

Taking a Distributed Perspective in Studying School Leadership and Management: Epistemological and Methodological Trade-offs

**James P. Spillane
Northwestern University**

**Eric Camburn
University of Wisconsin-Madison**

**Geoff Lewis
Amber Stitzel Pareja
Northwestern University**

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Abstract

Taking a distributed perspective has the potential to offer fresh insights into how school leadership and management contributes to the school improvement process. In this paper the authors examine various methodological approaches to studying school leadership and management from a distributed perspective, comparing and contrasting what is learned about school leadership and management from each approach. Exploring these different approaches we identify two dimensions along which to consider the epistemological challenges they raise about measuring how school leadership is distributed across school staff - data source (top down and bottom up) and data focus (the organization as designed or the organization as lived). We also explore whether these approaches capture variation between schools and between activity-types in the distribution of responsibility for leadership work. The primary goal of this paper is to consider different ways of studying how the work of managing and leading schools is distributed among people in schools and the methodological and epistemological trade-offs involved in this work.

Introduction

Recent work suggests that viewing school leadership from a distributed perspective has the potential to provide useful insight into how management and leadership unfold in the daily lives of schools. Writing in the area of distributed leadership has identified numerous entities in the school across which leadership can be distributed, including people and aspects of the situation such as routines and artifacts. While there have been recent advances in articulating conceptual frameworks for distributed school leadership (Gronn, 2000; Spillane, 2006; Spillane, Halverson, and Diamond, 2004), the empirical research base in this area is less developed. With a few exceptions (see for example Camburn, Rowan, & Taylor, 2001), most empirical work has involved small samples of schools.

In this paper, we examine some of the epistemological and methodological challenges involved in studying the distribution of leadership across *people* within the school – the leader-plus aspect of a distributed perspective (Spillane, 2006). Researchers who wish to measure and study the leader-plus aspect of distributed leadership face two important epistemological questions:

- Across which school actors do researchers hypothesize leadership and management is distributed?
- What aspects of leadership and management work are hypothesized to be distributed across people?

These questions surface a number of related methodological questions:

- Who should provide evidence of distributed leadership - leaders, followers, or both? Among leaders, should researchers seek evidence on formal leaders, informal leaders, or both?
- Should evidence on distributed leadership come from self-reports, or from more “objective” measurement strategies such as the reports of others (e.g., teachers) through network surveys?
- What tradeoffs do researchers make with each of these decisions? In other words, how do these various methodological choices about measuring distributed leadership affect the validity of data?

Researchers’ answers to these questions determine how the distributed leadership construct becomes operationalized, and subsequently, determines the kinds of inferences researchers will be able to make about distributed leadership.

As part of our evaluation of the National Institute for School Leadership (NISL), we used multiple ways of identifying those actors within schools among whom the work of leadership and management might be distributed. In this paper, we describe these methods and consider the tradeoffs involved for efforts to understand how leadership might be distributed in schools.

Our paper is organized as follows. We begin with an overview of what it means to take a distributed perspective on school leadership and briefly review the empirical evidence from prior work. Next, we briefly describe the NISL study and provide a more detailed account of the data we use in this paper addressing where possible issues of validity occur. Turning to results, we begin by looking at the data generated by our four methodologies through a case study of one of the 52 schools – Elementary 1029. We

compare and contrast these results on the distribution of responsibility for leadership and management work across people. Based on this analysis, we identify two dimensions along which to examine the epistemological issues involved in taking a distributed perspective. We then consider the extent to which our four methodological approaches tap into between school and between activity-type variations in the distribution of responsibility for leadership work.

Research Methodology

The National Institute for School Leadership (NISL) is a professional development program intended to prepare principals to be outstanding instructional leaders within the context of standards-based accountability systems. The primary objective of the evaluation is to assess the effects of NISL participation on school principals' practice and knowledge, particularly practices and areas of knowledge that are thought to support instructional improvement. A secondary set of objectives is to examine the connections between institute participation, principals' practice, teachers' efforts to improve their practice, and student achievement. The study is also designed to develop new research tools for measuring school principals' knowledge and practice.

Data Collection & Instruments

The NISL evaluation study is being undertaken in a mid-sized urban school district in the Southeastern United States. The study involves a random assignment of half of the school district's 52 school principals to the NISL treatment. Data collection involved the 52 principals (both treatment and control groups) and 2400 school personnel in the 52 schools. For the purpose of this paper, we analyzed data from four different

sources from the NISL study – experience sampling method (ESM) log, end of day (EOD) logs, a principal questionnaire (PQ), and a school staff questionnaire (SSQ).

The first dataset contained responses from principals that were collected using experience sampling methodology (ESM). ESM is a technique in which principals are beeped at random intervals throughout their work day alerting them to fill out a brief questionnaire programmed on a handheld computer (PDA). In this way the ESM log captures behavior as it occurs within a natural setting. In this study the principals were beeped fifteen times a day for six days during Spring 2005. Forty-two of the fifty-two participating principals provided multiple days of data. The overall response rate to the beeps spread out across the six-day sampling period was 66%¹.

The second dataset we used was generated from an end-of-day (EOD) web log that principals filled out at the end of each school day. The EOD log contained a series of questions aimed at collecting information on the daily practices of principals over the course of the same six day period that was used for the ESM log. The log asked principals about their involvement in various leadership functions and in professional growth activities. The main part of the EOD instrument involved a calendar in which principals report how much time they spent in nine general categories of activity during each hour of the day between 6 a.m. and 7 p.m. Overall, 93% of the principals completed the EOD log over the six days.

The third source of data was a web questionnaire (henceforth, PQ) that was also administered to principals. For the purpose of this paper, we focused on the question in the PQ that asked principals about formal leadership teams at their schools. The PQ

¹ Response rates were calculated for principals that participated for a majority (i.e., 4 days) of the sampling period

response rate was 94%. Finally, we also analyzed data collected using a questionnaire that was mailed to staff members in all 52 schools. In this survey (SSQ), school staff indicated the specific leadership roles they fulfill in the school as well as the percentage of their time that is assigned to this role. In this paper we focus on those questions that asked staff about formal leadership roles and responsibilities and social network questions that asked staff to identify who they turned to for advice in reading and mathematics. These data provide us with an estimate of the number of formally designated leaders in each school along with an estimate of how much time they spend on management and leadership-specific responsibilities. The overall response rate for the SSQ was 87%.

Validity

We performed (or are in the process of performing) several analyses to check on validity. We started by comparing information obtained from ESM to information obtained from the EOD log. This step involved the validation of responses about types of activities. Specifically, we found a positive and significant association between principals' ESM and end of day log responses with respect to daily activities such as administrative related tasks. We performed a weighted regression to calculate the correlation coefficient for percentage of time spent on administrative and instructional activities between ESM and EOD (see Table 1). The percentages for each principal were calculated for the morning and afternoon hours of each day. The findings in this table show that the correlations among the two data sources were statistically significant even after controlling for time of day, day, and principal effects as well as any effect due to

completing the EOD log one or more days after the study day (Konstantopoulos, Spillane, and Lewis, in preparation).

[Insert Table Here]

We also validated the ESM data by comparing our results with data generated by a shadower who observed five principals for one day each as they completed the logs. Again, we found significant associations between principals' responses on ESM and the shadower data in the following areas: types of activities, leading activities, intended audience, subject area, and how and where the activity took place. Overall, ESM seems to have provided valid responses about principals' daily experiences.

[Insert Table 2 Here]

The limited work on construct validity of social network instruments suggests that it captures long term interaction patterns. A number of studies have used social network instruments to identify intra-organizational influence (Brass, 1984) and leadership in schools (Friedkin & Slater, 1994) and other organizations (Fernandez, 1991). While we were unable to validate the instrument as a means of tapping school leadership as part of this study, in parallel work we are validating similar network questions as a means of identifying leadership in schools. Analysis of these data is ongoing.

Measuring the Distribution of Responsibility for Leadership & Management

In the ESM log, principals reported on when they were leading or co-leading the activity and who they were co-leading with – administrators, teacher leaders, specialists, teachers, etc. School principals also reported who was leading the activities that the principal was not leading. Because the principals are prompted to submit this

information by random beeps, we can get an overall estimate of the percentage of time they spend leading alone and with co-leaders when we look at all of the data points across the six-day sampling period. The percentages reported from the ESM data in the tables and various analyses below are based on instances where the principal indicated that the activity in which they were participating when beeped was school-related. In our analyses, we calculate the mean percentages differently based on the area of interest. When comparing means (e.g., percentage of time leading alone for administration versus time leading alone for instruction and curriculum) we calculate percentages on all school-related beeps across principals and days. However, if we are interested in analyzing variance between days and/or principals, our percentage of time estimates are calculated for each principal and day and averaged across all principal/day combinations.

In the EOD log, principals reported who they worked with across a variety of daily activities. Time estimates for each activity were provided by hour using a code for a range of minutes (i.e., 1-14 minutes, 15-29 minutes, 30-44 minutes, and 45-60 minutes). We used the upper threshold of these ranges to calculate the number of minutes spent on a particular activity². We then looked at the principal's responses regarding who they worked with for each of these activities to determine the percentage of time principals worked alone and with the various co-leaders.

The PQ asked principals to indicate the members that were included on the formal leadership teams in their schools. We analyzed these data by role to calculate the percentage of schools where a particular role was a part of the leadership team (e.g., how many schools had the math coordinator on their leadership team).

² For the purpose of this analysis, it makes no difference whether we use the lower threshold, mid-point, or some other value so long as we are consistent across the ranges since we are merely interested in the proportion of total time rather than the raw hours and minutes.

Two questions from the SSQ data were analyzed for this paper. We analyzed data from the social network questions that asked respondents to list those to whom they went to for advice about mathematics and language arts. Respondents were identified as being leaders in math and/or reading based on their “in-degree” centrality measures. Degree centrality is a measure of the number of ties an actor has to other actors. In an advice network, each actor’s “in degree” centrality score indicates the number of people who approach that actor for advice - the number of people who listed them as someone to whom they turn for advice or information in mathematics and reading. We used four different approaches to identify math and reading leaders using “in-degree.” First, we took all respondents who had an in-degree equal to the mean in-degree plus one standard deviation for their schools. Second, in order to account for possible skewness in the distribution, we used the log of one plus the mean plus one standard deviation as the criterion. Third, we identified all respondents whose math and/or reading in-degree was at the 90th percentile or above for their school. Finally, we took the top three respondents from each school based on their math and/or reading in-degree.

The second set of analyses from the SSQ looked at questions pertaining to formal leadership designations and the percentage of time spent on these roles. The percentage of staff with formal leadership assignments was based on the total number of staff who indicated that they held a leadership role compared to the total number of staff that completed the SSQ. Additionally, we calculated the percentage of time spent on each role by school and across schools based on the midpoint of the ranges provided in the SSQ (i.e., 0%, 1-25%, 26-50%, 51-75%, 76-99%, 100%).

Conceptual and Empirical Anchors

A distributed perspective is an analytical framework for investigating school leadership and management. It involves two aspects: the leader-plus aspect and the practice aspect. The leader-plus aspect recognizes that leading and managing schools can involve multiple individuals. Moreover, school leadership and management potentially involves more than the work of individuals in formal leadership positions – principal, assistant principal, and specialists; it can also involve individuals who are not formally designated leaders. The leadership practice aspect moves the focus from aggregating the actions of individual leaders to the interactions among leaders, followers, and their situation (Spillane, 2006). We focus chiefly on the leader-plus aspect in this paper.

Prior empirical work suggests that an exclusive focus on the school principal is short-sighted. Defining leadership as a set of organizational functions rather than tying leadership to a particular administrative position, Heller and Firestone (1995) found in a study of eight elementary schools that multiple leaders, including school district personnel and external consultants, were taking responsibility for leadership. A recent study of more than one hundred U.S. elementary schools also found that responsibility for leadership functions was typically distributed across three to seven formally designated leadership positions per elementary school (Camburn, Rowan, and Taylor, 2004). Camburn and colleagues surveyed formally designated leaders in each school to examine the distribution of responsibility for leadership functions. Such positions included principals, assistant principals, program coordinators or facilitators, subject area coordinators or facilitators, mentors, master teachers, or teacher consultants, and other “auxiliary” professional staff, such as family outreach workers. Individuals with no

formal leadership designations also take responsibility for leadership activities. Studies that look beyond those in formally designated leadership positions show that teachers also perform key leadership functions and routines (Heller and Firestone, 1995; Spillane, 2006).

Leadership and Management Work: The Case of Elementary 1029

In this section we examine how leadership is distributed among these staff members by looking systematically at what our different data sources turn up for one of the 52 schools in our study - Elementary 1029. We organized this section around the instruments and data sources we used to collect the data. At the end of the section, we examine these four instruments along two dimensions – the sources they rely on to generate data and what they seek data on.

Of the 548 students enrolled at Elementary 1029, 78% receive free or reduced lunches. The school principal, Mrs. Jale, has been a principal for 19 years and principal at Elementary 1029 for 7 years. A middle-aged white woman, Mrs. Jale was a teacher for 10 years prior to entering school administration. Our various research instruments suggest that the work of leading and managing Elementary 1029 involves many more people in addition to Mrs. Jale.

Methodological Approaches

One of the basic challenges facing researchers taking a distributed perspective is identifying the staff among whom the responsibility for leading and managing is

distributed. Our research design gives us four different views of who these individuals are at Elementary 1029:

- Principals identified who was on the “leadership team” in the PQ instrument
- Principals reported who lead an activity they participated in or with whom they shared leadership when beeped on the ESM instrument
- School staff self-identified themselves as leaders in the SSQ instrument
- School staff identified key people who provided advice in mathematics and language arts in social network type questions (SSQ).

Overall, these four methodological approaches suggest some convergence and divergence on who takes responsibility for leadership and management work at Elementary 1029 (See Table 3). While regular classroom teachers emerge in all four approaches, the assistant principal emerges as a player in three of the four approaches. Mrs. Jale, the school principal, emerges in two of the three applicable approaches. Further, while the self-identification as formally designated leader on the SSQ suggests that one classroom teacher is involved in managing and leading Elementary 1029, the social network questions suggest that some seven regular classroom teachers are critical to this work. We examine the four approaches below.

[Insert Table 3 Here]

Principal Report: “Leadership Team” membership (PQ Data). In the PQ instrument, Mrs. Jale identified who was on the leadership team at Elementary 1029. From the PQ we learn that the leadership team at Elementary 1029, according to the school principal, consists of the principal, assistant principal, a variety of specialists (math, reading, school improvement), a special education, and a computer teacher. While the principal identifies the reading and math specialists as members of the school leadership team, none of the respondents to the SSQ indicate that they spend any time in

these roles. This may be due to the fact that these individuals did not respond to the survey.

Principal Report: Who is Leading or Co-Leading (ESM Data). We can get a sense of how responsibility for school leadership and management is distributed across staff at Elementary 1029 by exploring with whom Mrs. Jale, the school principal, reports leading an activity or is working with on co-leading an activity when beeped at random. For nearly 30% of the activities in which she was involved over the six-day period, Mrs. Jale identified someone else as leading the activity. On those occasions where she reported that she was not leading or facilitating the activity, the leaders she identified typically were other formally designated leaders including subject area specialists, the assistant principal, and teacher leaders but also included informal leaders such as regular classroom teachers (see Table 4). These data suggest that other formally designated leaders and informal leaders are important in understanding the work of leading and managing Elementary 1029.

[Insert Table 4 Here]

Based on an analysis of the ESM data, Mrs. Jale reported that for half of those activities where she was leading she was not performing solo, and at least one other individual (sometimes more than one) was co-performing the activity with her (See Table 5). While Mrs. Jale was more likely to report co-performing an activity with another formally designated leader, she also reported co-performing activities with individuals with no formal leadership designations such as classroom teachers and even students (See Table 5).

[Insert Table 5 Here]

The percentage of time that Mrs. Jale reported leading an activity when beeped varied depending on the type of activity. While she reported leading over three quarters of administration activities (76%), she reported leading just over one-third (38%) of the instruction and curriculum activities. These data suggest that individuals other than the school principal may be even more important when it comes to managing and leading instruction and curriculum at Elementary 1029. Of the activities she reported leading, she worked alone for half of them, and a co-leader was present for the other 50%. When co-performing an activity, Mrs. Jale reported working with one other person 62% of the time, while 38% of the time there were two or more other people co-performing with her. Mrs. Jale reported spending most of her time co-performing with either the assistant principal or other professional staff (e.g., guidance counselors, social workers) (See Table 5).³ When Mrs. Jale was not leading an activity that she was involved in, other professional staff, subject area specialists, or the assistant principal were the leaders she most frequently identified as performing the activity (see Table 4).

Staff Self-Report of Formal Leader Designation (SSQ). Based on an analysis of the SSQ, School 1029 has 10 other individuals with formal leadership designations in addition to the school principal. These designations include two individuals who spent all of their time in a single leadership position: a full-time assistant principal and a full-time school reform coach. The remaining 8 leaders include grade level chairs, special program coordinator, mentor teacher, reading coordinator, etc. who spread their time amongst multiple roles (See Table 6). These eight formally designated leaders had from

³ Note that the percentages in this table, and several other tables, will not total to 100% as respondents were able to select more than one category for several of the questions

12.5% to 100% of time assigned to one or more formally designated leadership positions and all were part-time. Further, all eight selected “regular full-time teaching appointment” when asked about employment status while the two full-time leaders (AP and School Reformer) selected “administration” for this same question. Table 6 shows the number of people who spent some portion of their time in each leadership position and the average percentage of time⁴ spent on each role.

[Insert Table 6 Here]

School staff reports on leaders for mathematics and language arts (SSQ). In the SSQ we asked the staff at Elementary 1029 to identify those to whom they turn to for advice about mathematics and language arts instruction. Examining these data, we can identify both formal and informal leaders for two core school subjects and gauge how responsibility for leadership and management in these two school subjects is distributed. Using measures of “in-degree” centrality⁵, we can identify who provides leadership in mathematics and reading at Elementary 1029. Who emerges as a leader, however, depends on how we use in-degree centrality to identify leaders. First, when we take all staff members with an in-degree of the mean plus one standard deviation, we identify five mathematics leaders and only one reading leader. Of the two of five math leaders for whom we have information, one, a 2nd grade teacher, has no formal leadership designation while the other is a formally designated leader - a program chair and mentor teacher. The whole school reform coach, a formally-designated leader, is the only individual who emerges as a reading leader when using this approach.

⁴ Estimates for percentage of time spent on each leadership role were provided via a range (i.e., 0%, 1-25%, 26-50%, 51-75%, 76-99%, and 100%). When calculating the average percentage of time spent on each role, we used the midpoint of each of the ranges.

[Insert Figure 1 & 2 Here]

Using a second approach that involves taking one plus the log of the mean in-degree plus one standard deviation⁶, we now identify twelve mathematics leaders instead of five and nine reading leaders instead of one. We have information for eight of the twelve math leaders, where five have no formal leadership designation, and three have a formal leadership role in the school. Among the informal math leaders, two are 2nd grade teachers; one is a 3rd grade teacher; one is a 5th grade teacher; and one is a language arts specialist. The formal math leaders include a reading specialist, a program chair, and a 4th grade teacher (who identified herself as being a formal leader but did not provide information on that position). Of the five reading leaders for whom we have information, three are formally designated leaders, while two have no formal designation as leaders. These two informal leaders for reading are second and fourth grade classroom teachers.

Using a third approach that takes those individuals in the network with an in-degree in the top 90th percentile, we identify the same five leaders in mathematics identified by the first approach and the same nine reading leaders identified by the second approach. Finally, if we take the top three leaders according to their in-degree we identify the same five leaders in mathematics that we identified by the first and third approaches (due to a four-way tie) and three leaders in reading. Of the two (of three) reading leaders for whom we have information, one is the whole school reform coach, a formally designated leadership position, and the other is a 2nd grade teacher with no formally designated leadership position (see Table 7 & 8).

[Insert Table 7 & 8 Here]

⁶ This approach allows us to normalize skewness in the distribution.

Epistemological Considerations

As illustrated through the Case of Elementary 1029, these four methodological approaches involve different ways of knowing how leadership is distributed in schools – even when the same instrument was used such as the SSQ. By examining the four approaches we can identify different epistemologies about the distribution of leadership. We can think about the four approaches along two dimensions. First, we can categorize the various approaches based on the data source; that is, who provides the data. Second, we can categorize the approaches on whether they generate data about the formal designed organization or the organization as lived (See Table 9).

From an epistemological perspective, both dimensions are critical in that they suggest different ways of coming to know about how responsibility for leadership and management is distributed in the school. The top-down/bottom-up dimension foregrounds who should provide evidence about the distribution of responsibility. The designed organization/lived organization dimension underscores that one can come to know how leadership is distributed in schools either through focusing on the formally designated leadership positions in the school (the designed organization) or through the day-to-day practice of leadership and management (the lived organization). While these two aspects of the organization are related, they are not mirror images of one another.

The top-down approach relies on the reports of the school principal, Mrs. Jale and could be extended to include other formally designated leaders (see Camburn, Rowan, & Taylor, 2001). From an epistemological perspective, examining how leadership is distributed by examining the work of the school principal is sensible given the principal's

position at the top of the organization. The principal's reports are of two sorts. In the PQ, she is reporting on the designed organization by listing members of the school leadership team. The designed organization, however, may not be an accurate representation of what actually happens in the day-to-day life of managing and leading the school (the lived organization). In the ESM the principal is reporting on who actually performs or is co-performing with her particular leadership and management activities. Both approaches show that both formally designated and informal leaders have responsibility for school management and leadership at Elementary 1029.

The ESM data, however, goes beyond the PQ data in at least two respects. First, it goes beyond identifying those who have responsibility for leadership and management at Elementary 1029 and identifies those individuals who actually do the work. Second, with the ESM data we also get a sense of the arrangements for distributing leadership and management work. For example, we get a sense of the prominence of co-performance of leadership and management work - we can identify situations in which two or more actors co-perform a leadership or management activity, albeit tied entirely to the principal's practice. Using the ESM data for Elementary 1029 we can gauge the prevalence of co-performance in the school principal's work and examine how it differs by activity type. At Elementary 1029, the principal is more likely to co-perform an activity tied to instruction and curriculum than one tied to administration.

From an epistemological perspective, examining leadership from the perspective of those in the follower role also seems sensible. For leaders and managers to lead and manage, others must agree to be led and managed (Dahl, 1961; Cuban, 1988). Further, people in schools can move in and out of leader and follower roles depending on the task

or activity. Hence, we can learn about leadership and management by focusing on the perspectives of followers in addition to that of the leaders. The SSQ allows us to do this.

The two SSQ items that were designed to incorporate the bottom-up perspective generate somewhat different accounts of how leadership is distributed among people in the school. While the self-reports on formal leadership positions foregrounds the designed organization as represented in formally designated leadership positions, the network questions focus on the organization as lived and allow for the emergence of both formally designated and informal leaders. Over 25% (10 of 39 respondents) at Elementary 1029 indicated that they held a formally designated leadership or management position, which is a very high percentage of the faculty. (We propose to examine these reports as the number of leaders is very large.) The social network questions suggest that the distribution of leadership, at least for mathematics and language arts, is more evenly distributed between formally designated leaders and informal leaders (i.e., individuals with no formal leadership designation). Neither the principal nor the assistant principal emerges as a leader from the network measures. Still, formally designated leaders remain important (seven actors in all) and, as shown in Figures 1 and 2, are potentially some of the most important leaders in terms of the number of others who seek advice from them (e.g., school reform coach in the literacy network).

Regardless of methodological approach the data suggests that the work of managing and leading Elementary 1029 involves multiple actors, even the top down approach that privileges the school principal. Approaches that attempt to tap the organization as lived, suggest that when measuring how leadership is distributed over

people, it is important to try and capture actors with no formal leadership designations. Even the ESM data, looking at leadership and management work from the top-down, suggests that actors with no formal leadership designations are important to consider when examining how the work is distributed over people.

Variance Between Schools and Between Activity-Types

An important methodological concern is whether our measures manage to pick up variability in how leadership is distributed in schools. In this section, we present a preliminary analysis focusing on variance between schools and between activity types in the distribution of responsibility for leadership and management work. Our main question is this: Do these approaches to measuring the distribution of responsibility for leadership and management enable us to identify differences between schools and activity types?

From the Top Down

In this section we explore variability among schools and activity types using data generated by the ESM log that focused on the lived organization. Because the PQ question on the composition of school leadership team - the designed organization – showed little variation across schools we focus only on the lived organization here.

ESM Data: Focusing on the Lived Organization

We begin by looking at variability in ESM measures by school and then turn our attention to variability by activity type. We use box plots to depict the variance in this preliminary analysis.⁷

On average, school principals lead 69% of the activities they engage in and they lead alone for 52% of these activities.⁸ Graph 1 displays the distribution of the percent of time principals spend leading an activity. There is considerable variation across schools in the amount of time the principal is leading the activity in which he/she is engaged (44% - 90%, excluding outliers) (see Graph 1). While some principals reported that someone else was leading over 50% of the activities they participated in over the six-day period, others reported that someone else was leading only 10% of the time. Focusing on those activities where the school principal reported leading, we see even more variation between schools in the amount of time principals' lead alone as distinct from co-leading with someone else, ranging from 19% to 91%. Overall the ESM log is picking up considerable variability across principals in terms of whether someone other than the principal is likely to be leading an activity the principal is participating in and in terms of whether the principal is likely to be co-leading.

This variation across principals is more pronounced when we consider the type of activity in which the principal is participating. Table 10 shows the differences in the

⁷ The "box" indicates the upper and lower quartiles of the distribution and the median is the dark horizontal line. The "whiskers" show the range of values that are within 1.5 times the box height. All of the values outside of the whiskers are considered outliers.

⁸ EOD log sample of principals who spend approximately 22% of their time working alone and 64% of this time on administration. The ESM log also contains data about who principals work with on their daily activities. Because of the difference in the way the questions were asked in both logs, it is difficult for us to compare estimates on who principals work with. The ESM data provides us with an indication of who lead or co-lead activities, which the EOD log does not. For this reason, we will focus the majority of our "top-down" analysis on the ESM log data.

mean percentages for leading and leading alone by activity type:⁹ We find that principals lead the majority of administrative related activities more often by themselves than with a co-leader. Further, principals are leading just over half of the instruction and curriculum related activities.

There is more variability between principals in whether they are leading the activity or not for instruction and curriculum related activities than for administration related activities (see Graph 2). There is also more variation between principals in whether they are leading alone or co-leading for instruction and curriculum related activities compared with administrative related activities.

Data generated by the ESM log also shows considerable variation with whom school principals co-lead by activity-type. Overall, principals selected classroom teachers most frequently as co-leading an activity with them, followed by other professional staff, and teacher leaders (See Table 11). Principals were considerably more likely to co-lead with classroom teachers than with teacher leaders and assistant principals. The fact that principals spent more time co-leading with classroom teachers than teacher leaders is curious but may be driven by the total number of teachers relative to the number of teacher leaders and assistant principals. On average, principals spend relatively little time co-leading with assistant principals on matters of instruction and curriculum.

⁹ One note should be made on the ESM log data before proceeding. The number of missing responses for the question, “Who is co-leading this activity with you?” was far larger than the number of missing responses for any other question in the log. There was no response for 300 of the 1,417 beeps (~21%) for this question. We believe this can be attributed to the way in which the question was interpreted by the respondents. Rather than select “Working Alone”, it is likely that the respondents simply skipped this question. This is supported by the fact that an answer was provided for the question that directly followed the co-leading question for 298 of the 300 missing responses (ruling out the possibility that several people stopped participating at this point in the log). Additionally, our shadow data indicated that the principal was working alone for 73% of the beeps that were skipped for this question. We have concluded that these missing responses should actually be interpreted as working alone and have coded them as such.

Examining the variability in the school principal's co-leaders by activity, Graph 3 displays the data for the four most frequently selected co-leaders. There was substantial variation between principals in the percentage of time they spent co-leading with teachers (either teacher leaders or classroom teachers) in activities related to instruction and curriculum and less variability for administration related activities. Again, the ESM log seems to pick up considerable variation in how leadership is distributed over people by activity type. For example, comparing the distributions of these co-leaders to one another and comparing distributions within co-leaders across activity-types, we see that the range of variation in who co-leads differs by activity type.

[Insert Graph 3 Here]

The ESM log picks up considerable variance by school and activity-type in terms of whether the school principal is leading the activity or not, and if the principal is leading whether she or he is leading alone or whether the activity involves co-leaders. Overall, the ESM log picks up much greater variability in the distribution of responsibility for leadership and management work relative to the PQ question about leadership team membership. This may be in part a function of district policy with respect to who needs to be represented on the school leadership team. However, it also suggests that much of the variance between schools in how leadership is distributed among people is likely to be found in practice rather than in membership of formal committees and positions.

From the Bottom-up

In this section we shift perspectives and explore variability among schools and activity types from the bottom-up using data generated by the SSQ instrument – self-reports of formally designated leadership positions and advice givers in social network questions. While the self-reports of formally designated leadership positions tap the organization as designed, the social network questions focus more on the organization as lived.

Formally Designated Leaders (SSQ): The Designed Organization

Overall, 30% (622 of 2,070 respondents) spend at least a portion of their time in a formally designated leadership role. Over 38% of these actors reported being full-time in a leadership position. These percentages are fairly consistent across schools. The number of full-time leaders in a single role ranged from 0 to 13 depending on the school. The average number of full-time leaders per school (in addition to the school principal) was 4.6. Table 12 displays the number of people assigned to each role, the average number of people assigned to that role across schools, the number of full-time people assigned to each role as well as the average across schools, and the average percentage of time spent on each role across schools.

With the exception of the assistant principal and math coordinator roles, the median percentage of time spent on all other formally designated positions across schools is roughly equal (~ 40%) (see Graph 4). We notice however, that there is considerable variability between schools. For example, the amount of variation in the percentage of time spent in the reading coordinator role is much larger than the variation for the

mentor/teacher role, which may in part reflect differences between elementary, middle and high schools.

Leaders for mathematics and language arts (SSQ): Lived Organization

In this section we examine variability in the social network measures of leaders by school and activity type; in this case, mathematics and reading. For the purpose of this preliminary analysis, we selected people who were identified by all four approaches (mean plus one standard deviation, one plus the log of the mean plus one standard deviation, 90th percentile, and top three) as being leaders in math and/or reading. Using these criteria, we identified 193 math leaders and 180 reading leaders out of a total sample of 2436 people. Of the math leaders, 43% had a formal leadership role, while 46% had no formally designated leadership role in the school (11% were unknown). Among reading leaders, 43% were formally designated as leaders while 39% were informal leaders (17% were unknown). Overall, principals and vice-principals did not play a large role in leading and managing mathematics and reading according to this approach. Only one principal emerged as a leader in math, and one principal emerged as a reading leader. Vice-principals were slightly more prominent – 10 were identified as math leaders and 10 were identified as reading leaders (see Table 13). More striking is that individuals with formal leadership designations in mathematics and language arts figured less prominently than we might have expected. While 36% of the reading coordinators emerged as leaders based on our analysis of the social network data, 64% did not emerge as leaders. The situation was similar for mathematics; over 50% of

mathematics coordinators did not emerge as leaders based on our analysis of the social network data (See Table 13).

On average, slightly less than a tenth of the school's respondents were identified as math (8.5%) and reading (8.3%) leaders. The percentage of the school's respondents who were identified as reading and math leaders, however, varied greatly between schools. The percentage of respondents who were math leaders varied from 0 to 24% of the staff depending on the school, and the percentage of respondents who were identified as reading leaders varied from 2 to 23% of the staff (See Graph 5). Our analysis also suggests differences by school type – elementary, middle, and high school.¹⁰

Looking from the bottom-up, our data suggests fewer leaders when we use the social network measure rather than the self-report measure of a formal leadership position. This is to be expected as our social network measure focused narrowly on mathematics and reading rather than instruction writ large and did not touch at all on administration related activities.. Hence fewer leaders might be expected. Comparing the two approaches, one advantage of the social network approach is that it identifies actors with no formal leadership designation as important actors in school leadership and management. Further, the social network data suggests that a formal leadership designation (e.g., mathematics coordinator, literacy coordinator) may not be a good indicator of who leads in the day-to-day life of the organization. As noted above, more than two-thirds of the reading coordinators were not identified as leaders for reading

¹⁰ When we look at the percent of the respondents identified as math and reading leaders according to school type, there are more leaders identified at the elementary level than at the middle or high school levels, especially in the area of math. The average percent of respondents who were math leaders was 9% among elementary staff, 7.6% among middle school staff, and 4.7% among high school staff. For the area of reading, 8% of elementary, 8% of middle school, and 7.5% of high school staff members were identified as leaders.

instruction by staff. The social network measure also suggests little variation between reading and mathematics in terms of how leadership is distributed across leaders in terms of the mix of formally designated leaders and informal leaders and the average number of leaders per school by subject.

Discussion and Conclusion

Examining convergence and divergence in how responsibility for leading and managing schools was distributed across people, as well as using data generated through four different methodological approaches, we considered the epistemological challenges along two dimensions. First, we examined how the source of data – be it exclusively from the top of the organization or including the perspective of the bottom - influenced the conclusions one might draw. Second, we examined the implications of the target of the data collection approach – be it the designed organization or the lived organization - for the conclusions one might draw with respect to how leadership is distributed across people in schools. As documented in Table 2, the various approaches show considerable agreement with respect to the individuals over whom leadership is distributed in schools. While acknowledging broad similarities among the various approaches, our account also surfaces some divergence that has implications for thinking about the epistemological and methodological challenges in measuring leadership from a distributed perspective.

Of the four approaches, the findings about the distribution of leadership generated by the social network questions on the SSQ differed most from the findings generated by the other instruments. We suspect this is at least in part a function of the fact that these questions narrowed in on mathematics and reading rather than leadership and

management for instruction or writ large. Still, more than the mathematics and language arts focus of the questions seems to be at play. For example, nearly two-thirds of the formally designated language arts leaders and one half of the formally designated mathematics leaders did not emerge as leaders based on our analysis of the social network data. Tapping into the lived organization, the social network questions suggest that an exclusive focus on formally designated leaders may miss an important dimension of how the work of leading and managing schools is distributed over people.

Approaches that target the organization as lived (ESM Principal Log, SSQ Network Questions) are important for tapping how leadership is distributed over actors with no formal leadership designation. Regardless of whether these approaches attempt to get at leadership from the top down (i.e., the principals' on the spot reports regarding who is leading or co-leading) or from the bottom up, they tap into the informal leaders in the organization and appear to capture how responsibility for leading and managing schools is distributed across actors with no formal leadership designation. Approaches that focus on the organization as designed appear to under-estimate the role of actors with no formal leadership designation.

We examined whether the measures picked up variation between schools and activity-type. As one might expect, approaches that target the lived organization appear to pick up more variation between schools than approaches that focus on the designed organization. A comparison of data from the ESM log with data from the PQ Leadership Team Membership and the SSQ Self-Designation as Formal Leaders, suggests that approaches attempting to measure how leadership is distributed across people that involve tapping into the lived organization pick up more variability between schools.

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Table 1. Weighted Regression (Number of ESM Responses)

Measure	Administration		Instruction & Curric	
	Coef	R ²	Coef	R ²
Model 1: Bivariate correlation	.356	.126	.435	.189
Model 2: Model 1 + day effects	.354	.167	.440	.201
Model 3: Model 2 + time effects	.354	.167	.438	.207
Model 4: Model 3 + day/time interaction effects	.372	.183	.447	.221
Model 5: Model 4 + EOD response delayeffects	.369	.187	.443	.223

Table 2. Percent Agreement between ESM and Shadower Data

Measures	Percent Agreement	Association	P-Value
School-Related Work	100%	0.71	0.000
Location	91%	0.88	0.000
Type of Activity			
Administration	83%	0.90	0.000
Instruction and Curriculum	77%	0.85	0.001
Leading	94%	0.66	0.000
Working Alone	73%	0.30	0.163
Classroom Teachers	86%	0.47	0.031
Assistant Principal	95%	0.58	0.001
Subject area Specialist	95%	0.57	0.059
Other Professional Staff	82%	0.26	0.256
Non-teaching Staff	82%	0.41	0.053
District Staff	91%	0.57	0.000
Audience			
No one	94%	0.30	0.149
Students	86%	0.61	0.000
Classroom Teachers	85%	0.54	0.000
Assistant Principal	94%	0.57	0.000
Subject area Specialist	96%	0.61	0.000
Other Professional Staff	96%	0.61	0.000
Non-teaching Staff	98%	0.63	0.002
District Staff	98%	0.57	0.038
Subject	94%	0.90	0.000
How is Activity Done?	87%	0.83	0.000

Table 3. Nominated Leaders Across Data Sources for Elementary 1029

	Principal	Asst Prin.	Formally Designated Leader	Classroom Teacher
Member of Leadership Team According (PQ)	YES	YES	YES	YES
Principal Identification as Leader or Co-Leader According to ESM	YES	YES	YES	YES
Self-Identification as Formally Designated Leader (SSQ)	N/A	YES	8	1
Identified as Math and/or Reading Leader According to Network Data (SSQ)	NO	NO	6	7

Table 4. Percentage of Principal Time Where Someone Else was leading on ESM

Leader	%
Other Professional Staff	41.2%
Subject Area Specialist	35.3%
Assistant Principal	17.6%
Teacher Leader	11.8%
Classroom Teacher	11.8%
Non-Teaching Staff	5.9%
Other	5.9%
Student	0.0%
District Staff	0.0%
Parent	0.0%
Community Member	0.0%

Table 5. Percentage of Principal ESM Data Beeps Spent with Various Co-Leaders

Co-Leader	%
Assistant Principal	57.1%
Other Professional Staff	42.9%
Classroom Teacher	19.0%
Non-Teaching Staff	19.0%
Teacher Leader	14.3%
Parent	9.5%
Student	4.8%
Subject Area Specialist	0.0%
Other	0.0%
District Staff	0.0%
Community Members	0.0%

Table 6. Average Percentage of Time Spent on Each Leadership Role in SSQ

Role	# of People	% of Time
Assistant Principal	1	100.0%
School Improvement	1	87.5%
Grade-Level Chair	1	87.5%
School Reform Coach	2	68.8%
Special Prog Coord	4	31.3%
Mentor Teacher	4	18.8%
Teacher Consultant	4	18.8%
Other Subject Coord	2	12.5%
Reading Coordinator	0	0.0%
Math Coordinator	0	0.0%

Table 7. School 1029 Math Leaders

	Mean + 1 Std. Dev.	Log (1 + Mean) + 1 Std. Dev.	90 th Percentile	Top 3
Formal Leader	1	3	1	1
No Formal Leadership Designation	1	5	1	1
Unknown	3	4	3	3

Table 8. School 1029 Reading Leaders

	Mean + 1 Std. Dev.	Log (1 + Mean) + 1 Std. Dev.	90 th Percentile	Top 3
Formal Leader	1	3	3	1
No Formal Leadership Designation	0	2	2	1
Unknown	0	4	4	1

	Mean + 1 Std. Dev.	Log (1 + Mean) + 1 Std. Dev.	90 th Percentile	Top 3
Formal Leader	1	3	3	1
No Formal Leadership Designation	0	2	2	1
Unknown	0	4	4	1

Table 9. Epistemology and Methodology

	Designed Organization	Lived Organization
Top-down	PQ Leader Team Members	ESM
Bottom-up	SSQ – Leadership designation	SSQ – Social Network

Table 10. Percentage of Time Leading and Leading Alone by Activity

Activity	% Leading	% Leading Alone
Administration	77.8%	55.2%
Fostering Relationships	65.9%	38.1%
Instruction & Curriculum	55.2%	45.5%
Professional Growth	23.3%	46.4%

Table 11. Co-Leader Participation Percentages

Co-Leader	%
Classroom Teacher	29.3%
Other Professional Staff	24.0%
Teacher Leader	23.8%
Assistant Principal	21.3%
Non-Teaching Staff	16.0%
Student	15.7%
Subject Area Specialist	10.4%
Parent	7.2%
Other	7.0%
District Staff	3.8%
Community Members	2.3%

Table 12: SSQ Formal Leadership Designations

Role	#	Avg # per school	Full-Time	Avg # per school	Avg % of Time
Mentor Teacher	317	6.1	32	0.6	37.9%
Other Subject Teacher	213	4.1	32	0.6	43.5%
Consultant	201	3.9	16	0.3	35.3%
School Reform Coach	171	3.3	16	0.3	33.6%
Special Prog Coord	164	3.2	26	0.5	44.3%
School Improvement	160	3.1	16	0.3	39.7%
Other	120	2.3	23	0.4	41.6%
Assistant Principal	113	2.2	51	1.0	60.6%
Reading Coordinator	108	2.1	18	0.3	36.3%
Math Coordinator	81	1.6	7	0.1	30.4%

Table 13. Proportion of Category Considered Math & Reading Leaders According to Network Data

	% Math Leaders	% Reading Leaders
Principal (n = 52)	1.9	1.9
Assistant Principal (n = 126)	7.9	7.9
Reform Coach (n = 176)	16.5	11.9
Special Program Coordinator (n = 170)	11.8	11.8
Reading Coordinator (n = 114)	4.4	36.0
Math Coordinator (n = 87)	42.5	5.7
Other Subject Coordinator (n = 224)	8.9	6.7
School Improvement Coordinator (n = 167)	17.4	13.2
Mentor Teacher (n = 330)	15.2	13.0
Teacher Consultant (n = 212)	16.0	9.4
Other Leader (n = 126)	6.3	11.9
No Formal Leadership Designation (n = 1416)	6.2	4.9

Figure 1. Math Network at Elementary 1029

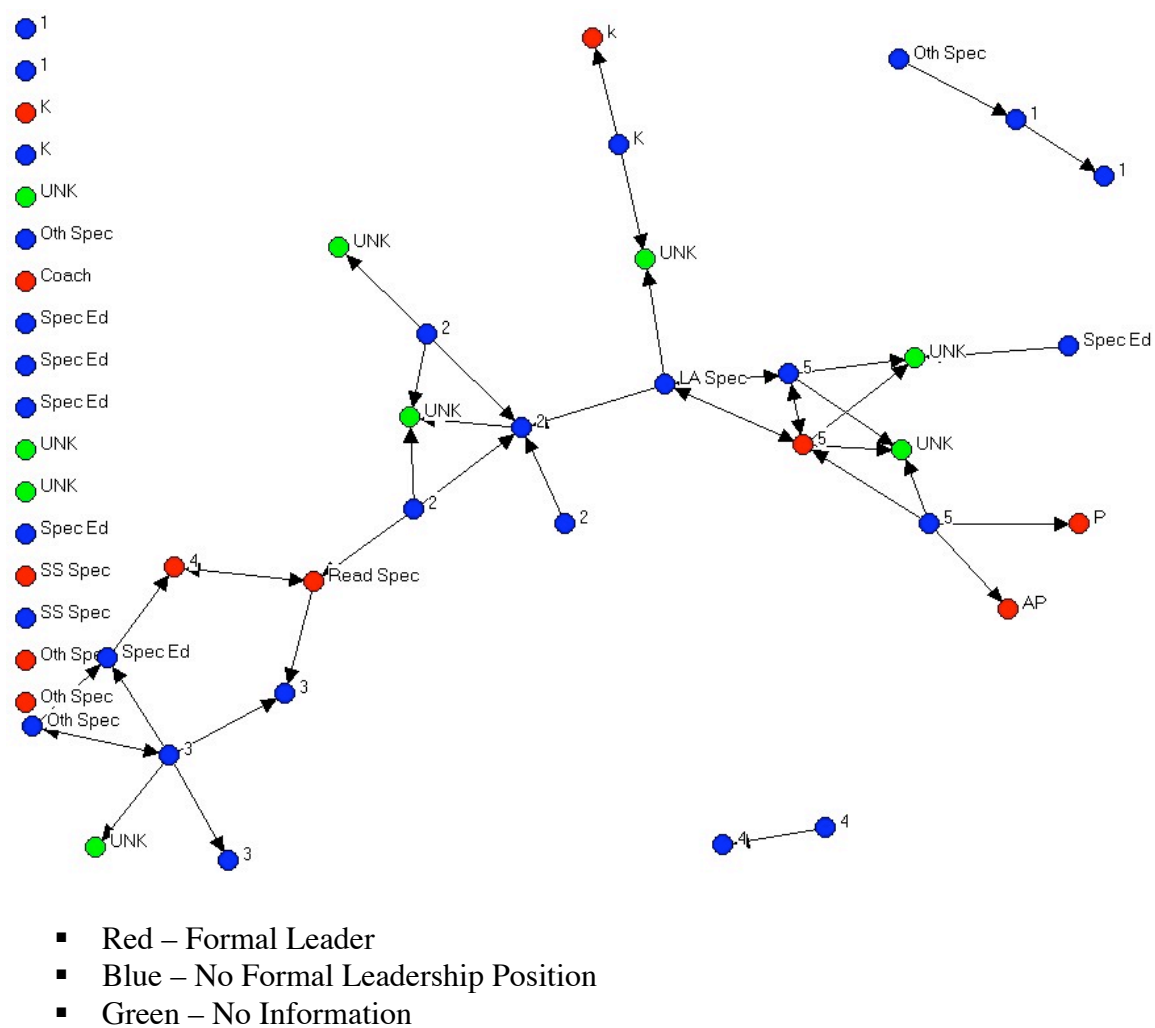
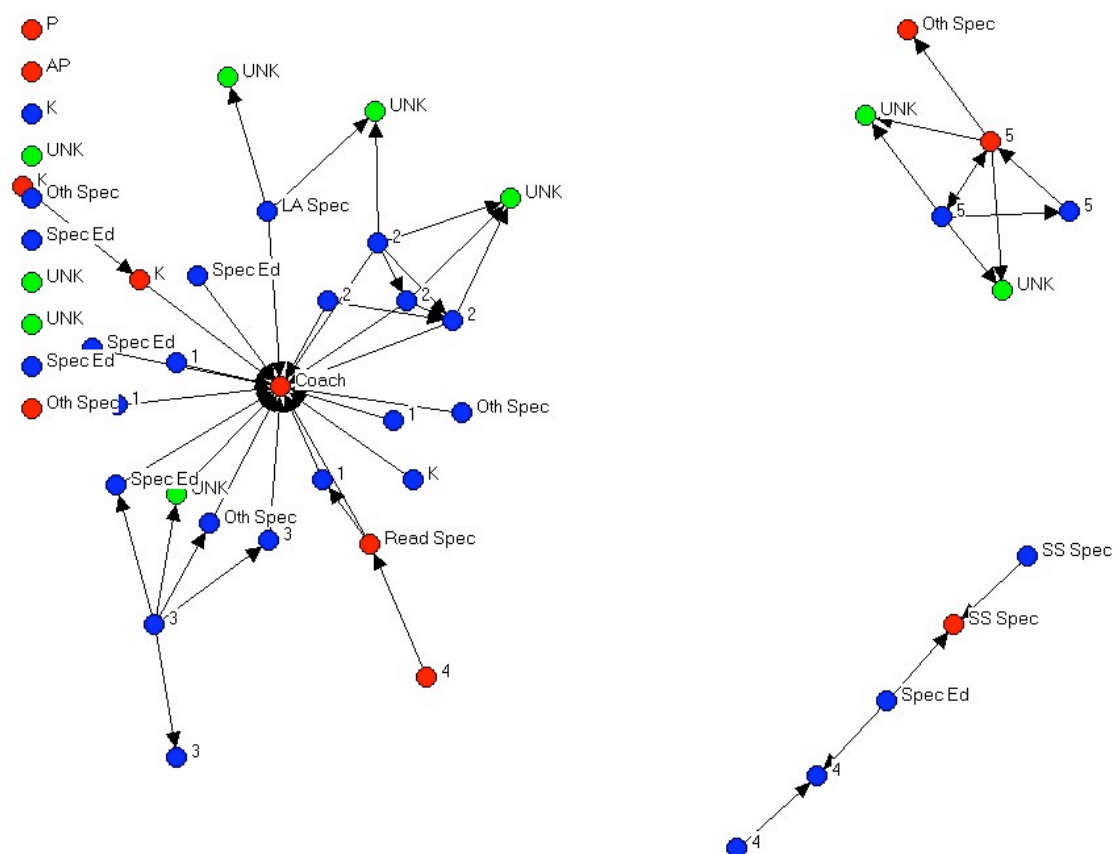
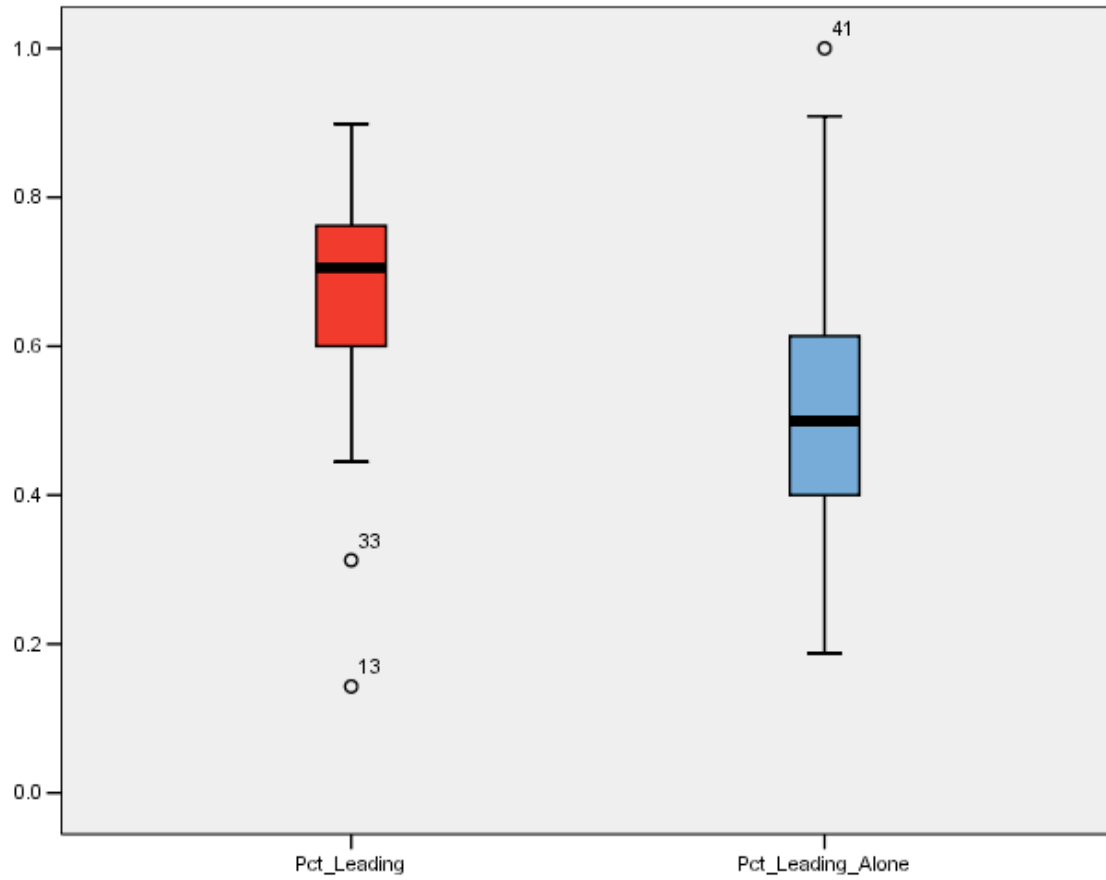


Figure 2. Reading Network at Elementary 1029

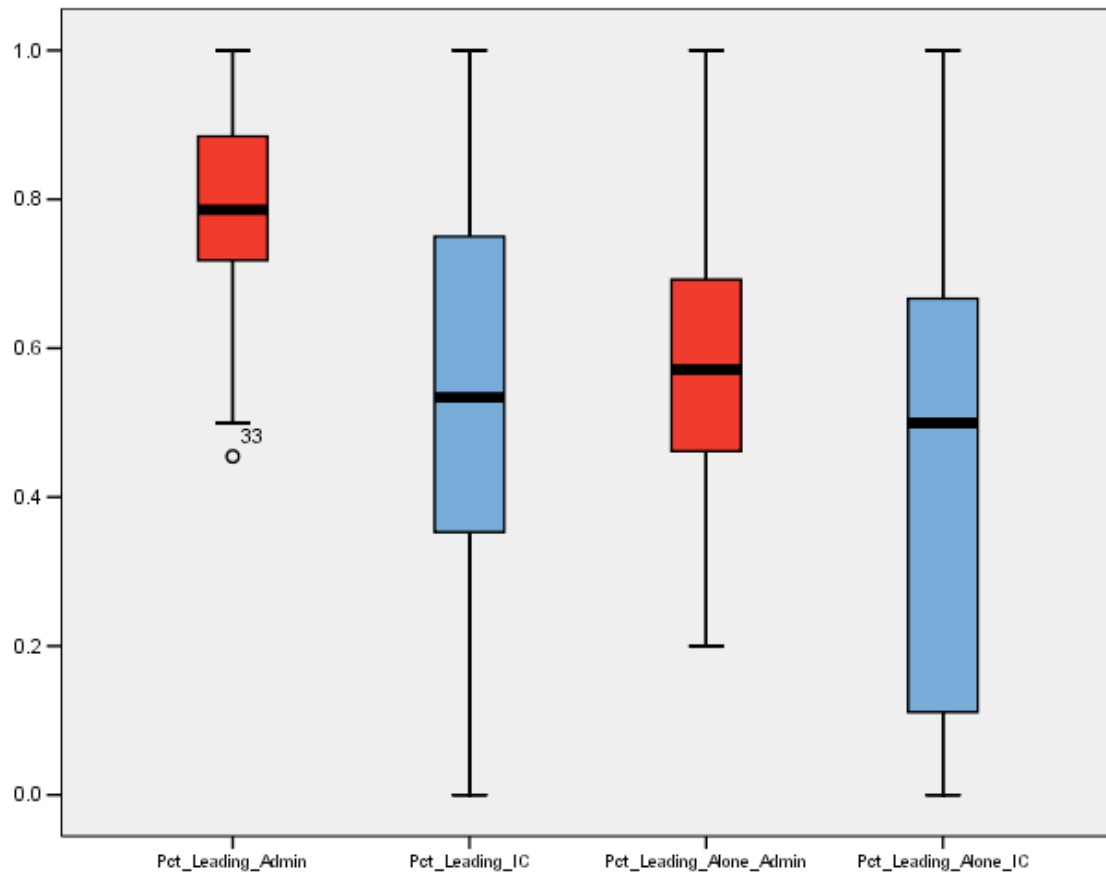


- Red – Formal Leader
- Blue – No Formal Leadership Position
- Green – No Information

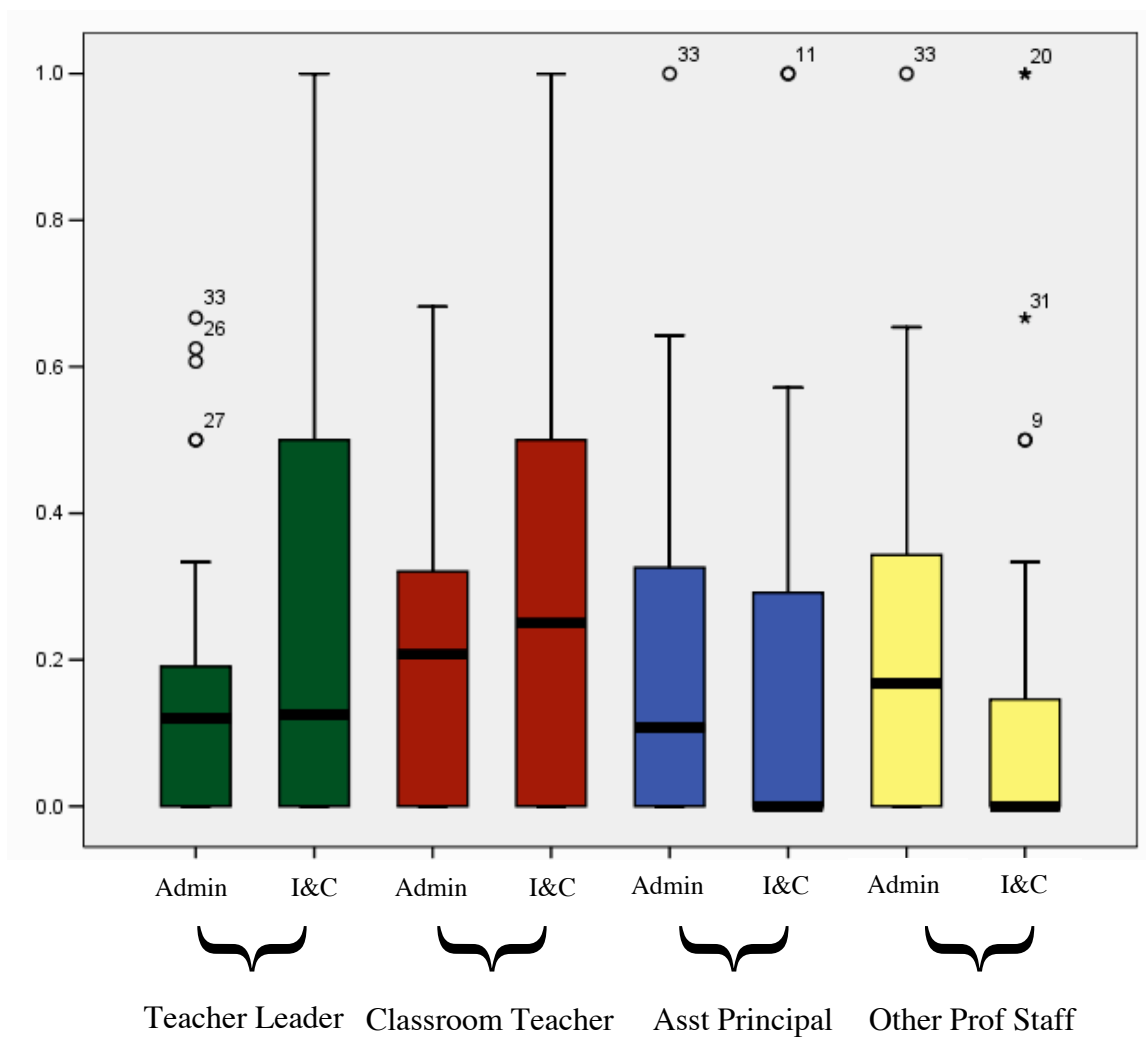
Graph 1. Percentage of Time Leading and Leading Alone



Graph 2. Percentage of Time Leading Activities

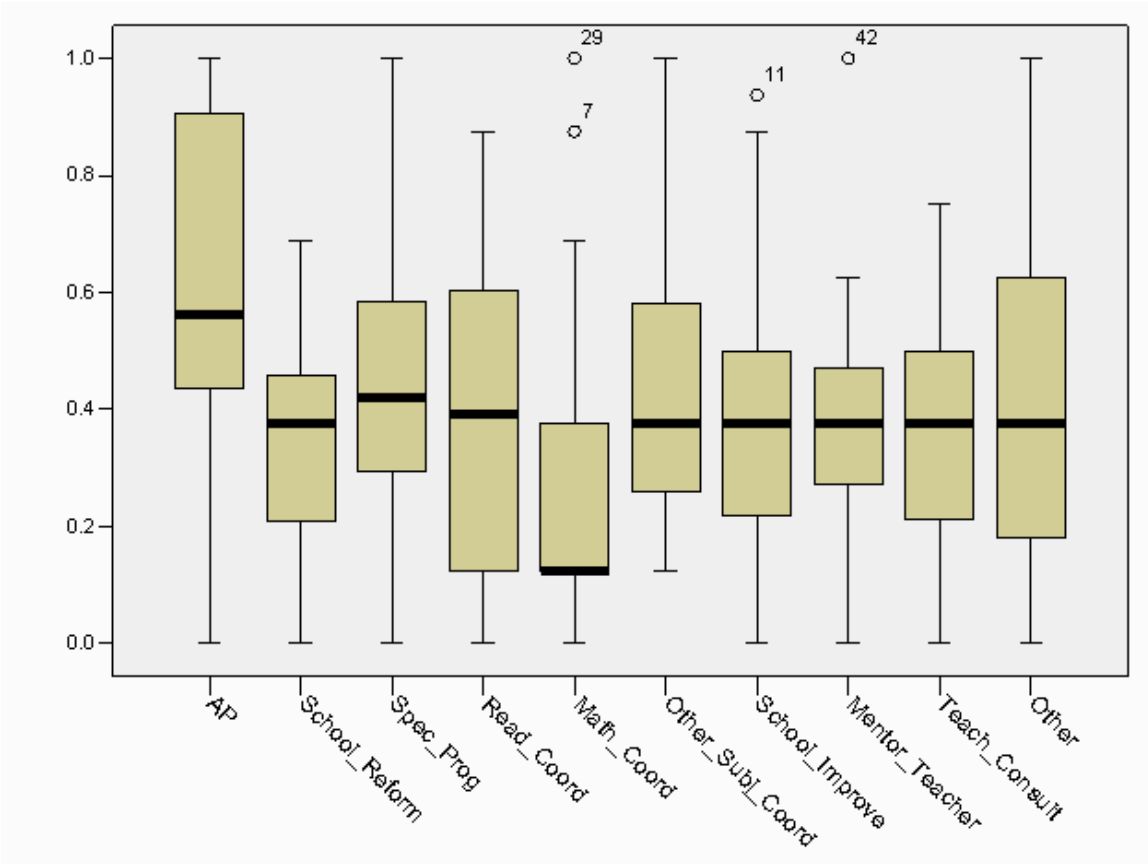


Graph 3: Percentage of Time Spent with Co-Leaders



Graph 4: Average Percentage of Time Spent in Formally Designated Leadership

Positions



Graph 5. Percentage of School Staff Identified as Math and Reading Leaders

