistants were chosen as mentors more often in School C than in School B. The isolated individual at the top left of the weekly mentorship map for School C also indicates that not everyone either was either sought or acted as a mentor on a weekly basis.

Network Correlations

To assess the similarity in the collaboration and mentorship networks at a single school, and determine the uniqueness of the relationships mapped in each network, correlations were conducted between the two network types at each of the three schools. Generally, a strong correlation ($r \geq .60$) is considered to be evidence that the networks were measuring the same relationships among individuals, and that the networks should be combined into a single relational network (Daly et al., 2010). If the networks are not strongly correlated, then it is considered appropriate to treat them as separate relationships among individuals in the network. (Daly et al., 2010). At School A, the correlation between the collaboration and mentorship network matrices was .48 which indicates that the collaboration and mentorship relationships are distinct, and should be treated as separate networks at School A. The correlation between the collaboration and mentorship networks at School B was .39, suggesting related but distinct

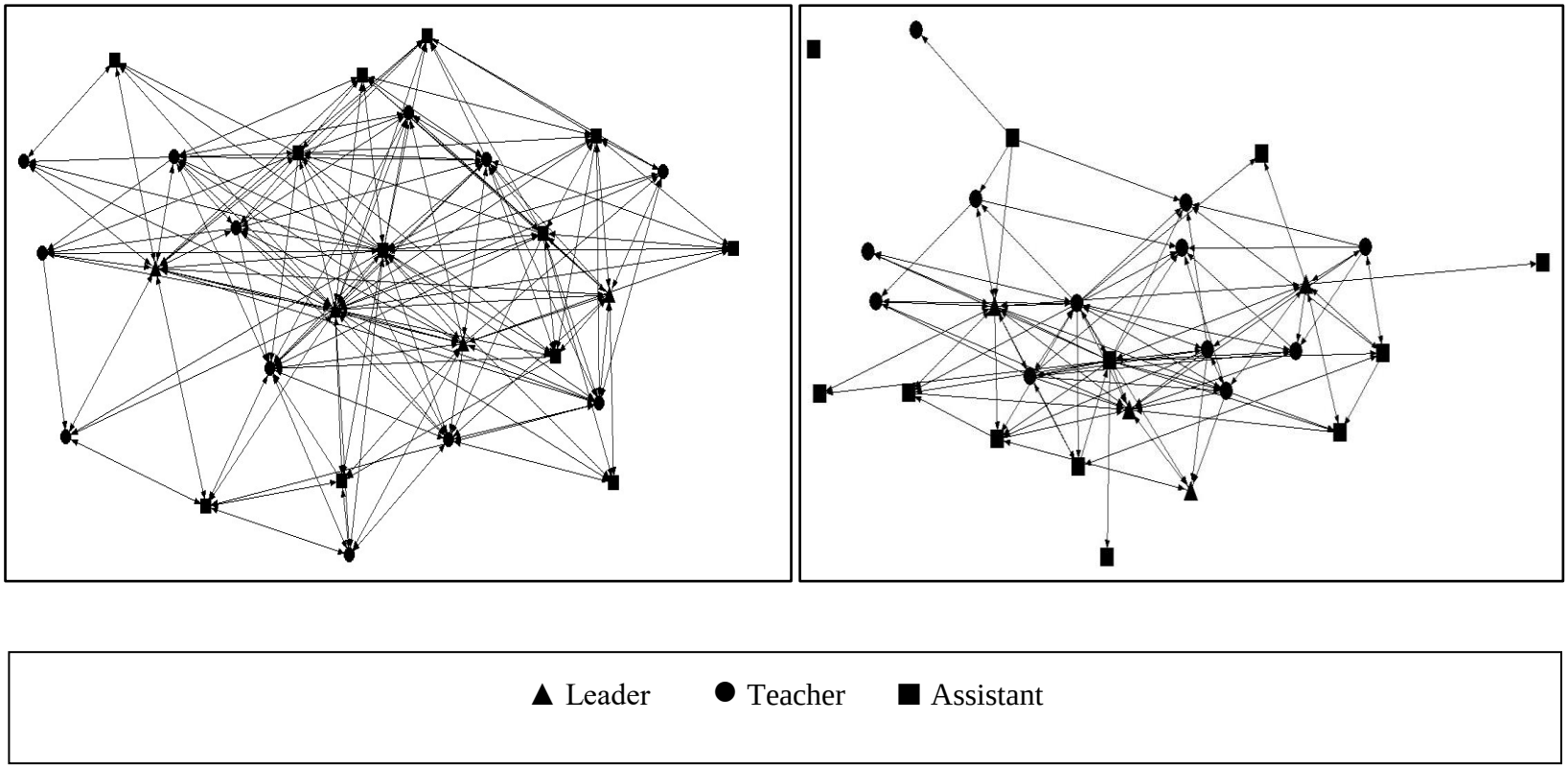

Figure 5. Maps of the weekly collaboration (left) and weekly mentoring (right) networks at School C.

relational networks. Similarly, at School C the correlation between the two networks was .43. These correlations at Schools B and C were moderate, and below the .60 threshold used most often to suggest combining networks (Daly et al., 2010). Based on these correlations, the networks of collaboration and mentorship at all three schools were kept as distinct relationships and the networks were analyzed separately on all measures.

Network Cohesion and Shape

Table 4 shows the characteristics of the collaboration and mentorship networks at Schools A, B and C. The size of the networks indicates the total number of individuals in the network, including survey non-respondents.

At School A, the average degree and density were moderate in the weekly collaboration network. Out of 10 possible connections in each network for each person, individuals had an average of 4.09 connections indicating a density of 41%., which is moderate to high compared to other educator networks. Reciprocity of connections was also moderate, with 41% of ties reported by both individuals in the weekly collaboration network. Analyses of the structure of the weekly collaboration network at School A indicated a weak to moderate core-periphery shape, with an average coreness of .24, suggesting that there was not a single strong core of individuals in the collaboration network at School A, though six individuals were possible core members. The transitivity at School A was above .5 in both the collaboration network, indicating moderate to strong clustering in triads, as is typical of social networks. The homophily was .38 on a scale from -1 (homophily) to +1 (heterophily) in the collaboration network at School A, suggesting considerable collaboration both within and across formal role groups.

Table 4

Characteristics of the Weekly Collaboration and Mentorship Networks by School

	School A		School B		School C	
	Weekly Collaboration	Weekly Mentoring	Weekly Collaboration	Weekly Mentoring	Weekly Collaboration	Weekly Mentoring
Size	11	11	36	36	28	28
Cohesion						
Average Degree	4.09	3.27	11.00	3.78	9.04	4.36
Density	.41	.33	.31	.10	.34	.16
Dyad Reciprocity	.41	.33	.41	.24	.63	.32
Shape						
Average Coreness	.24	.20	.13	.10	.16	.12
Correlation with Ideal	.47	.41	.43	.34	.45	.44
Recommended Core	6	2	9	6	12	7
Clustering						
Transitivity	.55	.63	.53	.57	.52	.74
Homophily by position	.38	.22	.14	.21	.34	.25

The weekly mentorship network at School A was slightly less dense (33%), and had slightly less reciprocity among ties (33%), as seen in the network map. The mentorship map had a weaker core-periphery structure than the collaboration network, but still had 6 members possibly serving in weaker core. In terms of clustering, the transitivity was higher in the mentorship network, indicating that individuals were more often connected in small clusters with their mentor's reported mentors. The homophily score was smaller (closer to -1) in the mentoring network, indicating that there was slightly less interaction across role groups in the mentorship network than in the collaboration network.

Overall, the two networks at School A seemed to be similar to other educational networks with moderate connections in both weekly collaboration and weekly mentorship. Neither network showed strong evidence of a core-periphery structure, which indicates that information and resources may move more easily across the more diffuse networks, and no group of individuals is central in both of the informal networks. In both networks, there was some cross-group interaction indicating relationships across formal role groups.

Given its larger size, as might be expected, School B had less dense networks overall than School A. Similar to School A though, School B also had a considerably less dense weekly mentorship network than weekly collaboration network. The average density of the collaboration network at School B was 31% (11 ties out of 35 possible ties) while the density of the mentorship network was 10 % (average of 3.78 out of 35 possible mentorship ties). Reciprocity was also considerably lower in the mentorship network than the collaboration network. At School B, 41 % of ties were reciprocated in the weekly collaboration network and 24% of ties in the weekly mentorship network were reciprocated. This difference is important in that mentoring ties are reporting whom the individual sought mentoring from, and it was

uncommon for an individual to seek mentorship from someone who also considered them a mentor. This suggests a possible hierarchy within the mentoring network, with more experienced and/or knowledgeable individuals having more ties from others (in-degree) than ties that they report to others (out-degree).

School B showed little evidence of a core-periphery structure in either the collaboration or mentorship networks. The average coreness in the two networks was .13 (collaboration) and .10 (mentorship). Together, these indicate a weak to moderate core in both of the networks, and no one group of individuals being central in the networks. Transitivity was high in both of the School B networks, (.53 in collaboration network,.57 in mentorship network), showing the high levels of clustering into triads often seen in social networks (Newman & Park, 2003). Homophily, the indicator of interaction across role groups, was .14 in the collaboration network and .21 in the mentorship network at School B. These scores suggested that individuals were less inclusive than educators at School A, though there was both collaboration and mentorship across formal role groups to some extent. School B was the only school where there was less homophily in the mentorship network than the collaboration network, suggesting that it was more common for individuals to seek a mentor who did not share their same formal role than it was to collaborate with others outside of their formal role group.

Finally, at School C, in the weekly collaboration network, the average number of ties (degree) was nearly twice as high as it was in the weekly mentorship network. The density was almost double in the collaboration network what it was in the mentorship network. Individuals collaborated with many more people than they sought as mentors at School C. The percent of reciprocal ties was almost double in the collaboration network what it was in the mentorship

network. This pattern shows more collaboration connections were mutual than mentorship connections.

As in School B, there was little evidence of a core periphery structure overall in either network of School C. Transitivity was also strong in the two networks at School C (.52 in collaboration and .74 in mentorship), with stronger clustering into triads in the mentorship network at School C than at either of the other two schools. Homophily scores were larger at School C than School B indicating that there were more connections across formal role groups at School C than School B in both the weekly collaboration and weekly mentorship networks, possibly due to increased interactions with assistants at School C.

Network Subgroups

Although subgroup analyses were completed for each of the three schools, no cohesive subgroups were identified at any of the three schools. At School A, the small network and dense connections lead to only a single clique within the collaboration network, therefore making the clique and network identical. In the mentorship network, 4 cliques were identified. However, each clique contained 8 of 11 members of the networks, and they overlapped significantly, with only 1 or 2 members different. No individual was completely isolated from the cliques.

At Schools B and C, large numbers of overlapping cliques were identified in both the collaboration and mentorship networks. However, while further analysis of the hierarchical clustering matrix of these cliques was conducted, this analysis indicated no meaningful structure or patterns to the cliques at Schools B or C.

Research Question 1 Summary

In sum, Research Question 1 examined the network characteristics across and within each of the three pre-kindergarten schools. The network maps that included all three schools

indicated there was little interaction across the three schools in terms of weekly collaboration or weekly mentorship. The few connections that existed were derived from collaboration among leaders and one teacher, and mentorship among leaders and teachers across the three schools. Since the cross-site networks were very sparse, all additional analyses were conducted within each site.

At each of the three schools, the collaboration network was denser than the mentorship network, though the difference was more pronounced at Schools B and C. In addition, the networks at School C were also slightly denser than those at School B (collaboration – 34% at School C vs. 31% at School B; mentorship –16% at School C vs. 10% at School B).

Transitivity was high in both networks at all three school sites; each network had more than 50% transitivity. This means that individuals in the network were closely connected to one another, such that if person X collaborated with person Y, and person Y collaborated with person Z, then person X also likely collaborated with person Z. This can lead to densely connected networks, and matches the overall structure of the networks.

Finally, homophily was positive, but low in each of the school networks, meaning that individuals did not limit themselves only to interactions with others in the same formal position. Rather there was a moderate amount of interactions with individuals from different formal role groups. At Schools A and C, there were more interactions across role groups in the weekly collaboration networks than there were in the weekly mentorship network. School B was the opposite, with more cross-group interaction in the mentorship network, so that individuals were collaborating with others in the same role, but seeking mentors in other role groups (such as teachers seeking leader mentors).

None of the networks had strong evidence of a core-periphery structure, which indicates that these three networks were more diffuse. The network maps suggest that the structure of the networks was similar across the three schools. The formal role of those in the center of the weekly collaboration and weekly networks differed slightly from school to school. In particular, School B appeared to have a mix of teachers, leaders, and assistants at the center of the collaboration network, while School C had more assistants towards the center, so that teachers and leaders were interacting more with them. School C also contained the only individual who was isolated in any of the weekly collaboration and mentorship networks.

Research Question 2: To what extent do the informal network structures align with formal structures within the pre-kindergarten schools?

This question explored the extent to which the informal network structure aligned with the formal structures at the three pre-kindergarten schools. The formal structure was represented by the formal roles of the individuals within the schools, and the power assigned to them. For example, the directors and coaches (leaders) usually have more responsibilities and/or formal education than the teachers, and would form the top tier of the formal hierarchical structure. Teachers, in turn, have more education and/or responsibilities than assistants, and would form the middle tier. Assistants, with the lowest education and/or responsibilities form the lowest tier in the formal structure. The structure of the informal networks is represented by averages of individual scores of centrality, as measured by out-degree, (the number of ties reported by an individual in a given network), in-degree (the number of ties reported to an individual in that network), and betweenness, the extent to which an individual lies on a path connecting others. The network measures were normalized as proportions out of the maximum possible in order to make comparisons across schools and networks more comparable. Strong alignment between

the formal structure and informal network is seen when those in formally designated positions of authority also have positions of authority or importance in the informal networks.

The means for each of the network centrality measures are reported for collaboration and mentorship networks by position across schools in Table 5. One-way ANOVAs with Tukey's HSD post hoc comparisons indicated some differences in network centrality, where the leaders had significantly higher scores than either teachers or assistants ($p<.05$) in the weekly collaboration network across all three schools. Leaders had significantly greater centrality than teachers and assistants on all three centrality measures in the collaboration network. Teachers also had significantly greater in-degree centrality (.35) than assistants (.28) across the collaboration network across the three schools. This means that across the three schools, leaders were the most sought as collaborative partners followed by teachers.

In contrast, there was only one significant difference in centrality means by position in the mentorship network: the leaders had significantly greater in-degree centrality (.33) than either teachers or assistants (.15 and .12, respectively). Overall, these findings indicate that individuals in the formal positions of leadership (directors and coaches) also had greater centrality in the collaboration, which indicates that the formal structure does appear to align with the informal structure of this network. The greater in-degree centrality of leaders in the mentorship network also indicates an alignment with formal structure, as those being sought for mentorship were also those with formally designated positions of authority as well as higher levels of expertise.

Finally, in Table 6, the means for the network centrality measures were examined by position within each of the three schools. At School A, one-way ANOVA with Tukey's post hoc comparisons indicated only two significant differences in centrality means by position.

Assistants had significantly lower in-degree centrality in the collaboration network, and leaders had significantly higher betweenness centrality in the collaboration network. This means that at School A, assistants had fewer collaboration connections reported to them than teachers and leaders, while leaders helped to connect individuals more than teachers and assistants.

At School B, leaders had significantly higher mean scores ($p<.05$) on all three of the centrality measures within the weekly collaboration network, and on both in-degree and betweenness within the weekly mentorship network (see Table 6). This pattern matches the pattern seen in the overall comparison of centrality by position seen in Table 5. There were no significant differences between the mean centrality scores of teachers and assistants in either collaboration or mentorship.

Table 5

Network Centrality Means by Position Across All Three Schools

	Leaders Mean (SD)	Teachers Mean (SD)	Assistants Mean (SD)
Collaboration			
Out-Degree	.77 (.24)	.25 (.16)	.27 (.25)
In-Degree	.46 (.12)	.35 (.11)	.28 (.05)
Betweenness	.12 (.08)	.02 (.03)	.01 (.02)
Mentorship			
Out-Degree	.24 (.29)	.17 (.22)	.15 (.15)
In-Degree	.33 (.15)	.15 (.11)	.12 (.09)
Betweenness	.13 (.14)	.03 (.06)	.02 (.03)

Table 6

Network Centrality Means by Position and School

	School A			School B			School C		
	Leaders	Teachers	Assistants	Leaders	Teachers	Assistants	Leaders	Teachers	Assistants
Collaboration									
Out-Degree	.80 (.14)	.32 (.26)	.33 (.32)	.87 (.25)	.23 (.13)	.22 (.22)	.63 (.26)	.25 (.13)	.32 (.23)
In-Degree	.50 (.14)	.48 (.08)	.28 (.10)	.40 (.07)	.32 (.07)	.29 (.04)	.53 (.15)	.33 (.11)	.28 (.07)
Betweenness	.22 (.01)	.05 (.06)	.01 (.01)	.08 (.04)	.01 (.01)	.01 (.01)	.11 (.09)	.01 (.01)	.01 (.02)
Mentorship									
Out-Degree	.50 (.71)	.38 (.39)	.18 (.05)	.14 (.14)	.08 (.07)	.13 (.16)	.24 (.17)	.18 (.19)	.12 (.17)
In-Degree	.45 (.21)	.32 (.08)	.28 (.05)	.27 (.11)	.07 (.05)	.09 (.05)	.34 (.16)	.17 (.07)	.10 (.07)
Betweenness	.13 (.19)	.09 (.10)	.03 (.05)	.13 (.18)	.02 (.03)	.03 (.04)	.12 (.12)	.02 (.04)	.01 (.02)

Note: shaded values indicate means that are significantly different from other position means at the same school.

At School C, leaders once again had significantly higher centrality scores on all measures of centrality in the collaboration network, and on the in-degree and betweenness measures in the mentorship network (see Table 6). This indicates that at School C, as well as School B, leaders have taken the central roles in the collaboration and mentorship networks, and have power in these informal networks. In both schools, leaders and coaches have power in both the formal and informal networks. Leaders and coaches do not have a significantly greater out-degree centrality in the mentorship network at either School B or School C. This indicates that the coaches and leaders were sought out for mentorship more than teachers and assistants, but they did not seek as much mentorship from others. This is a surprising finding at School C, where some assistants appeared more central. This difference may be due to the use of average centrality to explore centrality by position. Some assistants at School C were central in the collaboration and mentorship networks, but others were not. On the other hand, the smaller number of leaders at School C all had positions of centrality in the networks.

Research Question 2 Summary

Overall, the alignment between the formal structures and informal network centrality appeared to be strong, with leaders having the highest centrality across measures in the collaboration network and the highest in-degree centrality in the mentorship network. This pattern suggests that the directors and coaches were acting as leaders in both the formal and informal structures.

Within School A, only two significant differences by position were identified: assistants had lower in-degree centrality, and leaders had greater betweenness centrality in the weekly collaboration network. This indicates that assistants were less sought out as collaboration

partners than teachers and leaders, while assistants were more often serving a role to connect two others in collaboration. No differences were identified in the mentorship network.

In both Schools B and C, leaders had significantly higher centrality on all measures across both types of networks, except for out-degree in the mentorship network, where they were no different from teachers and assistants. The similarity in patterns of centrality at Schools B and C, and the centrality of leaders in both schools, seems to be responsible for the overall pattern of centrality for leaders across the three schools in both the collaboration and mentorship networks.

Research Question 3: What do the individual and collective beliefs of the professional community of educators suggest about the professional culture within each of the pre-kindergarten centers?

Individuals' beliefs about themselves (self-efficacy, autonomy) and about others (collective efficacy, trust, coaching, and leadership) were examined at each of the three schools. The average total scores and item scores for each belief scale were calculated and summarized for each school as a first step toward constructing a picture of the professional culture within and across the centers.

Individual and Collective Beliefs

Table 7 shows the beliefs reported by all participants at the three school sites. Overall, belief scores among participants were fairly high on the scales, but no ceiling effects were observed on any of the six scales.

To examine the possibility of differences in beliefs across the three schools, interclass correlations (ICCs) were obtained for each of the six beliefs scales. Using separate null multi-level models with individuals nested in schools (Snijders & Bosker, 2012), the ICCs indicated significant variance accounted for by site differences only in the autonomy and teacher-assistant

Table 7

Individual and Collective Beliefs Across All Three Schools

Scale	Maximum Score Possible	Score Range	Mean Total Score (SD)	Mean Item Score (SD)	Interclass Correlation (ICCs)
Self-Efficacy	84	36-84	67.04 (10.57)	5.58 (0.88)	.0125
Collective Efficacy	63	23-63	51.74 (9.09)	5.75 (1.01)	.0654
Autonomy	84	13-84	46.74 (16.23)	3.89 (1.35)	.1167
Teacher-Assistant Trust	70	12-70	48.28 (13.63)	4.83 (1.36)	.3586
Coaching	63	16-63	44.69 (12.71)	4.97 (1.41)	.0000
Leadership	56	14-56	40.94 (10.82)	5.12 (1.35)	.0226

trust scales (see Table 7). Little variance in belief scores was attributable to school differences in self- or collective efficacy, coaching or leadership. Using analysis of variance (ANOVA) and Tukey's HSD post hoc comparison to explore the item means of the beliefs scale by school (in Table 8) significant differences were found in the autonomy and teacher-assistant trust scales at School B and School C. The mean autonomy item score was significantly higher at School C than at School B, and the mean teacher-assistant trust score was significantly higher at School B than at School C. It seems possible that these two types of beliefs might be related, such that trust goes down when individuals have higher autonomy, perhaps because everyone is free to make decisions and others may not trust those decisions.

Relationships Among Beliefs

Next, the associations among the six belief types were analyzed for all participants. This was done as part of the process to reduce the number of dimensions and identify more complex underlying factors. Table 9 shows the correlations among the belief scales across all three schools. Positive and significant correlations were identified among the self-efficacy, collective efficacy, and autonomy scales. In addition, positive and significant correlations were found among the leadership, coaching, and autonomy scales. The scale assessing teacher-assistant trust was not significantly correlated with any of the other belief scales; however, the trend suggests possible *negative* correlations with the scales of self-efficacy and autonomy.

Finally, to continue the examination of the relations among beliefs and to identify underlying constructs, exploratory factor analyses were conducted using the average item scores for the six beliefs scales. Using the maximum likelihood extraction method with varimax rotation, two factors were identified. The first factor was made up of the mean score for the self-efficacy, collective efficacy, and autonomy scales with factors loadings of 0.81, 0.78 and 0 .49

Table 8

Individual and Collective Beliefs by School

			School A			School B			School C	
Scale	Maximum Score Possible	Score Range	Mean Total Score (SD)	Mean Item Score	Score Range	Mean Total Score (SD)	Mean Item Score	Score Range	Mean Total Score (SD)	Mean Item Score
Self-Efficacy	84	50-72	65.73 (7.48)	5.48	36-84	65.65 (11.64)	5.46	50-84	69.74 (9.99)	5.81
Collective Efficacy	63	48-63	54.55 (5.20)	6.06	23-63	49.32 (10.39)	5.46	41-63	53.96 (7.70)	6.00
Autonomy	84	23-78	47.91 (18.34)	3.99	13-71	41.62 (15.18)	3.51	35-84	53.74 (14.55)	4.48
Teacher-Assistant Trust	70	31-70	59.36 (11.27)	5.94	12-69	50.51 (11.96)	5.04	18-65	40.13 (12.51)	4.01
Coaching	63	20-63	45.09 (15.56)	5.01	18-63	45.18 (11.63)	5.03	16-63	43.78 (13.33)	4.86
Leadership	56	14-56	36.82 (14.18)	4.60	22-56	42.94 (9.88)	5.37	16-56	39.96 (10.14)	4.99

Table 9

Correlations among Beliefs at All Three Schools

	Self-Efficacy	Collective Efficacy	Autonomy	Teacher-Assistant Trust	Coaching
Self-Efficacy					
Collective Efficacy	.62**				
Autonomy	.32**	.41**			
Teacher-Assistant Trust	-.17	.07	-.13		
Coaching	-.07	.07	.26*	.17	
Leadership	.02	.18	.32**	.23	.56**

respectively. I labeled this factor Professional Capability, and used it as one index of the professional culture at each school. The second factor included the coaching and leadership scales, with loadings of .69, and .78, respectively. This factor was labeled Leadership Team, and used as a second indicator variable of professional culture at each school. In the factor analyses, teacher-assistant trust did not load onto either factor very highly, likely due to its low correlation with the other scales, and therefore was considered separately as a third single-scale factor.

Research Question 3 Summary

In general, individuals' beliefs at the three schools were positive and similar across the three school sites and across formal positions. Significant differences were identified between schools in the autonomy and teacher-assistant trust scales only, with School B reporting higher teacher-assistant trust and School C reporting higher autonomy beliefs. Comparing beliefs by position, significant differences were found only between leaders and teachers and only on the autonomy scale.

Correlations among the beliefs scales were mostly positive, with significant correlations among the self-efficacy, collective efficacy and autonomy scales and also among the scales of autonomy, coaching, and leadership. Scores on the teacher-assistant trust scale were not significantly correlated with any of the other scales, but patterns suggested possible negative correlations with self-efficacy and autonomy.

Three variables were identified using exploratory factor analysis to index the beliefs component of professional culture. These variables were named Professional Capability, Leadership Team, and Teacher-Assistant Trust. Aggregated mean factor scores for each of the three beliefs factors were calculated for each individual and then averaged at the school level to as part of the quantitative picture of professional culture presented in Research Question 4.

Research Question 4: How are the professional cultures of each pre-kindergarten school similar or different and how is understanding those similarities or differences enhanced by interviews with individuals at each school?

The final research question focuses on indexing professional culture, both the content and the form, in three pre-kindergarten schools as well as using individual interview comments to help make sense of the quantitative models of professional culture. Quantitative indexes were developed and compared across schools. Then, the findings of these comparisons were triangulated with information from the interviews conducted with participants in order to better understand the professional culture of the schools.

Six variables were included in the quantitatively derived picture of professional culture at these three pre-kindergarten schools. Three indexes of beliefs were created through the exploratory factor analysis in Research Question 3. Factor scores for each of the factors were created at the individual level, and aggregated to an average for each factor at the school level (see Table 10). Three indexes of the network structure were also included: density (overall proportion of ties), reciprocity (proportion of ties which were reciprocated), and homophily, the measure of the interaction across formal role groups within the networks. These three indexes are network-level measures that provide an overall view of the network structure and provide insight into the formation of connections by indicating mutual and cross-group ties. Centrality, while useful as an individual level measure is not as helpful in the overall picture. The measures of core-periphery were not utilized because there was only moderate evidence of a core-periphery structure at any of the three schools. The network structure indexes of professional culture were averaged across the two networks.

Table 10

Indexes of Professional Culture by School

	Range of Possible Scores	School A	School B	School C
Beliefs (Content)				
Professional Capability	1-21	15.53 (2.21)	14.42 (2.68)	16.29 (2.22)
Leadership Team	1-14	9.61 (2.83)	10.39 (2.43)	9.86 (2.31)
Teacher-Assistant Trust	1-7	5.94 (1.13)	5.04 (1.20)	4.01 (1.25)
Network Structure (Form)				
Average Density	0-1	.37	.21	.25
Average Reciprocity	0-1	.37	.33	.48
Average Homophily	-1 to 1	.30	.18	.30

Indexes of Professional Culture

Table 10 shows the six professional culture indexes for each of the three pre-kindergarten schools. One-way ANOVA with Tukey's HSD post hoc comparisons indicated that there were differences between the schools on professional capability and teacher-assistant trust, but not on the leadership team factor. School C had the highest scores related to beliefs about professional capability. School B had significantly lower professional capability scores than School C ($p<.02$), but was not significantly different from School A. Schools A and C were also not statistically different from one another in terms of professional capability. On the teacher-assistant trust index, as mentioned in Research Question 3, School C had significantly lower trust than both School A and School B. School A and School B were not statistically different from one another on the teacher-assistant trust index.

The form of the professional culture, as indicated by the network measures, also signposted differences across the three schools. School A had the highest density of any of the three schools, while School B had the lowest density, suggesting that the size of the network influenced the number of connections. School B, in fact, had the lowest average ratings on all of three of the network measures, with a smaller proportion of mutual relationships and less interaction across role groups. School C, on the other hand, had the highest proportion of mutual ties among network members, as well as a greater proportion of ties cutting across formal role group roles.

These quantitative indexes indicate that the professional cultures were not the same at the three pre-kindergarten schools. School A's professional culture was the most stable with both the highest density among the schools and a strong trust between teachers and assistants. School B, in contrast was characterized as a large community with lower beliefs in professional capability,

middling trust scores and fewer mutual relationships or relationships across formal groups than the other two schools. This suggests that School B has a more fragmented professional culture, where individuals were working separately and the entire school had not (yet) come together. The alignment between networks indicates that School B was organized around the leaders, who had positions of authority in both the formal and informal networks. Finally, School C's professional culture, as indexed by network structures and beliefs, can be described as erratic, with strong beliefs in the professional capability of the group, but tense relationships among individuals and groups, particularly teachers and assistants. As at School B, the leaders are critical to the professional culture at School C, playing central roles in both the formal structures and informal networks.

Case Studies of Professional Culture

Next, the qualitative indexes were compared for each of the three schools. Comments and statements from interview participants at each school were searched to illustrate features of the professional culture that were seen in the picture of professional culture derived from quantitative analyses. Case studies for each of the three schools follow.

School A. This school was the smallest of the three pre-kindergarten centers, with only 11 staff members in their network. The collaboration and mentorship networks at School A were the densest of any of the networks at the three schools, indicating a closely connected community of educators, where individuals have access to the resources of many others at their school. Low to moderate homophily scores indicated collaboration and mentorship interactions occurred both within and across formal role groups. Very few differences in centrality across position groups at School A were identified, suggesting that rather than a hierarchical structure seen in the formal structure at schools, the informal structure was more egalitarian, with similar mean centrality among leaders, teachers and assistants.

Statements from interview participants appeared to support this picture of a closely connected and interactive group, still working out some kinks in their professional community. School A had a challenging start at the beginning of the first year of the pre-kindergarten schools, as they waited for their building to be completed. Physically, they had a smoother start to the second year of operation, with a completed building and strong connections to their community already started. However, in the second year they had turnover in the front office, with a new principal, a new coach, and a new secretary. Chelsea[2], a teacher at School A, described the changes as somewhat "chaotic" and Brenda, another teacher, described a push among the continuing school staff to ask the new director for meetings and communication that were lacking at the beginning of the year. Throughout the year, formal staff meetings were held, but most planning and exchanges were done informally. Both Samantha, a teacher, and Amanda, an assistant, described planning together in the classroom and asking others down the hall to share ideas and resources. While this seemed to be working at the time, both Samantha and school leader Patricia mentioned that the goal was to develop more formalized professional learning communities at School A in the future.

The professional capability beliefs at School A were in the middle of the range of the three schools. Teacher- assistant trust at School A was the highest of the three schools, suggesting that classroom partners were successfully working together. In their interviews, both teachers and assistants described strategies that were used to support positive and effective classroom relationships: teachers and assistants sharing responsibilities; regular communication between the classroom teams, and assistants being treated as co-teachers with respect and understanding of strengths.

[2] All names used are pseudonyms.

Perceptions of coaches and school leaders were the lowest at School A out of any of the three schools, as seen in the leadership team factor score. This low score seems to have been related to the start of the new principal, who was also acting as principal for the first time in her career. The coach was also new the second year. While all interview participants at School A expressed support for their school leaders, there was some concern about the availability of the principal and coach for professional development needs and school wide issues. Several teachers, who wished to have more opportunities to get mentoring and instructional support from their principal and coach mentioned scheduling and demands on the time of the leaders.

Overall, the community of educators at School A seemed to be functioning as a small but cohesive team across the school, somewhat independent of the leadership. This matches most closely with Hargreaves' description of a collaborative professional culture. While there were still a few hiccups and details to be worked out, the small size of the school allowed for extensive collaboration and supportive mentorship networks to develop in the first two years of the school's operation. Care will have to be taken in School A for possible unintended consequences of formalizing the interactions as the principal suggested she would do. If the collaboration becomes forced by administrative design, the professional culture could shift more towards contrived collegiality.

School B. This school was the largest of the three schools, with 36 members of the network. School B was also the only school that had the same school leader through the first two years of operation, and had the largest leadership team of the three schools. School B network members rated their leaders the highest of the three schools. They were less certain about their own professional capabilities than staff at the other two schools. School B networks were the least dense on average, and had the smallest proportion of mutual relationships, suggesting ties

had formed between pairs of individuals, but that people were still learning about and developing trust with one another at this point in the school's operation. Among the three schools, School B also had the lowest average homophily score, indicating the least amount of interaction across role groups. One possible reason for this is that teachers and assistants were interacting with the other person in their classroom, but also making sense of how to do their job with others in the same role.

Despite its larger size and an influx of new teachers the second year, efforts were made at School B to encourage educators to get to know one another. One teacher, Rochelle, reported icebreaker activities at the beginning of the school year, which were designed to get individuals to learn about and talk to one another. Collaborative planning meetings at School B were also designed to support meeting and working with different people, primarily as classroom teams. Professional learning communities were organized by topic of study. Usually there were three or four different units being taught at the same time across School B. Each time the units of study changed, classroom pairs selected a new unit from among the choices and then began working with others who had selected the same unit at the same time. However, teachers had the final choice, and some assistants reported that their input was not considered.

Teachers and assistants at School B reported being able to work with almost everyone over the course of the last two years, but also indicated that groups had started to form where all of the classrooms teaching a unit would decide to move to the next unit together as well. At School B, the classroom team also planned together in informal daily meetings. The shared hour-long common planning time was most often used by the classroom team to collaborate and develop their goals and plan for the upcoming days and weeks. Between the professional

learning communities and the daily planning times, classroom teaching teams became the most important unit at School B.

School B respondents were the most positive in their perceptions of their coaches and leaders of any of the three schools. It was the only school that had the same leader in the first and second years, and this seemed to have help the staff gain confidence in the leadership groups as a whole. In their interviews, teachers and assistants were mostly positive about the coaching and leadership teams as well. Coaches themselves reported a bumpy start in their roles, which were newly expanded for the second year of the pre-kindergarten schools. Marion, the coach mentioned earlier, stated:

> "we really didn't have a clear vision or expectation for the job and so it was really bumpy in the beginning trying to figure out what we were supposed to do, how we were supposed to do it. And so, at the beginning of the year, I think those expectations were, like, unattainable. They were just out the window."

Kelly, another coach at School B agreed, but felt that by the time of the study (late Spring of the second year), that the roles and responsibilities of the coaches had been developed across the ELCS. Participants at School B also indicated that the coaches and leaders were instrumental in sharing the goals and missions of the school, and supporting classroom teams in aligning their work toward the goals.

The trust among teachers and assistants at School B was lower than at School A, but considerably stronger than at School C. In most cases, the relationships appeared to be productive. One teacher, Lily, described discussing instructional strengths and interests with her assistant, in order to develop a routine for the students' school day. Rochelle, another teacher, said, "At the end of the day, we'll reflect. We'll talk about what went right, what went wrong,

and maybe what if we can go back and reteach the next week. And we also……we engage one another." There were however, suggestions that the autonomy of teachers and assistants was not equal. One assistant, Callie reported feeling like she had to agree with what the lead teacher she worked with wanted to do, limiting her ability to make choices and share ideas. She said, "So there are a lot of things that I was able to bring to the classroom that I think, kind of, I don't know, not shocked her or anything like that, but she just didn't realize that." Despite having extensive experience, Callie was treated as a subordinate by the classroom teacher and was expected to go along with the teacher's choices. Sentiments like these may be related to the lower autonomy ratings that contribute to the professional capability score.

Interestingly, the professional capability score at School B was the lowest of the three schools. One reason for the low score could be the large size, and a less robust picture of the capability of others in the community. Another issue however seems to be the demand on educators, and the reliance on others to address the needs of their students. Interview statements by several teachers and assistants included references to difficulty meeting the needs of the students served at School B while also meeting administrative demands. Janna, a teacher, described her frustration with paperwork and administrative requirements saying "I feel the pressure of it too, all the red tape, all the assessments, all the evaluations. I feel so bogged down by that." Karen, the assistant mentioned above, reported needing extensive support from coaches and other school leaders to develop a plan to address the needs of the students in her classroom. Finally, the autonomy of individuals in the network was somewhat unclear. Several assistants reported that they had conversations and meetings about classroom performance data only if the lead teacher was interested, despite their own interest. It appears that assistants were not able to make the choice.

Overall, School B also appeared to have a functioning professional culture, but not a collaborative culture, as described by Hargreaves (1994). The larger size meant that individuals were less closely connected across the entire school, but this did not appear to be problematic for daily functioning. The stability of the staff at School B meant that everyone had had time to get to know the leaders and one another, and that groups were starting to emerge after repeated interactions. However, these groups had not yet solidified or separated into distinct subgroups. At School B, rather than building a whole school team, attention was given to developing the classroom teaching teams, including the trust between the teacher and assistant and support of the team by coaches and school leaders. However, School B still had considerable challenges in coming together, and was dependent on administrative forces, such as the professional learning community structure. This suggests that School B might have been closer to a culture of contrived collegiality at the end of their second year in operation.

School C. The final school case, School C, had considerable differences in its professional culture from Schools A and B. This school had experienced significant turnover at the beginning of the second year of operation, with half of its teachers and a few new assistants coming new to the school, as well as a new principal hired in the middle of the fall term. Confusion and tension were rampant among teachers and, in particular, among assistants. At School C many assistants had more experience in pre-kindergarten or at the school and, perhaps as a consequence, seemed to take more central roles in the collaboration and mentorship networks than the teachers.

School C experienced a rocky start to the second year. The new principal expressed some different goals and expectations than the previous leadership, and teachers and assistants scrambled to "get aligned on some of the goals we had already set" (Mary, assistant).

Despite the efforts to get everyone on the same page, the feelings at the school were still somewhat mixed at School C, as the educators worked towards a vision of high quality pre-k that they did not feel was well-understood. This was signposted by comments made in the interviews. Della, a teacher at School C, commented, "No one really knows what to do, we're all on different pages. You know that just causes stress." While another teacher, Jesse, added that there were "A lot of people telling you a lot of things and pulling you in different directions."

The collaboration and mentorship networks at School C were slightly denser than at School B, but not as closely connected at School A. This fits the trend seen in Schools A and B, with less dense connections as the school gets larger. However, School C demonstrated the highest average reciprocity, indicating a greater proportion of mutual relationships than occurred at either of the other two schools. Nearly half of the relationships were mutual in the two networks, suggesting that pairs of individuals who collaborated agreed upon their connection more often than at Schools A and B. There was moderate interaction across role groups in the collaboration network at School C. In addition, the mentoring network at School C had more cross-group interaction than the mentorship networks at the other two schools. This suggests that the hierarchical formal structure may be more important for mentorship relationships in School C, as people sought out formal leaders for support in the mentoring network. Correspondingly, the leaders and coaches played the most central role in both networks at School C, perhaps because teachers and assistants were trying to understand and respond to changing expectations as decided by the leadership team, and sought out collaboration and mentorship opportunities with the coaches and leaders.

Teacher-assistant trust was much lower at School C than at either of the other two schools. Assistants seemed to play more central roles in the collaboration and mentorship maps

at School C, and this seemed to be related to strain between teachers and assistants. There was considerable evidence of the tension between teachers and assistants in the interviews, from both groups. Some assistants resented being told what to do by less experienced classroom teachers. Mary, an assistant, described her difficulty in working with a less experienced teacher:

> "And so, this year, I'm working with someone who is younger than me and it's kind of, not hard to take orders from, from her, but I just feel that it's, um, it is kind of difficult working with someone younger and fresh out of school who lacks the experience."

One teacher described personal problems with an assistant, saying:

> "Yeah, just being positive and being a team and just communicating, you know, your wants and needs and what you see. That was a big struggle this year. My assistant was horrible."

Though the teacher did not go into any additional detail about the source of the trouble, it seems likely that this tension between a teacher and assistant illustrates a pattern of similar feelings would lead to lower trust across the entire school.

Surprisingly, educators at School C reported the highest level of professional capability beliefs of the three schools. There seemed to be a more general belief that the teachers and assistants could individually and collectively make a difference, despite the stressed teacher-assistant relationships.

School C had the least functional and most unstable professional culture at the three schools. High turnover had led to confusion and chaos for teachers and assistants trying to work towards a vision of high quality pre-kindergarten instruction. Despite relatively strong beliefs in the professional capability in themselves and others, there was considerable tension between teachers and assistants, which also led to problems in the professional culture as a whole. School

C is more difficult to place within Hargreaves' types of professional culture. There was little evidence of isolated individuals expected in the individualistic culture, but the formal role subgroups did not present as clear and identity-based balkanized groups. However, the distrust between teachers and assistants suggested that those two groups might in the future split even further, which could lead to a balkanized professional culture.

Research Question 4 Summary

Overall, the quantitative pictures of professional culture and the statements made by community members at each school indicated that there were significant differences in the content and form of the professional culture across the three pre-kindergarten schools. School A was small and densely connected school, with members working as a cohesive team to support one another and to address small problems that arose in the course of their work. Although they still had some challenges to overcome, School A most closely resembled Hargreaves' description of a collaborative professional culture. School B was a large and more sparsely connected school, but functioned effectively. At School B, the focus was on developing the classroom teaching teams to work together closely, while some groups of classrooms were beginning to form as well. The stability of the school leadership seemed to have supported a shared mission. However, School B seemed to rely on the administrative structures to support their collaboration. This suggests that they were closer to Hargreaves' contrived collegiality type of professional culture. Finally, School C was a tense and somewhat chaotic professional culture, where high turnover led to confusion and instability. Among teachers and assistants at School C, leadership expectations and goals were unclear, and individual relationships were tense. Across the three schools, both the content and the form contributed to the professional culture of each. School C

was difficult to categorize within Hargreaves' types of professional cultures, but showed signs off balkanization as teachers and assistant distrust pervaded the culture.

CHAPTER 5

DISCUSSION

The goal of this study was to explore the professional culture in three pre-kindergarten schools. This dissertation used a social network approach combined with descriptive analyses to index patterns of social interactions within and across schools, as well as to explore the beliefs held by individuals and groups within the networks. This approach allowed for the exploration of formal structures, informal networks, and individuals' positions within the networks. First, the characteristics of the collaboration and mentorship networks at the three schools were explored. Next, the alignment between formal and informal structures was examined. In the next step, the attention was shifted to beliefs held by educators at the three schools. Finally, a composite picture of the professional culture at each of the three schools was developed. Statements and examples from participant interviews were used to illuminate elements of the professional culture.

Summary of Findings

The first finding of the study was that the schools evidenced three distinct school cultures. Since the schools were all created as part of a single initiative to develop a model pre-kindergarten program, it was anticipated that the schools might be well connected to each another. In contrast, analysis of the networks showed that there was very little interaction across the three school sites, and that each school functioned as a separate entity. This finding was supported in the interviews by teachers and assistants who described having formal opportunities about once a year to interact with teachers and assistants from other schools. No informal

opportunities to interact with other schools were described. Coaches and leaders detailed more frequent opportunities to interact across the three schools. These sessions, also formally designated, were primarily meetings at which coaches and leaders worked through the role responsibilities in order to have some agreement about who was responsible for supporting teachers and assistants in improving practice.

After examining the network characteristics, formal and informal structure alignment, and beliefs at each of the schools, differences began to emerge. Once the analysis focused on the patterns within and differences across the schools, three major areas of interest were explored. These areas included differences in the network positioning of the teaching assistants at the three schools, differences in the alignment of formal and informal networks across the three schools, and varying levels of teacher-assistant trust and autonomy at the three schools.

At School A, the teachers and assistants were very similar in terms of the roles that they played in the informal networks. There was a mix of teachers, assistants, and leaders spread throughout the networks. At School B, teacher assistants were seen throughout the maps of the collaboration network. In the mentorship network, assistants were mostly observed to be seeking mentorship from those formally designated as having more knowledge and experience. However, at School C, more assistants were central in the maps of the collaboration and mentorship network, with some occupying informal positions of power. Interview findings suggested that assistants did behave differently at School C. There, the assistants went to one another for help and mentorship, something that did not occur often in Schools A and B.

When the alignment of formal structures and informal networks was explored, Schools B and C seemed most similar. In both the collaboration and mentorship networks at Schools B and C, school leaders (coaches and principals) occupied more positions of centrality in the informal

networks, on average. This suggests that at both schools the leaders, as a group, were the main sources that others went to for collaboration and mentorship support. However, interviews suggested that the reasons for going to the leaders were different at School B from School C. At School B, the leaders seemed to have knowledge and information that the teachers and assistants wanted to access to improve their practices. On the other hand, at School C, interviews suggested greater confusion, and the leaders seemed to be the community members who had information to communicate about the expectations for teachers, assistants, and instructional practices.

A third key finding in the study emerged from the final research question. Interviews suggest some information relevant to professional culture was not being completely picked up in the descriptive quantitative picture. One area that emerged in the interviews was the critical impact of turnover. Schools A and B had little turnover between years 1 and 3 of the pre-kindergarten initiative. While School A had some disruption from the change in leadership, the continuity of all the teachers and assistants meant they could work together to ask for support from the new leadership and get their needs addressed. At School C, in contrast, turnover in teachers and the principal and, to a lesser extent, assistants, led to instability in both collaboration and mentorship networks. The addition of several new and younger teachers at School C appeared to have led the way for some assistants to gain more central positions in both the collaboration and mentorship networks. Interviews with staff members suggested that the turnover of the principal and the holding of informal positions of power by some assistants were associated with chaos and confusion at School C, as well as tense relationships among teachers and assistants. This problem, while evident in the teacher-assistant trust scale, was described in greater detail in interviews.

Another element that emerged from the interviews related to how the professional capability beliefs factor at the three schools related to the autonomy, or the freedom of decision making, that was afforded to individuals in the formal structures established at each of the three schools. At School A, everyone was afforded the same choices of whom to work with, and there were no formal learning communities established. However, the school was also small, and there were opportunities for both teachers and assistants to be involved in making classroom decisions. At School A, the professional capability factor was equally highly rated by teachers, assistants and leaders.

At School C, in contrast, teachers and assistants were individually given the choice of what topic to study in a yearlong professional learning community. Since interest drove the establishment of the groups, the composition was mixed, including one group made up entirely of assistants. An alternative choice arrangement at School B involved teachers and assistants joining a new professional learning community together every few months based on their unit of study. Each time a unit of study ended, teacher and assistant pairs selected the next unit of study from among the units not yet completed. Although designed to be selected based on students' interests, the teacher had the ultimate responsibility for choosing the unit of study, sometimes freezing assistants out of the choice. Not surprisingly given the reduced input by assistants, autonomy was lower at School B than at either of the other two schools.

This study provided the opportunity to examine network structures and beliefs that comprise the professional culture within three pre-kindergarten schools. Although prior work has looked at each of these components separately, and in the K-12 context, little had been done to consider a full picture of professional culture using both quantitative and qualitative views of the

content and form of professional culture in early childhood education. This study's results suggest ways of thinking about the critical elements of professional culture.

Emerging Issues

The results of this study suggest attention to several important points about professional culture to consider further, including the use of social network analysis and beliefs scales. In the following section, first, the emergence and stability of professional culture over time will be explored, including the development and consistency of network structures. Next, the relevance and utility of the types of beliefs studied will be investigated. Finally, the structures of the pre-kindergarten networks in comparison to other networks studied in the literature will be examined.

Emergence and Stability of Professional Culture

The pre-kindergarten schools explored in this study were new; all three schools were in their second year of operation when data were collected. The emergence and stability of a professional culture this early in the establishment of any school is unclear. As relatively new institutions, the patterns of interactions may still be settling, and the networks may not have stabilized yet.

This seems to be particularly true at the school with the highest turnover, School C, where there was more uncertainty about the goals and mission of the school. The policies and expectations at the school seemed to be changing, and the professional culture appeared to be in flux as well. Generally, investigations have found that turnover at schools is related to poor working conditions and significant pressure reported by teachers (Borman & Dowling, 2008; Ingersoll, 2001). Staff turnover, and leadership turnover in particular, have been seen as problematic for the development of stable professional communities in schools. The turnover is

particularly difficult when schools have little time to prepare for the changes and establish continuity (Copland, 2003). In these schools, however, the turnover was partially attributed to the promotion of some teachers and leaders to different roles. In addition, some of the turnover might be attributed to individuals trying out the pre-kindergarten center teacher and assistant positions and deciding that it was not the right place for them to work. The promotion within schools as a source of turnover suggests more of a settling of the structures and positions within the network at the schools, while the movement out of the pre-kindergarten centers could be related to personal choices or to negative conditions across the school.

The principal also seemed to be an important factor in turnover. At School B, where the principal's position was stable, the staff was able to stay focused on their vision. However, at School C, where the principal's position also turned over, there was no principal to buffer the effects of the higher teacher and assistant turnover. School A, which also had a principal change, had not experienced the same staff turnover and was able to work together as a group during the change.

As some teachers were moved into coaching roles and the number of coaches increased, teaching vacancies were opened up (leading to turnover) and the formal structure of the school changed. There were also potential changes in the informal structure as the coaches were added. A previous study of coaches selected from among elementary school staffs, suggested that networks shift in different ways when coaches are added or promoted from within the teaching staff (Atteberry & Bryk, 2010). Usually, the coaches become more central in the network, as they become sources of advice or information for other teachers. However, in the Atteberry and Bryk study, coaches had particular responsibilities in the schools related to the literacy reform

effort. Coaches who did not serve their teachers well in that study were found to be less central over time.

In the pre-kindergarten networks, the role of coach was not clearly developed in the second year of operation. At the beginning of the second year, the coaches at the three schools realized that there was not a clear consensus about their responsibilities and expectations. Coaches described talking within a school about their roles, and acting independently of other coaches. Then, partway through the year, the coaches across the three schools finally came together to clarify the job description of coach at the pre-kindergarten centers to make it more uniform. Teachers and assistants also described uncertainty about the coaching role, particularly at School C. It seems that at the end of the year, the coaches had moved to central roles in the informal networks, but that may have been a relatively recently shift as the role became clearer in the spring term. As the formal structures were clarified, the network structures may have continued to develop in response, suggesting that perhaps the networks are still emerging in the first two years of the schools.

Identifying Appropriate Beliefs

Another issue that emerged from the findings of this study was the difficulty of identifying appropriate beliefs to reflect the professional culture of the schools. In this study, only the teacher-assistant trust and autonomy beliefs varied across schools, suggesting that those two beliefs were the most relevant beliefs measured. The teacher belief scores found in this study are supported by existing research on teacher beliefs, which indicates high and unchanging scores on efficacy beliefs in particular. However, my results suggested that trust and autonomy are somehow connected among educators, though there is little in the existing literature that

specifically supports this relationship. Both the high efficacy ratings and the relationship between trust and autonomy will be explored further.

Both self and collective efficacy have been explored in educational contexts extensively in the last 30 years. Self and collective efficacy have been related to job satisfaction and commitment to teaching (Coladarci, 1992; Hinojosa, 2014). Some studies suggest that self and collective efficacy are often rated as high: teachers generally believe that they can make a difference both individually and as a group. Efficacy beliefs are found to be low mostly in schools with staffing problems, including huge turnover and intensive accountability pressure or demands (Kleinsasser, 2014). Efficacy beliefs also seem to be more positive for teachers working with younger children. Elementary teachers' self-efficacy is higher than middle and high school teachers (Klassen & Chiu, 2010; Wolters & Daugherty, 2007). Brown (2005) found that pre-k teachers had high self-efficacy for mathematics instruction, with many teachers rating themselves at the highest level of self-efficacy. Bullock similarly found that classroom management self-efficacy was skewed among early childhood educators, indicating a high score was normative (skew=-1.02).

Several studies of dense networks among educators have suggested that tightly connected professional communities are associated with higher collective responsibility and collective efficacy beliefs. In these cases, when educators are tightly connected they seem to feel better about the ability of the group to make a difference, perhaps because they are more likely to have knowledge of others' abilities and practices (Coburn & Russell, 2008; Moolenaar, Sleegers & Daly, 2012; Penuel, Riel, Krause & Frank, 2009).

Autonomy and teacher -assistant trust emerged in this study as being the most useful for understanding professional culture, but they also seemed to be interconnected. At these schools,

increased autonomy levels were associated with a decrease in teacher-assistant trust. The existing literature has not addressed this possible association, which may in part be due to the unique early childhood context. In the pre-kindergarten schools, the teacher-assistant trust relationship represents not only the most proximal relationship, but also one that is potentially impacted by power differentials between teachers and assistants. Future work is needed to explore why autonomy and trust might be negatively related in pre-kindergarten settings.

Another potentially important reason to consider trust as a belief is the relationship between trust and the development of positive and mutual relationships. Daly and Finnigan, in their 2012 study of central office leaders and school principals found that when trust was low, the development of relationships, particularly mutual relationships was constrained. This association between trust and the number of mutual ties did not hold for the pre-kindergarten school. If so, we would have expected lower reciprocity at School C, where the teacher-assistant trust was much lower. Instead, the proportion of mutual ties at School C was higher than at School B in both the collaboration and mentorship networks. However, the evidence from this study also seems to contradict the finding from Moolenaar and Sleeger's work that that density, and opportunities to connect to others may be more important to the development of trust among educators. Instead, it seems that the development of trust in pre-kindergarten teacher-assistant relationships may be different from other trust relationships, and not be directly linked to either density or reciprocity. More work is needed to explore the relationship between teacher-assistant trust and other network structures and characteristics.

Autonomy was also an important type of belief in the three pre-kindergarten schools. A 2015 National Center for Education Statistics (NCES) report suggests that over time more teachers are reporting lower feelings of autonomy, particularly elementary teachers (Sparks &

Malkus, 2015). This change may be related to increased accountability pressure and demands. In elementary schools, those demands are often related to instructional reform and high-stakes testing that have become more widespread. In the pre-kindergarten schools, there was no high-stakes testing analogous to those implemented in K-12 education. However, the teachers were under pressure to achieve a vision of quality pre-kindergarten that was not well defined for them. The lower autonomy ratings at the three schools and particularly at School B may have developed in response to the intense but unclear expectations that some of the teachers and assistants, in particular, described.

Another study of teachers indicated that positive autonomy was associated with more participation in decision making at schools (Lu, Yu, Jiang, & Li, 2015) The lower autonomy scores in pre-kindergarten may reflect the more leadership-centric formal and informal structures, where the leaders and coaches made the decisions and the teachers and assistants felt they must go along with them. Thus, the autonomy beliefs at a school may reflect, at least partially, the extent to which educators feel that the culture of their school does not include decision making by a range of participants.

Network Structures in Pre-Kindergarten

Due to the structural differences from K-12 contexts, it was posited that pre-kindergarten networks might be different than the education networks previously studied. For example, while most of the elementary schools studied were organized into grade levels (Penuel, Riel, Krause & Frank, 2009; Spillane & Kim, 2012) the pre-kindergarten centers involved a single grade level of students. However, the findings from this study suggest that in fact the networks are descriptively similar to the networks seen in other education studies. In addition, there was concern that the single grade level networks might be smaller than other school networks. In

fact, the networks described in this study were similar to other networks in terms of their size, the within and between site network structures, and the extent to which connections were formed, both in one direction and mutually.

The pre-kindergarten schools were similar in size to the local elementary schools studied, but it was still not clear whether they would act differently from other school networks, because of structural differences such as the presence of a teaching assistant in each classroom. A review of the network studies conducted in the United States and the Netherlands suggests that the pre-kindergarten school networks were not much smaller than previously explored school networks. The network membership ranged from 11 members at School A to 36 members at School B. Dutch primary schools are rather small, with only 10-20 faculty members (Bakkenes, De Brabrander, & Imants, 1999; Moolenaar & Sleegers, 2010). American elementary school networks tend to be bigger than Dutch schools, often between 25 and 45 faculty members per school (Penuel et al, 2010; Spillane & Kim, 2012). Schools B and C were within this range, and therefore similar in size to other networks explored. It is unclear whether the presence of teaching assistants constituting close to half of the membership of the networks might have any impact on what the size of the network means, as no previous studies have included assistants in network analysis.

Since the schools were opened as part of a specific initiative to build and develop model pre-kindergarten programs, there was some expectation that the schools might be connected across sites, to collaborate on the single mission that all three schools were working towards. Instead, the combined network for the three schools illustrates only a few connections among the leaders and a few teachers at the three schools; the within-site networks were more extensively connected than the cross-site networks. Previous studies of school and district leadership

networks also indicate that cross-site networks are often sparse, even when multiple sites are working towards a common goal. Just as there were a small number of connections across schools in this study, Daly and Finnigan found that district central office leaders were more closely connected to one another than to leaders at schools throughout the district (Daly & Finnigan, 2010; Daly & Finnigan, 2012).

Finally, the numerical comparisons of the density of connections and the extent to which ties were mutual in the pre-kindergarten networks were both close to the range of previously explored network structures. Moolenaar and Sleeger (2010) analyzed frequent interactions (at least once every two weeks) of information seeking networks at more than 50 schools in the Netherlands. They found network densities between .15 and .77 at their schools. The density of the collaboration networks in this study ranged between .31 and .41. The mentorship network density in the pre-kindergarten centers went slightly below the previous range seen, with network densities between .10 and .33. Similarly, in Moolenaar and Sleeger's study the proportion of mutual ties was between .17 and .64 (2010). In the pre-kindergarten networks, the proportion of mutual ties per network was between .24 and .63, well within the range of the previous study.

Overall, the pre-kindergarten networks were structurally similar to the elementary school networks explored in previous studies. Despite differences in the historical development, ages of the children served, and the formal structures in the pre-kindergarten context, the schools were not very different from elementary schools.

Implications for Policy and Practice

Results from this study, in conjunction with previous studies of networks and professional culture, suggest some implications for those policymakers and practitioners considering professional culture in schools. Three areas seem to need special attention:

consideration of initiatives as site-based or multi-site programs, the importance of staff stability to professional culture, and the importance of trusting relationships, particularly in the early childhood context.

First, the trend across the literature indicates that single-site networks are much more developed than cross-site networks, but that both are useful. Single site networks are more likely to develop into dense connections than cross-site networks, even within the same school district. This is important to consider when multiple sites are under pressure to meet expectations and adhere to a common vision. Without considerable crossover between school networks, there is the potential for each school to develop or adapt visions and role definitions in ways that become unique to the school. Over time, if a program is meant to be maintained across multiple sites but the original vision is not carried to all members of the community, then the vision is likely to change within each site in response to local strengths and needs. If the intention is fidelity to a single vision across multiple sites, then attention must be paid to developing connections across the multiple sites.

A second key area for policymakers and practitioners to consider is the importance of staff stability in developing a positive professional culture. Prior research has shown that high turnover of teachers is problematic for schools and that turnover of leadership without time to transition also leads to problems. The current study supports that finding. When the staff is stable, there is more time for everyone to get on the same page. The timing of turnover, especially of the principal led to uncertainty at these schools. The hiring of a principal at School B several months into the year left uncertainty about the goals, procedures, and expectations among staff members, even six months later. It seems that the principal may be an important

player when there is staff instability. Consistent leadership can help to buffer teachers and assistants from changes and maintain focus.

Stability in positions within a school also affects network characteristics. For example, at both Schools B and C, the movement of some teachers into coaching roles meant disruption among the networks at each school. While some interview participants lauded the expansion of the coaching role, the moves within the school meant that new teachers had to be hired and the staff compositions changed more than they might have otherwise.

A final area of importance for professional culture is the development of trust within schools. Trust has been considered a key component in long-term professional relationships, but most of the existing research has focused on trust among teachers or between teachers and leaders. This study pointed out that, in early childhood education, the teacher-assistant trust relationship is especially relevant to professional culture. The teacher-assistant team spends a large portion of the workday together, and effective team functioning impacts the overall professional culture of the school. As school leaders are making hiring decisions and classroom assignments, attention to the trust among staff members within classrooms can make a big difference to the overall tone of interactions across the entire school.

Strengths

The biggest strength of this study is the social network approach, which enabled the exploration of the form of professional culture in a systematic way. This systematic description of patterns of interactions allowed for meaningful comparison of both formal and informal social structures across schools of different sizes. In addition, the social network approach foregrounded the relationships among members of the community as a way for information, ideas, and resources to be introduced and shared around the community.

Another strength to this study is the complex view of the professional culture it explores. Multi-faceted views of both social networks and beliefs were studied, including the analysis of multiple relational networks (collaboration and mentorship) and a series of beliefs scales. This multi-dimensional perspective encouraged the identification of the most important elements of professional culture, both those that were similar and those that were variable across the three schools.

The focus on three schools exclusively serving pre-kindergarten students allowed for the examination of professional culture among early childhood educators. While pre-kindergarten teachers are sometimes included in elementary school culture, the potential for differences between elementary school and pre-kindergarten contexts had remained unexplored. The high participation rates within the three schools, particularly at Schools A and B, allowed for robust indicators of the networks and beliefs at each of the three schools.

Finally, the professional community examined was in the middle of actively trying to make sense of a vision that was new for them. While the vision was not well defined for many of the members of the community, there was significant pressure to work toward and achieve something that was called a vision for a high quality model pre-kindergarten program. This afforded the opportunity to investigate the ways that the educators at the three schools were interacting in their efforts to make sense of the work they were being asked to do.

Limitations

While the strengths of this study made it a unique and interesting setting to conduct the research, there were also some limitations to consider. One limitation concerns the different sizes of the three schools. The other two concerns relate to the process of data collection within the pre-kindergarten centers.

First, the different sizes of the schools restricted some of the comparisons across the three schools. While the two larger schools were similar in size to many of the schools examined in other studies, School A was not. As a result, most of the comparisons could be made only between the two larger schools.

Another limitation with this study was the data collection timeline. The quantitative data were all collected only once during the study. This meant that the social network maps represented only a picture at that moment in time, and not a map that could be expected to remain stable for longer periods of time within the three schools. Analytically, there was no opportunity to look at change or development in the networks.

Finally, the social network and beliefs data were collected simultaneously. As a result, it was not possible to explore any potential direction to the associations between network structures and beliefs at any of the three schools. In other words, I could not examine whether beliefs were structuring network interactions or network interactions were affecting beliefs. While it would be interesting and helpful to know how beliefs affect network structures and/or the reverse, this study had to rely on data collected about both at the same time. Thus I could examine contemporaneous associations between the two but not change over time.

Future Research

The body of research on professional culture and social networks in education is growing, with individuals and teams of researchers contributing to the field by studying particular contexts, such as literacy reform or technology use (Atteberry & Bryk, 2010; Frank, 1996; Penuel et al, 2009), or by studying specific kinds of relationships, such as those between district and school site leaders (Daly & Finnigan, 2010). Regardless of their precise focus, each study contributes to the understanding of social networks and professional culture in education

contexts. This work is an initial investigation of social networks in early childhood education, but also provides three important implications for future research in the broader field.

First, although the current study utilized measures of self and collective efficacy, the findings suggest that future use of these measures may not be informative with respective to professional culture. The findings from this and other studies suggest that efficacy beliefs are consistently positive and unchanging in most schools. This suggests that, unless there is reason to believe there may be considerable dysfunction in a particular school context, self-efficacy and collective efficacy beliefs may not be particularly informative to collect. Other measures of educators' beliefs such as trust in others and autonomy may be more important within professional culture in most schools.

Next, it is critical to think about what relational networks might be important to the contexts in which professional culture is being studied. In this study, both the collaboration and mentorship networks were indexed; however, the collaboration network provided the broader picture of interaction at each of the three schools. That said, if the research question involved exploring the adjustment and experiences of new teachers in a school context, the mentorship network might be more relevant for understanding whom new teachers rely on for support.

Finally, the findings in the last research question in this study suggest that a quantitative picture of professional culture is not a comprehensive picture of professional culture. The interviews supported the picture presented in the quantitative results, but provided a depth of information that shone a light on the details of the professional culture. For this reason, future research should continue to combine quantitative and social network methods with observations and interviews of participants. With continued research on the many types of school

organizations using rigorous methods to triangulate findings, knowledge of professional culture will be enhanced in the years to come.

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APPENDIX A

Survey Demographics

Please indicate your age:

- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65-74

How many years have you worked as an educator? _____

At which school do you work?

- School A
- School B
- School C

How many years have you worked at that school?

What is your position?

- Teacher
- Educational Assistant
- Coach
- Dean
- Director

How many years have you worked in that position? _____

APPENDIX B

Social Network Directions and Items

In the next section, I will ask you to reflect on your social and professional networks within the Early Learning Centers.

I will ask you about the people you work with, and the people who work in all three of the Early Learning Centers. Some of these people you may interact with quite regularly and some of them you may interact with very little.

Please respond for each person listed.

COLLABORATION

This section is about the people with whom you collaborate. **By collaborate, I mean sharing ideas, resources, and planning your work together.**

How often do you collaborate with the people **at your school** to plan your work or instruction? Please respond for each person listed below.

	Never	Yearly	Monthly	Weekly	Daily
Amy A.	☐	☐	☐	☐	☐
Barbara B.	☐	☐	☐	☐	☐
Claire C.	☐	☐	☐	☐	☐
Devon D.	☐	☐	☐	☐	☐
Eddie E.	☐	☐	☐	☐	☐

... (with full roster)

COLLABORATION

How often do you collaborate with the people **at School B**? Please respond for each person listed below.

	Never	Yearly	Monthly	Weekly	Daily
Anne A.	☐	☐	☐	☐	☐
Bess B.	☐	☐	☐	☐	☐
Charles C.	☐	☐	☐	☐	☐
Diana D.	☐	☐	☐	☐	☐
Evelyn E.	☐	☐	☐	☐	☐

... (with full roster)

COLLABORATION

How often do you collaborate with the people **at School C**? Please respond for each person listed below.

	Never	Yearly	Monthly	Weekly	Daily
Ari A.	☐	☐	☐	☐	☐
Bonnie B.	☐	☐	☐	☐	☐
Christy C.	☐	☐	☐	☐	☐
Dara D.	☐	☐	☐	☐	☐
Emma E.	☐	☐	☐	☐	☐

... (with full roster)

There may be others with whom you collaborate outside of the Early Learning Centers. Who else do you collaborate with **outside of the ELCs**? By collaborate, I mean sharing

ideas, resources, and planning your work together. Please list their first name and position (e.g. Amy –teacher).

You may enter as many or as few names here as you choose.

MENTORING

This section is about the people from whom you seek work-related **mentoring. By mentoring I mean trusted advice, feedback and support for your work. This can include both instructional and non-instructional support.**

How often do you go to the following people **at your school** for work-related mentoring?

	Never	Yearly	Monthly	Weekly	Daily
Amy A.	☐	☐	☐	☐	☐
Barbara B.	☐	☐	☐	☐	☐
Claire C.	☐	☐	☐	☐	☐
Devon D.	☐	☐	☐	☐	☐
Eddie E.	☐	☐	☐	☐	☐

... (with full roster)

MENTORING

How often do you go to the following people **at School B** for work-related mentoring?

	Never	Yearly	Monthly	Weekly	Daily
Anne A.	☐	☐	☐	☐	☐
Bess B.	☐	☐	☐	☐	☐
Charles C.	☐	☐	☐	☐	☐
Diana D.	☐	☐	☐	☐	☐
Evelyn E.	☐	☐	☐	☐	☐

... (with full roster)

MENTORING

How often do you go to the following people **at School C** for work-related advice or mentoring?

	Never	Yearly	Monthly	Weekly	Daily
Ari A.	☐	☐	☐	☐	☐
Bonnie B.	☐	☐	☐	☐	☐
Christy C.	☐	☐	☐	☐	☐
Dara D.	☐	☐	☐	☐	☐
Emma E.	☐	☐	☐	☐	☐

I know there may be others from whom you seek advice outside of the Early Learning Centers. Who else do you seek work-related mentoring from **outside of the ELCs**? Please list their first name and position (e.g. Michelle–teacher) for each person. *You may enter as many or as few names here as you choose.*

APPENDIX C

Self-Efficacy Scale

Please indicate your opinion about each of the questions below marking each item on a scale, ranging from (1) “None at all” to (7) “A Great Deal.”

1=None at all 3=Some 5=Quite a Bit 7= A Great Deal

Please respond to each of the questions by considering the combination of your *current* ability, resources, and opportunity to do each of the following in your present position.

1. How much can you do to control disruptive behavior in the classroom? ①②③④⑤⑥⑦
2. How much can you motivate students who show low interest in school? ①②③④⑤⑥⑦
3. How much can you do to calm a student who is disruptive or noisy? ①②③④⑤⑥⑦
4. How much can you do to help your students value learning? ①②③④⑤⑥⑦
5. To what extent can you craft good questions for your students? ①②③④⑤⑥⑦
6. How much can you do to get children to follow classroom rules? ①②③④⑤⑥⑦
7. How much can you do to get students to believe they can do well in schoolwork? ①②③④⑤⑥⑦
8. How well can you establish a classroom management system with each group of students? ①②③④⑤⑥⑦
9. How well can you support students with a variety of learning styles? ①②③④⑤⑥⑦
10. How much can you assist families in helping their children do well in school? ①②③④⑤⑥⑦
11. How well can you implement new or alternative teaching strategies ①②③④⑤⑥⑦

in your classroom?

12. To what extent can you provide an alternative explanation or example when students are confused? ①②③④⑤⑥⑦

Adapted from the Teacher Self-Efficacy Scale Short Form (TSES; Tschannen-Moran & Woolfolk Hoy, 2001)

APPENDIX D

Collective Efficacy Scale

Directions Please indicate your opinion about each of the questions below marking each item on a scale, ranging from (1) "None at all" to (7) "A Great Deal."

1=None at all 3=Some 5=Quite a Bit 7= A Great Deal

Please respond to each of the questions by providing your own personal beliefs, considering the combination of the *current* situation, resources, and opportunity to do each of the following at your school.

1.	How much can teachers and staff in your school do to produce meaningful student learning?	①②③④⑤⑥⑦
2.	How much can your school do to get students to believe they can learn?	①②③④⑤⑥⑦
3.	To what extent can teachers and staff in your school make expectations clear about appropriate student behavior?	①②③④⑤⑥⑦
4.	To what extent can school personnel in your school establish rules and procedures that facilitate learning?	①②③④⑤⑥⑦
5.	How much can school personnel in your school do to control disruptive behavior?	①②③④⑤⑥⑦
6.	How much can teachers in your school do to help students master content?	①②③④⑤⑥⑦
7.	How much can teachers in your school do to help students talk about their thinking?	①②③④⑤⑥⑦
8.	How well can adults in your school get students to follow school rules?	①②③④⑤⑥⑦
9.	How much can your school do to foster student creativity?	①②③④⑤⑥⑦

Adapted from the Collective Teacher Beliefs Scale (Tschannen-Moran & Barr, 2004)

APPENDIX E

Autonomy Scale

a. TEACHERS/EDUCATIONAL ASSISTANTS:

How much actual control do you have IN YOUR CLASSROOM at this school over the following areas of your planning and teaching?

b. DIRECTORS/COACHES:

How much actual control do you have IN INDIVIDUAL CLASSROOMS at this school over the following areas of your planning and teaching?

Please indicate your opinion about each of the questions below marking each item on a scale, ranging from (1) "None at all" to (7) "A Great Deal."

1=None at all 3=Minor 5=Moderate 7= A Great Deal

1. Selecting instructional materials ①②③④⑤⑥⑦
2. Selecting content topics and skills to be taught ①②③④⑤⑥⑦
3. Selecting teaching strategies ①②③④⑤⑥⑦
4. Evaluating and assessing students ①②③④⑤⑥⑦
5. Managing student behavior ①②③④⑤⑥⑦
6. Determining the role of teacher and educational assistant ①②③④⑤⑥⑦

How much actual influence do you think teachers and other staff have over policy AT THIS SCHOOL in each of the following areas?

Please indicate your opinion about each of the questions below marking each item on a scale, ranging from (1) "None at all" to (7) "A Great Deal."

1=None at all 3=Minor 5=Moderate 7= A Great Deal

1.	Setting performance standards for students at this school	①②③④⑤⑥⑦
2.	Establishing curriculum	①②③④⑤⑥⑦
3.	Determining the content of professional development programs	①②③④⑤⑥⑦
4.	Evaluating and hiring new teachers	①②③④⑤⑥⑦
5.	Setting behavior policy	①②③④⑤⑥⑦
6.	Determining how the school budget will be spent	①②③④⑤⑥⑦

Adapted from the Schools and Staffing Survey, NCES, 2011

APPENDIX F

Teacher-Assistant Trust Scale

Please indicate the extent that you agree or disagree with each of the statements about your school, from (1) Strongly Disagree to (7) Strongly Agree.

1. Teachers and assistants in this school typically look out for each other. ①②③④⑤⑥⑦

2. Teachers and assistants in this school trust each other. ①②③④⑤⑥⑦

3. Teachers and assistants in this school are open with each other. ①②③④⑤⑥⑦

4. Teachers in this school do their jobs well. ①②③④⑤⑥⑦

5. Assistants in this school do their jobs well. ①②③④⑤⑥⑦

6. Teachers and assistants in this school have faith in the integrity of their colleagues. ①②③④⑤⑥⑦

7. Teachers and assistants in this school are suspicious of each other. ①②③④⑤⑥⑦

8. When teachers in this school tell you something, you can believe it. ①②③④⑤⑥⑦

9. When assistants in this school tell you something, you can believe it. ①②③④⑤⑥⑦

10. Even in difficult situations, teacher and assistants in this school can depend on each other ①②③④⑤⑥⑦

Adapted from the Faculty Trust subscale of the Comprehensive Teacher Trust Scale, (Hoy & Tschannen-Moran, 2003)

APPENDIX G

Coaching Scale

Please indicate the extent that you agree or disagree with each of the statements about your school, from (1) Strongly Disagree to (7) Strongly Agree.

1.	The coaches' roles and responsibilities are clearly defined.	①②③④⑤⑥⑦
2.	The coaches have a deep understanding of the instructional practices they share.	①②③④⑤⑥⑦
3.	The coaches have sufficient time to be effective.	①②③④⑤⑥⑦
4.	The coaches engage the teachers in professional learning that is differentiated to meet their needs.	①②③④⑤⑥⑦
5.	The coaches and leadership provide feedback with specific action steps to improve practice.	①②③④⑤⑥⑦
6.	The coaches' activities focus on supporting teachers' implementation of practices	①②③④⑤⑥⑦
7.	The coaches use data to identify strengths and areas for improvement.	①②③④⑤⑥⑦
8.	The coaches help teachers to understand the data from their classrooms.	①②③④⑤⑥⑦
9.	The coaches and leadership help teachers to understand the data from the whole school.	①②③④⑤⑥⑦

Adapted from The Kansas Coaching Project's Coaching Survey (Center for Research on Learning, 2008)

APPENDIX H

Leadership Scale

Please indicate the extent that you agree or disagree with each of the statements about your school, from (1) Strongly Disagree to (7) Strongly Agree. **The ELC leadership team includes directors, deans, and coaches at your school.**

1. The vision for our school incorporates the expectation of ongoing professional learning and growth. ①②③④⑤⑥⑦
2. The ELC leadership team collaborates with staff to analyze and use data throughout the year to establish specific goals and strategies aimed at improving practice and student achievement. ①②③④⑤⑥⑦
3. The ELC leadership team uses teacher and staff strengths to improve practices and student achievement ①②③④⑤⑥⑦
4. The ELC leadership team recognizes and celebrates improved performance related to school vision and goals. ①②③④⑤⑥⑦
5. The ELC leadership team puts suggestions made by the staff into operation. ①②③④⑤⑥⑦
6. The ELC leadership team is willing to make changes to their own work. ①②③④⑤⑥⑦
7. The ELC leadership team lets teachers and assistants know what is expected of them. ①②③④⑤⑥⑦
8. The ELC leadership team maintains definite standards of performance. ①②③④⑤⑥⑦

Developed using Tennessee Teacher Perception Survey (Tennessee Department of Education, n.d.).and general leadership inventories.

APPENDIX I

Interview Protocol for Teachers

Opening Questions: Experience at ELCs

1. Tell me a little bit about yourself.
    a. Probe: Why did you decide to work at this school/the ELCs?
2. Where else have you worked?
    a. Probe: Were you teaching pre-k?
    b. Probe: Were there other pre-kindergarten classrooms at your site?
3. How does your current school compare to other places that you have worked?
    a. Probe: How is that different from working in other MNPS schools?
    b. Probe: How is that different than your experiences in other districts?
    c. (if first job) How is this different from your student teaching and what you expected a teaching job to be?
4. From your perspective, what is the mission of the ELCs?
5. How would you describe the values and goals of the ELCs?
    a. Probe: To what extent are there school specific values and goals?
    b. Probe: Who has been involved in setting the goals and the values?
        i. To what extent have people in different positions been part of the vision setting?
6. Now the ELCs are in their second year.

    EXPERIENCED: What was it like to start a second year at the ELCs this year?
    a. Probe: How did it compare to the start of the first year?

b. Probe: How were new teachers/staff introduced to the staff at the ELCs at the beginning of the new school year?

c. Probe: Did you have a role in welcoming or helping the new teachers?

NEW: What it was like to be a new teacher this year at (school)?

d. Probe: Did you receive any support to help you as a new teacher?

e. Probe: How did you feel as a new teacher at the beginning of the year? What about now?

7. In your survey, you mentioned that you think *(x supports your work in the ELCS, y is an obstacle, or z could be changed)*. Tell me more about your thinking about this.

Professional Interactions

Next, I'd like to hear more about some of the ways that teachers and staff work together at your school.

8. Tell me about the opportunities that you have to work with others throughout the school year.

    a. Probe: Please give some examples.

    b. Probe: Who is involved or invited to attend these events?

    c. Probe: How were these events/occasions organized (set up, advertised)

    d. Probe: What was the purpose of the work?

9. How often do you have the opportunity to work with others at the other ELCs?

        i. Probe: Are those others in the same position or different positions from yourself?

        ii. Probe: What kinds of work do you do together?

        iii. Probe: How often does this type of work occur?

10. Within the ELCs teachers, assistants, MCLS, and directors all have responsibilities related to instruction.
    a. What are the some of the most important ways that you and your assistant(s) work together?
        i. Probe: How does this compare to your ways that you worked with the assistant(s) in your previous work places?
        ii. Probe: How does this compare to the ways that you see other teachers and assistants work together?
        iii. Probe: Are there things that could be improved about the relationships between teachers and assistants?
    b. What is the role of the coach/MCL in your classroom?
        i. Probe: Do you work primarily with a single coach?
        ii. Probe: How often does she come into your classroom?
        iii. Probe: What does the coach look for when she visits?
        iv. Probe: Do you have individual meetings to get feedback and set goals with your coach?
    c. What is the role of the director at your school?
        i. Probe: How often do you have individual interactions with the director?
        ii. Probe: What do you work on together?
        iii. Probe: In what settings do you interact with the director?
11. When you are planning for a new activity or event, how do you decide which colleagues with whom you want to plan?

12. From your survey responses, it seems that you _____ (use identified patterns or unusual responses in network relationships). Can you tell me a little more about this?

13. **Data Use/Work**

Next, I'd like to talk more about the data that you use in your work, including the Vanderbilt Data, GOLD assessments, and other forms of data.

14. What data do you use and how do you use it?
    a. Probe: How do you use student assessment data?
    b. Probe: How do you use observation data?

Now, I'd like to focus specifically on the data that you receive from Vanderbilt.

15. Please describe what happens when you receive new observation or assessment data from the Vanderbilt researchers?
    a. Probe: In what setting do you get to see and/or discuss your data first?
    b. Probe: Who else is a part of this conversation?
16. How do you decide what is important in the data, and what do you do with that information?
    a. Does your coach seem to understand the data?
    b. Does your coach help you focus on what is important in the data?
        a. Student data: have you had a chance to visit the website VU set up that displays the student data for your classroom? How did you use the website?
        b. Classroom observations: Are you given copies of the reports? What do you do with them?
    c. Probe: Do you set goals for yourself based on the data?

d. Probe: How do you know when you are meeting your goals (individually, or as a school)?

e. Probe: How do you use the 8 goals that have been set across the ELCs?

f. Probe: Did you and your team ever find something unexpected or particularly interesting when you were looking at the data? Tell me about that conversation. What happened?

Closing Questions

17. Is there anything else you think is important for me to know about working as a teacher at your school or in the ELCs in general?

APPENDIX J

Interview Protocol-Assistants

Opening Questions: Experience at ELCs

1. Tell me a little bit about yourself.
    a. Probe: Why did you decide to work at this school/the ELCs?
2. Where else have you worked?
    a. Probe: Were you working in a pre-kindergarten classroom?
    b. Probe: Were there other pre-kindergarten classrooms at your site?
3. How does your current school compare to other places that you have worked?

18. Probe: How is that different from working in other MNPS schools?

19. Probe: How is that different than your experiences in other districts?

20. (if first job) How is this different from your student teaching and what you expected a teaching job to be?

4. From your perspective, what is the mission of the ELCs?
5. How would you describe the values and goals of the ELCs?
    a. Probe: To what extent are there school specific values and goals?
    b. Probe: Who has been involved in setting the goals and the values?
        i. To what extent have people in different positions been part of the vision setting?
6. Now the ELCs are in their second year.

EXPERIENCED: What was it like to start a second year at the ELCs this year?

a. Probe: How did it compare to the start of the first year?

b. Probe: How were new teachers/staff introduced to the staff at the ELCs at the beginning of the new school year?

c. Probe: Did you have a role in welcoming or helping the new assistants?

NEW: What it was like to be a new assistant this year at (school)?

21. Probe: Did you receive any support to help you as a new teacher?
22. Probe: How did you feel as a new teacher at the beginning of the year? What about now?

7. In your survey, you mentioned that you think *(x supports your work in the ELCS, y is an obstacle, or z could be changed)*. Tell me more about your thinking about this.

Professional Interactions

Next, I'd like to hear more about some of the ways that teachers and staff work together at your school.

8. Tell me about the opportunities that you have to work with others throughout the school year.
    e. Probe: Please give some examples.
    f. Probe: Who is involved or invited to attend these events?
    g. Probe: How were these events/occasions organized (set up, advertised)
    h. Probe: What was the purpose of the work/event?
9. How often do you have the opportunity to work with others at the other ELCs?
        i. Probe: Are those others in the same position or different positions from yourself?
        ii. Probe: What kinds of work do you do together?
        iii. Probe: How often does this type of work occur?

10. Within the ELCs teachers, assistants, MCLS, and directors all have responsibilities related to instruction.
    d. What are the some of the most important ways that you and the lead teacher work together?
        i. Probe: How does this compare to your ways that you worked with the teacher(s) in your previous work places?
        ii. Probe: How does this compare to the ways that you see other teachers and assistants work together?
        iii. Probe: Are there things that could be improved about the relationships between teachers and assistants?
    e. What is the role of the coach/MCL in your classroom?
        i. Probe: Do you work primarily with a single coach?
        ii. Probe: How often does she come into your classroom?
        iii. Probe: What does the coach look for when she visits?
        iv. Probe: Do you have meetings to get feedback and set goals with your coach?
    f. What is the role of the director at your school?
        i. Probe: How often do you have individual interactions with the director?
        ii. Probe: What do you work on together?
        iii. Probe: In what settings do you interact with the director?
11. When you are planning for a new activity or event, how do you decide which colleagues with whom you want to plan?

12. From your survey responses, it seems that you _____ (use identified patterns or unusual responses in network relationships). Can you tell me a little more about this?

Data Use/Work

Next, I'd like to talk more about the data that you use in your work, including the Vanderbilt Data, GOLD assessments, and other forms of data.

13. What data do you use and how do you use it?
    a. Probe: How do you use student assessment data?
    b. Probe: How do you use observation data?

Now, I'd like to focus specifically on the data that you receive from Vanderbilt.

14. Please describe what happens when you receive new observation or assessment data from the Vanderbilt researchers?
    c. Probe: In what setting do you get to see and/or discuss your data first?
    d. Probe: Who else is a part of this conversation?
15. How do you decide what is important in the data, and what do you do with that information?
    g. Does your coach seem to understand the data?
    h. Does your coach help you focus on what is important in the data?
        a. Student data: have you had a chance to visit the website VU set up that displays the student data for your classroom? How did you use the website?
        b. Classroom observations: Are you given copies of the reports? What did you do with them?
    i. Probe: Do you set goals for yourself based on the data?

j. Probe: How do you know when you are meeting your goals (individually, or as a school)?

k. Probe: How do you use the 8 goals that have been set across the ELCs?

l. Probe: Did you and your team ever find something unexpected or particularly interesting when you were looking at the data? Tell me about that conversation. What happened?

Closing Questions

16. Is there anything else you think is important for me to know about working as an assistant at your school or in the ELCs in general?

APPENDIX K

Interview Protocol for Coaches

Opening Questions: Experience at ELCs

1. Tell me a little bit about yourself.
    a. Probe: Why did you decide to work at this school/the ELCs?
2. Where else have you worked?
    a. Probe: What was your role in these previous schools?
    b. Probe: Were there multiple pre-kindergarten classrooms at your site?
3. How does your current school compare to other places that you have worked?
    a. Probe: How is that different from working in other MNPS schools?
    b. Probe: How is that different than your experiences in other districts?
4. From your perspective, what is the mission of the ELCs?
5. How would you describe the values and goals of the ELCs?
    a. Probe: To what extent are there school specific values and goals?
    b. Probe: Who has been involved in setting the goals and the values?
        i. To what extent have people in different positions been part of the vision setting?
6. Now the ELCs are in their second year.

EXPERIENCED: What was it like to start a second year at the ELCs this year?

a. Probe: How did it compare to the start of the first year?

b. Probe: How were new teachers/staff introduced to the staff at your school at the beginning of the new school year?

c. Probe: Did you have a role in welcoming or helping the new teachers and staff?

NEW: What it was like to be a new MCL this year at (school)?

a. Probe: Did you receive any support to help you as a new MCL?

b. Probe: How did you feel as a new MCL at the beginning of the year? What about now?

7. In your survey, you mentioned that you think *(x supports your work in the ELCS, y is an obstacle, or z could be changed).* Tell me more about your thinking about this.

Professional Interactions

Next, I'd like to hear more about some of the ways that staff works together at your school. I'd like you to think specifically about when you collaborate with others *around instructional planning*.

8. Tell me about the opportunities that you have to work with others throughout the school year.

a. Probe: Please give some examples.

b. Probe: Who is involved or invited to attend these events?

c. Probe: How were these events/occasions organized (set up, advertised)

d. Probe: What was the purpose of the work?

9. How often do you have the opportunity to work with others at the other ELCs?

i. Probe: Are those others in the same position or different positions from yourself?

ii. Probe: What kinds of work do you do together?

iii. Probe: How often does this type of work occur?

10. Within the ELCs teachers, assistants, MCLS, and directors all have responsibilities related to instruction.
    a. What is your role in the classrooms?
    b. How much autonomy or flexibility to do have as an MCL?
        i. Probe: How do you organize your schedule for the day or week?
    c. Tell me more about how you work with the director/principal of your school.
        i. Probe: What is the role of the director at your school?
        ii. Probe: How often do you have individual interactions with the director?
        iii. Probe: What do you work on together?
        iv. Probe: In what settings do you interact with the director?
    d. From your perspective, what are the some of the most important ways that teachers and assistants work together?
        a. Probe: How does this compare to the ways that teachers and assistants have worked together in your previous work places?
        b. Probe: Are there things that could be improved about the relationships between teachers and assistants?
11. When you are planning for a new activity or event, how do you decide which colleagues with whom you want to plan?
12. From your survey responses, it seems that you _____ (use identified patterns or unusual responses in network relationships). Can you tell me a little more about this?

Data Use/Work

Next, I'd like to talk more about the data that you use in your work, including the Vanderbilt Data, GOLD assessments, and other forms of data.

13. What data do you use and how do you use it?
    a. Probe: How do you use student assessment data?
    b. Probe: How do you use observation data?

Now, I'd like to focus specifically on the data that you receive from Vanderbilt.

14. Please describe what happens when you receive new observation or assessment data from the Vanderbilt researchers?
    a. Probe: In what setting do you get to see and/or discuss your data first?
    b. Probe: Who else is a part of this conversation?
15. How do you decide what is important in the data, and what do you do with that information?
    a. Do the teachers that you work with seem to understand the data?
        a. Student data: Have you had a chance to visit the website VU set up that displays the student data for your classroom? How did you use the website?
        b. Classroom observations: How do you use them? How do you decide what to share with the teachers/assistants?
    b. Probe: Do you set goals for the teachers you work with based on the data?
    c. Probe: How do you know when the teachers/classrooms are meeting your goals)?
    d. Probe: How do you use the 8 goals that have been set across the ELCs?
    e. Probe: Did you and your team ever find something unexpected or particularly interesting when you were looking at the data? Tell me about that conversation. What happened?

Closing Questions

16. Is there anything else you think is important for me to know about working as an MCL at your school or in the ELCs in general?

APPENDIX L

Interview Protocol for Directors

Opening Questions: Experience at ELCs

1. Tell me a little bit about yourself.
    a. Probe: Why did you decide to work at this school/the ELCs?
2. Where else have you worked?
    a. Probe: What was your role in these previous schools/places?
    b. Probe: Were there multiple pre-kindergarten classrooms at your site?
3. How does your current school compare to other places that you have worked?
    c. Probe: How is that different from working in other MNPS schools?
    d. Probe: How is that different than your experiences in other districts?
4. From your perspective, what is the mission of the ELCs?
5. How would you describe the values and goals of the ELCs?
    a. Probe: To what extent are there school specific values and goals?
    b. Probe: Who has been involved in setting the goals and the values?
        i. To what extent have people in different positions been part of the vision setting?
6. Now the ELCs are in their second year.

EXPERIENCED: What was it like to start a second year at the ELCs this year?

a. Probe: How did it compare to the start of the first year?

b. Probe: How were new directors introduced to the staff at your school at the beginning of the new school year?

c. Probe: Did you have a role in welcoming or helping the new directors?

NEW: What it was like to be a new director this year at (school)?

c. Probe: Did you receive any support to help you as a new principal?

d. Probe: How did you feel as a new principal at the beginning of the year? What about now?

7. In your survey, you mentioned that you think *(x supports your work in the ELCS, y is an obstacle, or z could be changed)*. Tell me more about your thinking about this.

Professional Interactions

Next, I'd like to hear more about some of the ways that staff works together at your school.

8. Tell me about the opportunities that you have to work with others throughout the school year.

e. Probe: Please give some examples.

f. Probe: Who is involved or invited to attend these events?

g. Probe: How were these events/occasions organized (set up, advertised)

h. Probe: What was the purpose of the work/event?

9. How often do you have the opportunity to work with others at the other ELCs?

i. Probe: Are those others in the same position or different positions from yourself?

ii. Probe: What kinds of work do you do together?

iii. Probe: How often does this type of work occur?

10. Within the ELCs teachers, assistants, MCLS, and directors all have responsibilities related to instruction.

a. What is your role at the school?

b. How much autonomy or flexibility to do have as an ELC director?
    i. Probe: How do you organize your schedule for the day or week?
c. Tell me more about how you work with the coaches/MCLs at your school.
    i. Probe: How often do you have individual interactions with direction?
    ii. Probe: What do you work on together?
    iii. Probe: In what settings do you interact with the MCLs?
d. From your perspective, what are the some of the most important ways that teachers and assistants work together?
    c. Probe: How does this compare to the ways that teachers and assistants have worked together in your previous work places?
    d. Probe: Are there things that could be improved about the relationships between teachers and assistants?

11. When you are planning for a new activity or event, how do you decide which colleagues with whom you want to plan?
12. From your survey responses, it seems that you _____ (use identified patterns or unusual responses in network relationships). Can you tell me a little more about this?

Data Use/Work

Next, I'd like to talk more about the data that you use in your work, including the Vanderbilt Data, GOLD assessments, and other forms of data.

13. What data do you use and how do you use it?
    a. Probe: How do you use student assessment data?
    b. Probe: How do you use observation data?

Now, I'd like to focus specifically on the data that you receive from Vanderbilt.

14. Please describe what happens when you receive new observation or assessment data from the Vanderbilt researchers?
    c. Probe: In what setting do you get to see and/or discuss your data first?
    d. Probe: Who else is a part of this conversation?
15. How do you decide what is important in the data, and what do you do with that information?
    f. Do the teachers that you work with seem to understand the data?
        a. Student data: Have you had a chance to visit the website VU set up that displays the student data for your classroom? How did you use the website?
        b. Classroom observations: How do you use them? How do you decide what to share with the teachers/assistants?
    g. Probe: Do you set goals for the teachers you work with based on the data?
    h. Probe: How do you know when the teachers/classrooms are meeting your goals)?
    i. Probe: How do you use the 8 goals that have been set across the ELCs?
    j. Probe: Did you and your team ever find something unexpected or particularly interesting when you were looking at the data? Tell me about that conversation. What happened?

Closing Questions

16. Is there anything else you think is important for me to know about working as an MCL at your school or in the ELCs in general?