Investigating the Potential of Using Social Network Analysis in Educational Evaluation

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Abstract: This article describes results of a study investigating the potential of using social network analysis to evaluate programs that aim at improving schools by fostering greater collaboration between teachers. The goal of this method is to use data about teacher collaboration within schools to map the distribution of expertise and resources needed to enact reforms. Such maps are of great potential value to school leaders, who are responsible for instructional leadership in schools, but they also include information that could bring harm to individuals and school communities. In this article, the authors describe interview findings about concerns educators have with collecting and sharing social network data. A chief finding is that although the majority of teachers consider collecting social network data to be problematic but feasible, some teachers report concerns about privacy and the effect on their school's goals to foster community if the data are shared with their schools.

Keywords: social network analysis; evaluation standards; evaluation use; K-12 education

Social network analysis (SNA), which focuses on understanding the nature and consequences of ties between individuals or groups (Scott, 2000; Wasserman & Faust, 1994), has become an increasingly popular method within the social sciences for exploring human and social dynamics. The ties that are the focus of SNA vary widely, depending on the topic of interest: Psychologists have studied how friendship ties affect children's development and socialization (Kindermann, 1996), sociologists have studied how acquaintances help people find jobs (Granovetter, 1973), and economists have studied how business alliances have

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helped companies adapt to rapid economic transformation (Stark & Vedres, 2005). In these studies and others, the power of SNA has been its ability to help explain important developmental, social, and economic outcomes for particular individuals and groups.

There has been growing interest in using SNA for program evaluation as well. A recent volume of *New Directions for Evaluation* was dedicated to exploring different uses of SNA for program evaluation (Durland & Fredericks, 2006). In addition, several different research groups have been using SNA to evaluate the merit of research and development centers funded by businesses and governmental organizations (Corley, Melkers, & Johns, 2005; Nowell, 2005; Vonortas & Malerba, 2005; Zuckerman & Kupfer, 2005). In these evaluation studies, a primary goal of applying SNA has been to assess the value of using collaboration as a strategy for improving program outcomes, such as fostering innovation or improving productivity.

There are important reasons to be cautious about the potential of using SNA widely for program evaluation, however. Questions used to elicit social ties can often be of a sensitive and political nature, such as "Who are your closest colleagues in the organization?" and "On whom do you depend the most for information about this program?" Individuals may name colleagues with whom they are close who have not consented to participate in an evaluation study, thereby compromising professional standards for evaluation. Furthermore, sociograms, which are maps of social network ties often produced as part of SNA, do not hide individual responses beneath aggregate statistics. They represent aspects of the "raw data" that make it difficult to protect individual participants' privacy, particularly in small organizations.

In this article, we report results of a study of concerns that educators had with collecting and sharing social network data as part of an evaluation of collaborative, whole-school reform efforts at their schools. We relied on interview data from teachers, reform facilitators, and principals from a purposive sample of 25 schools and analyzed these data using a grounded theory approach (Glaser & Strauss, 1967; Strauss & Corbin, 1990). As part of the interviews, we provided teachers with alternative questions for eliciting information about collegial ties and showed teachers varied representations of social network data. With these prompts, we explored teachers' concerns about how data might be collected and used in the context of evaluating their schools' reform efforts.

Background to the Study

Prior Uses of SNA in Evaluating the Merit of Programs

Although SNA is not widely used within program evaluation, it has been applied in many fields of basic social science research. SNA has been used to evaluate HIV-prevention strategies (Amirkhanian, Kelly, Kabakchieva, McAuliffe, & Vassileva, 2003) in public health. It has also been used to evaluate the effectiveness of interorganizational alliances in public health (Muller, Krauss, & Luke, 2004) and community-based social services (Nowell, 2005). Within education, Maroulis, Gomez, and Griesdom (2005) have applied SNA to study the effectiveness of efforts to create smaller schools that enable stronger, more positive relationships to be built between staff and students and between students. Other researchers have sought to use SNA formatively to improve the design of online learning environments intended to foster collaboration as a means to promote learner interaction with content (McDonald, Noakes, Stuckey, & Nyrop, 2005).

Perhaps the most significant application of SNA in program evaluation in recent years has been to the study of interdisciplinary research and development centers. Such centers were introduced in the 1970s and 1980s to promote and stimulate cooperation between universities

and industry and thereby improve the process of applying basic research to develop scientific and engineering innovations (Feller, 1997; Smith, 1990). Evaluation studies have focused on the success of a core strategy that most centers have adopted for improving the research-to-application pipeline: fostering strong interdisciplinary collaborations of researchers engaged in clusters of related projects (for details on this strategy, see Geiger, 1990; Peters & Fusfeld, 1983; Stahler & Tash, 1994).

Evaluators working as part of the Research Value Mapping Program at the Georgia Institute of Technology have made the most extensive use of SNA in evaluating science and engineering research and development centers funded by the National Science Foundation and the Department of Energy in the United States.[1] Centers they have evaluated include the Experimental Program to Stimulate Competitive Research (EPSCoR; Dietz, 2000), and the Historically Black Colleges and Universities (HBCU; Rogers, 2003). Both the EPSCoR and HBCU programs are aimed at increasing the productivity and grant-writing skills of under-represented groups of researchers in science and engineering. To study these programs, evaluators used SNA to help judge whether the centers were effective in supporting clusters of related research projects with multiple investigators within and across universities as a means of promoting long-term, sustainable improvements to institutional research competitiveness.

The EPSCoR evaluation showed how particular types and levels of collaboration contributed to the success of the program. Overall, researchers found that the many centers succeeded in promoting clusters of interdisciplinary research projects, thus making the institutions less vulnerable to the movement of individual investigators (Bozeman & Rogers, 2001). A closer analysis of specific ties found variability among individuals and institutions with respect to success, however. Survey studies showed that researchers with the largest numbers of collaborators and with collaborators from other institutions tended to win larger grants; by contrast, having fewer collaborators was associated with having no grants at all (Bozeman & Corley, 2004). They also found that overall research productivity was higher among faculty with more collaborators, especially among faculty who sought out collaborations with people who had complementary expertise (Lee & Bozeman, 2005).

Potential Problems With Using SNA in Evaluation

Despite the potential utility of SNA to help in judging the merit of programs such as the research and development centers described above, there are some challenges to collecting and reporting data that scholars have identified and that are important to consider carefully before widely applying the method in schools. First, evaluators need knowledge of and access to as many members of the network as possible to learn about their ties or relationships. If the network's boundaries are unknown, evaluators may find it impossible to conduct an analysis based on the patterns of relationships of the entire group (Laumann, Marsden, & Prensky, 1983). Second, evaluators need to secure consent of the maximum possible number of network members for participation, because missing data make sociograms much less accurate portrayals of communities (Stork & Richards, 1992).

Beyond these practical challenges are serious potential ethical challenges. For example, anonymity in the data collection stage of SNA cannot be ensured: Individuals must disclose their own names and those of their colleagues to construct a picture of a social network. Many studies require participants to identify themselves somehow to match different data sources or data associated with the same individual collected at different points in time. Additionally, individuals who opt out may be identified by someone who has consented to participate, and opting out of a study that involves SNA may not preclude them from being portrayed in a sociogram (Borgatti & Molina, 2003, 2005). Thus, collecting evaluation data with this approach

Figure 1
Sociogram Showing Individual Nodes With Few Outside Connections
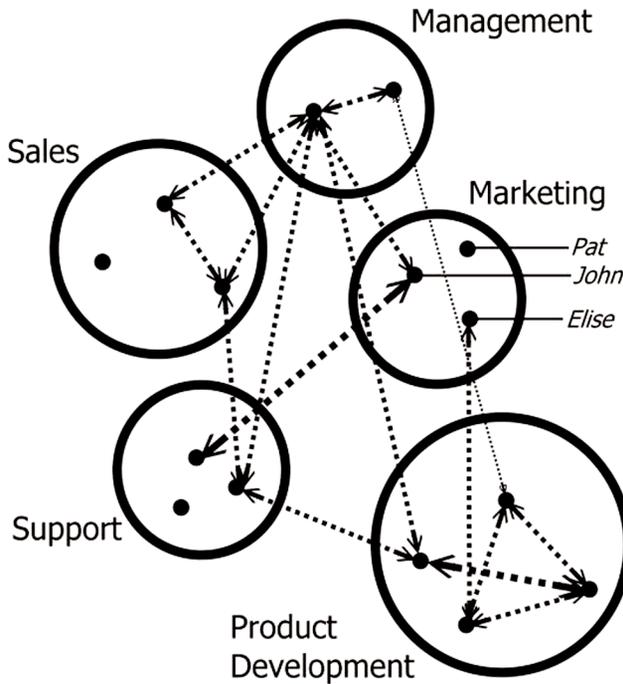
potentially violates a key standard in evaluation — namely, the obligation to protect the rights of human subjects (The Joint Committee on Standards for Educational Evaluation, 1994).

Further problems arise when considering how to share the results of an evaluation. Most social science research presents data in aggregate form, in which individual data points are embedded within summary statistics. However, in SNA, individuals and data they have contributed are preserved in a sociogram or map of the network (see Figure 1). Even if the sociogram does not identify names, identifying departments or units may still put individuals at risk if people in authority positions could act on the basis of patterns they see in the sociogram (Borgatti & Molina, 2003). In business settings, for example, oftentimes, there is an expectation that workers will collaborate within and across units. If a sociogram reveals that particular individuals are not reaching out across units as expected, a manager could judge those individuals to be failing, instead of seeing the isolation of individuals as an organizational or programmatic problem. Thus, the potential to cause harm through sharing results of an SNA can compromise evaluators' obligation to adhere to the propriety standard of refraining from harming participants in an evaluation (The Joint Committee on Standards for Educational Evaluation, 1994).

The approach that the Research Value Mapping Program has taken in its evaluations illuminates the challenges involved in using SNA in program evaluation. For generating social network data, the evaluators rely primarily on publicly available data, such as curricula vitae

(Gaughan & Bozeman, 2002). In this way, the evaluators do not violate any expectation of privacy among the researchers they are studying. Furthermore, the evaluators have not in the past presented sociograms in reports, articles, or conversations with center leaders. Instead, their analyses focus on the number and nature of ties, and they use this information as part of regression analyses that relate implementation variables to desired program outcomes (see, e.g., Bozeman & Corley, 2004; Lee & Bozeman, 2005). The evaluators have largely refrained from showing sociograms because they believe that showing them could bring harm to particular individuals or labs (B. Bozeman, personal communication, August 7, 2003).

The Potential and Challenges of Using
SNA in Evaluating School-Wide Reform Initiatives

Our own evaluation research is exploring how we can use SNA to evaluate initiatives designed to improve whole schools by fostering greater collaboration between teachers. The particular study results we report here focused on the potential ethical challenges of collecting and reporting social network data. This study is part of a larger National Science Foundation project that is examining how SNA can be used in evaluation studies to judge the merit of programs that aim to foster improved teacher collaboration as a means to improve schools (for preliminary results of that study, see Penuel, Frank, & Krause, 2006). The overall study is also exploring how SNA could provide early formative data to principals on program implementation.

Why use SNA to evaluate educational reform initiatives? A central motivation for our research is that many reformers today believe that improving schools requires greater collaboration between teachers (Elmore, 2000), a strategy whose effectiveness can readily be assessed with SNA. In particular, reform advocates and many educational researchers believe that when teachers discuss dilemmas in teaching, create and share lesson plans, and report on the success of particular teaching strategies to colleagues, teaching and learning in a school will improve (Darling-Hammond, Bransford, LePage, & Hammerness, 2005; Grossman, Wineburg, & Woolworth, 2001). An emerging body of evidence suggests that schools in which teachers collaborate well and often have higher levels of student achievement (Bryk & Schneider, 2002; Lee & Smith, 1996; McLaughlin & Talbert, 2001). In response to the growing calls for increased teacher collaboration, many schools have created school improvement teams and ad hoc committees charged with working together toward reform goals (Camburn, Rowan, & Taylor, 2003; Hallinger & Richardson, 1988; Laguarda et al., 2006; Sergiovanni, 1994).

In this institutional context, SNA could be useful in evaluations of a wide variety of increasingly popular programs that promote greater teacher collaboration as a means to improving teaching and learning. These include having teachers engage in "cycles of inquiry" about teaching (McLaughlin, 2004), action research (Allen & Calhoun, 1998), lesson study (Fernandez, 2002; Lewis, Perry, & Hurd, 2004), collaborative unit design (Wiggins & McTighe, 1998), mentoring and coaching (Carroll, 2005; Schaverien & Cosgrove, 1997), and collaborative forms of evaluating student work (Blythe, Allen, & Powell, 1999). Programs where SNA might be applied also include locally defined whole-school initiatives in which teachers together develop, implement, and refine plans for improving teaching and learning in their schools (Desimone, 2002).

There are three main purposes for which we have hypothesized SNA might be used in evaluating such programs. We hypothesize that SNA could be used to evaluate the success of programs that employ strategies such as lesson study or mentoring by examining, first,

whether in fact the programs do promote greater numbers and more significant ties between faculty members in a school and, second, whether people who have better access to resources and expertise through those ties are more likely to change their practice. Results from our own studies (Penuel et al., 2006) and from others (Frank, Zhao, & Borman, 2004; Frank, Zhao, Penuel, Ellefson, & Porter, 2006) provide evidence for the second of these hypotheses. Third, having demonstrated a relationship between increased collaboration and broad diffusion of reforms in a school, we would hypothesize that principals and other school leaders might be able to use such data formatively as an early indicator to see whether a particular program is taking hold in a school. More talk about reform among colleagues could serve as a proxy for teachers' sense of engagement in and ownership of reform goals, a critical factor in the success of whole-school reform initiatives (Desimone, 2002).

Before these hypotheses can be fully investigated, however, it is imperative to anticipate the particular concerns educators may have with evaluators' collecting and using SNA data. Some of the difficulties schools face that led to the idea that leaders should promote teacher collaboration also make schools potentially difficult environments for collecting social network data. In particular, teachers historically have held strongly to the belief that teaching is a "private" matter and that they ought to be given considerable autonomy in what they do (Little, 1990; Lortie, 1975; Westheimer, 1998). To the extent that SNA requires teachers to give up privacy and autonomy in reporting their collegial interactions to researchers, collecting social network data may pose a threat to teachers who hold those values dear. Researchers studying teams of collaborating teachers have also remarked that some teams tend to avoid conflict at all costs, finding it difficult to explore deeply held differences in teaching approach among themselves (Achinstein, 2002a, 2002b; Grossman, Wineburg, & Woolworth, 2000). If sharing SNA results caused conflict to arise among a faculty team, then that conflict might sabotage ties formed on the team.

There are no equivalents to curricula vitae to use in collecting social network data from teachers either. Teachers do not typically have curricula vitae that include their collaborators or any other publicly available documents from which to determine their collegial ties. Furthermore, significant collaboration happens both formally in the context of face-to-face meetings and informally inside and outside of school (Little, 2003; Schwab, Hart-Landsberg, Reder, & Abel, 1992). Thus, for both cultural and practical reasons, conducting SNA as part of evaluations of school-based programs necessarily poses different challenges from the research and development center context.

The Current Study

Our study set out to contribute to an understanding of the concerns that school staff might have with collecting and sharing social network data with evaluation researchers. To learn more about concerns that teachers, principals, and other school leaders of reform initiatives might have, we undertook an interview-based study in 25 schools. The questions that guided our initial study included the following:

- What concerns do teachers and school leaders have about providing evaluation researchers with information regarding their social networks?
- What concerns do teachers and school leaders have about how results of a SNA might be used within their school?

In this article, we report on the main findings from our investigation and discuss their implications for the potential of using SNA in educational evaluation.

Table 1
Characteristics of Schools in the Study ($n = 25$)

Characteristic	Median	Minimum	Maximum
School size (student population)	541	220	1,993
Faculty size	31	11	82
Percentage of students on free or reduced-price lunch	19.2	1.1	99.9
Percentage of non-White students	68.9	10.7	99.6

Method

Sample

The sampling of schools for the study was purposive; we sought out schools in which principals indicated a commitment to building and sustaining teacher community so that the purpose of our study would be of interest and use to them. Schools in which teacher community was not emphasized would not be likely places for examining ways in which opportunities for teachers to interact with colleagues would influence the implementation of initiatives. In addition, we included schools where all teachers were expected to implement some aspect of a school's reform or where the reform was targeting whole-school change in an effort to establish that conditions were in place for teacher collaboration around a single topic. All schools in the total sample had at least one school-wide focus that researchers could identify through subsequent analysis of principal interviews; these foci included technology integration, literacy, data-driven decision making, and school restructuring.

Although all the schools shared a commitment to collaboration and had a school-wide focus for their reform efforts, the schools in the sample varied with respect to the size of the student and teacher population and with respect to demographic factors. Table 1 provides a summary of the characteristics of schools in the study as obtained from the National Center for Education Statistics Common Core of Data for the 2002-2003 school year.

We interviewed 151 school staff members from the schools in the sample: 25 principals or vice principals, 28 other principal-identified school leaders associated with a reform initiative in their schools, and 98 classroom teachers.

Instruments

Our research team used three overlapping protocols targeted to teachers, administrators, and teachers with informal leadership roles. The protocols consisted of questions covering three main themes: teacher interactions and school-level communications, concerns about collecting data about teachers' ties to colleagues, and concerns about sharing social network data with the school community. The research team, comprising educational sociologists, evaluation researchers, and former classroom teachers, worked together to develop the protocols. We adapted some questions from earlier studies of teacher collaboration (e.g., Lortie, 1975) and interpretive studies of teachers' adoptions of reform (e.g., McLaughlin & Talbert, 2001). We piloted our instruments with six teachers and three school leaders and revised the protocols on the basis of our pilot-test experience.

Because we believed that SNA was likely to be unfamiliar to most educators, part of our interview consisted of showing teachers and school leaders sample questions and invented sociograms of schools before asking them about the potential challenges of collecting and

Figure 2
Sample Sociogram Shown to Study Participants
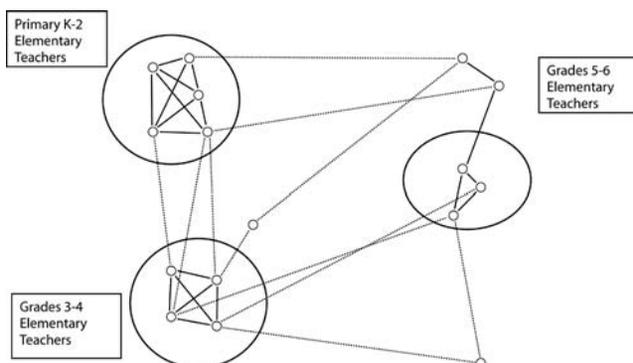
sharing network data (a sample sociogram shown in interviews appears in Figure 2). Thus, the interview questions were anchored in concrete examples to facilitate respondents' developing an understanding of the method itself.

Procedure

Evaluation researchers went to schools in pairs, and they first conducted interviews with a principal or school leader. As part of that interview, leaders nominated four or five teachers in the school to interview: at least two teachers they believed were on the periphery of the school's reform initiative and two who were more central to the effort. Interviews with school leaders lasted from 60 to 90 min, and interviews with teachers lasted from 30 to 45 min. Researchers audiotaped all interviews and sent them to a transcription service that created verbatim transcripts.

Analysis

To analyze the 151 interview transcripts, we developed a coding scheme based on answers from a small sample of interviews using broad content categories identified from the literature on SNA. There were three broad content themes for which we coded: acceptability of SNA methods for data collection, privacy, and data sharing. For each code, we used the sample transcripts to identify subcategories or codes. For the first category, we identified whether interviewees believed it would be feasible to collect social network data from teachers in their school and whether it would be problematic. For privacy, the content coded pertained particularly to subcategories of the perceived invasiveness of data collection and to potential issues related to crossing personal and professional boundaries. The subcategories for data sharing were as follows: concern for isolated individuals in a sociogram, threats to self-perception, negative comparisons with others, potential harm to efforts to build accountability, and concerns with misuse of data.

Five researchers coded the interviews. To maximize reliability, a training session was held for coders in which the coding scheme and decision rules for analyzing text were reviewed. After the first week of coding, a calibration session was held with the coders, to which they

Table 2
Reactions to Potential Social Network Questions

Role	Questions Not Feasible to Ask	Questions Problematic but Feasible to Ask	Questions Not Problematic
Teacher ($n = 50$)	1 (2%)	33 (66%)	13 (26%)
School leader ($n = 28$)	0 (0%)	16 (57%)	11 (39%)
Principal ($n = 25$)	1 (4%)	15 (60%)	9 (36%)
All respondents ($N = 103$)	2 (2%)	64 (62%)	33 (32%)

Note: Fifty teachers responded to one version of the interview that included this item; 48 teachers were not asked about the feasibility of the items to allow time for other questions. Of those asked about feasibility, there were some who did not respond or whose responses could not be coded, so the responses do not total 100% of those asked.

brought samples of text they found difficult to code. All transcribed interviews were entered into NUD*IST 6 (N6), a software program developed by QSR International for qualitative data analysis. All coders were assigned a set of codes to complete across schools. A second researcher not involved in the coding conducted reliability checks on 20% of the data for key codes. Across these codes, intercoder agreement ranged from 70% to 95%.

Subsequent to coding, we used results to construct tables of data showing the most frequently arising concerns and issues associated with collecting and sharing social network data. We then reviewed the coded data a second time to identify themes in responses for the most frequently occurring codes.

Results

Most of the participants we interviewed saw possible problems with asking for information about their colleagues and depicting the results in a sociogram that would then be shared within their school. In response to an open-ended question about whether teachers could see any problems with asking teachers questions about their social networks, many of the participants raised privacy concerns. In addition, some participants believed that asking colleagues about social networks and then sharing that information could undercut the very goal of promoting teacher collaboration in the school.

More than two thirds of interviewees (68%) answered questions about the feasibility of asking sample social network questions shown them by researchers. Only 2% of those answering thought the questions were not at all feasible to ask teachers or other school staff (Table 2). The majority of teachers, school leaders, and principals felt that asking social network questions in schools would be either not problematic (32%) or problematic but feasible (62%). The latter group of respondents thought the questions might cause discomfort and concern but that appropriate modifications and considerations would allow the questions to be asked.

Perceived Problems With Collecting Social Network Data

The data show that interviewees' role in the school was associated with the likelihood of their perceiving problems with collecting social network data. Slightly more teachers (66%) than principals (60%) and school leaders (57%) rated the questions as problematic but feasible to ask of teachers in the context of their reform initiatives. The converse was true for those who identified the questions as not at all problematic; slightly more principals (36%) and school leaders (39%) were unconcerned compared with teachers (26%).

Although these differences suggest that teachers may perceive questions as more threatening because they are more vulnerable than school leaders to ways data might be misused, the concerns raised by interviewees did not show a clear pattern that reflected that premise. Teachers, school leaders, and principals all tended to emphasize similar concerns in their responses. For example, some interviewees said that they thought the questions "crossed a line" into personal matters that researchers did not have a right to know. According to one teacher, "some people might consider this personal information they don't want to share." Others suggested that delving into close relationships could result in hurt feelings when teachers were not nominated by friends as helpful. For example, a teacher commented, "I could see some people wanting to keep this very close to their chest. It's almost like asking, 'Who's your best friend?'" Another principal suggested, "I would feel uncomfortable listing somebody's name if it weren't in the most positive of contexts. Or I left somebody, just by omission, you're like, 'Well, wait a minute. You're supposed to be my friend!'"

These concerns were similar to those of the few interviewees who believed collecting the data in their school would be impossible. They believed that asking teachers about their closest colleagues constituted an invasion of privacy. According to one of these interviewees, "I don't want them to know who I talk to and who I talk to about my problems, who is my confidant, who is my informal mentor, who is my formal mentor, and who I lean on."

Still others were concerned that teachers would not be honest, either because the information might be used by their school administration or because the teachers would be unsure about the purpose of the survey and thus mistrust the data collectors. They thought that people might ask, as one teacher put it, "'What are you doing this for?' and 'Why do you want this?'"

Many of these respondents offered suggestions for what researchers could do to lessen the likelihood that collecting the data could cause harm to them or their colleagues. For example, several interviewees suggested we ask teachers to nominate their closest professional colleagues, rather than just their colleagues, to make clear we were not interested in data on friendship networks that could be irrelevant to their work as teachers. Others suggested that it might be important to make it difficult for teachers completing a survey to look over the shoulder of another teacher to see whom they named as close colleagues. For example, a principal suggested having teachers write down initials rather than names when identifying their colleagues.

Others suggested to us that potential concerns about misuse by administrators could be overcome by providing a clear description about how the data would be used at the time of data collection. If staff could not be assured of anonymity at the time data were collected, interviewees did think it was important to be told that their responses would be anonymous to others in the school, as these suggestions indicate:

> I think maybe if this were explained first, that we're trying to draw this kind of a diagram which will be anonymous, but in order to do that, we have to know who you connect with a lot and a little specifically, that might help. (school leader)

> Just letting them know that this is anonymous and that it won't be reported back to any of the supervisors, I would think. (teacher)

> I think maybe just the assurance that other people on our staff wouldn't see the answers, the confidentiality of it. (school leader)

Perceived Problems With Sharing Social Network Data

Many interviewees (60%) had concerns about the possibility of evaluators' sharing social network data with their schools. Slightly more principals (68%) and school leaders (68%)

than teachers (55%) expressed concern. Nonetheless, more than half of teachers interviewed reported potential problems with sharing the data.

Across the different coding categories related to sharing network data, we identified five primary areas of concern with respect to how social network data might be used if the data were shared with schools.

1. Some participants felt that revealing information about the isolation of some teachers within the school might further isolate those teachers.
2. A number of participants feared negative consequences might arise if individuals discovered that their perception of themselves as helpful resources to others was not matched by the data.
3. Several participants suggested that teachers might compare their degree of connectedness with the connectedness of others, detracting from rather than supporting the goal of building teacher community.
4. Some teachers were concerned that sharing the data might negatively affect friendships they had with some of their colleagues.
5. A number of participants expressed concern about the potential use of the data as an accountability tool; they indicated that if the data were used to hold teachers accountable for collaboration or implementation, then teachers probably would not respond favorably to the study.

Participants who focused on the possible negative consequences of explicitly identifying isolated teachers suggested that identifying them on sociograms would make them feel more isolated. According to one teacher, the effects would be particularly problematic if individuals who were on the periphery of reforms were somehow identified on sociograms:

And I guess I would be fearful if I was the one giving out this information that you're actually making it more difficult to get those two people to buy in to reform than maybe a more subtle approach or an approach in which maybe it's not so subtle, but you're not doing it with those two individuals but with an entire staff event where everybody is clearly labeling who those two people are. And I think a lot of times it's very obvious who the people who are not buying in to the process are. And I guess I would just be worried that there would be repercussions for those two people, and if they feel cut off from the faculty, I guess I would just be concerned.

Another concern was the potential consequences of sharing information that does not match with individuals' perceptions of themselves within the school network. Some teachers might consider themselves to be particularly helpful to others, but sociograms could reveal that others do not perceive them as so helpful. A principal said while looking at the sample sociogram in Figure 2,

But let's say a grade level determines where they think everyone is individually and that data is compiled, and all of a sudden Teacher A finds out that she's perceived by all of her peers as out here, even though she thinks she's right inside here, that could be a little bit difficult for that person to accept.

Interviewees who were concerned about how teachers might compare themselves with others when presented with a sociogram of their school were concerned about the consequences for their school's sense of community. For example, one principal suggested that teachers might negatively compare their own level of collaboration with others' levels, which could undercut the goal of creating a collegial atmosphere in the school:

I have a fear that it could undercut the very goal of promoting community. We've got some people, some teachers who are very self-conscious, and they rate themselves. They grade themselves in

relation to others, so I think it's better not to do the "haves" and "have-nots" or set up a tiering basis because then it starts tearing away at what you want to do.

Another concern was how friendships between colleagues might be negatively affected by sharing social network data. Participants were concerned that interpersonal conflicts might arise if teachers knew how others had responded to survey questions about who helped them implement the reform at their school. Several were especially concerned about answering the questions if personal friends were included in the definition of colleagues. One teacher expressed her concerns as follows:

> I could put down my five closest friends here on campus, but I don't want X person over there to think they're not on the list because I want every colleague to know that I appreciate what they do and we're all members of the team here.

A final area of concern was that social network data would be used for accountability purposes. If the data were to be used to hold teachers accountable for their level of collaboration, teachers would be likely to object to having the data made available to school leaders. Most participants who cited this concern suggested this possibility would make teachers uncomfortable and even unwilling to participate in the study.

Discussion and Conclusion

As we anticipated, faculty members expressed many concerns about collecting and using SNA in the context of a study of their schools' reform efforts. For the most part, those concerns were related to their values and to ethical concerns rather than to the pragmatics of collecting and using social network data. Teachers' value of privacy was evident in their concern that sensitive data might be seen or used by others. Furthermore, their concern about how others might be harmed by finding out they were isolated in the school could be seen as evidence both for teachers' genuine wish not to see harm come to their fellow faculty members and for their desire to avoid conflict between teachers in the schools. In these ways, the concerns teachers raised reflect earlier research about teachers' strong beliefs in privacy and autonomy and their concern with minimizing conflict between colleagues.

The findings of this study are not a simple confirmation of sometimes negative portrayals of school culture in the past, however, and they do point to some situations where SNA might be ethically collected as part of an evaluation study. In contrast to earlier portrayals of teachers as being unwilling to open up dilemmas of the classroom to colleagues, teachers' concern with privacy did not extend to professional interactions. At least some teachers saw it as fair to ask about professional interactions — just not personal ones — and a fair number of respondents did not identify any problems at all with collecting social network data in their schools.

The findings with respect to the potential for sharing social network data offer less promise for evaluators who wish to present sociograms to program leaders or participants in school-based programs. There were specific concerns that showing a sociogram could undercut the very efforts of a school to promote greater collaboration between faculty members and concerns about potential harm to individuals. Nor did teachers suggest as many clear pathways for resolving the dilemma of how to report these data as they did for data collection. An appropriate strategy, one that we used in the larger study and that has been used in other evaluation work using SNA cited earlier, might be to use the social network data in regression

modeling and then share the modeling results with schools in an understandable format. Here, the purpose of the modeling would be to understand how particular kinds of social ties might lead to wider and more effective implementation of reform initiatives.

In summary, before SNA can be widely used in educational evaluation studies, evaluators need to develop specific strategies for addressing and overcoming educators' concerns about the collection and, in particular, the use of social network data. Participants in our study suggested some specific strategies that could work in some settings, but we expect that these strategies will work best in schools where there is already a high degree of trust among faculty members and in the school's principal. Where there is trust, teachers may be more willing to give up their privacy for the betterment of the school. Participants also need to trust the evaluator, who would need to cultivate a relationship based on reciprocity and respect with the participants in the evaluation. Even here, specific precautions need to be taken so that the evaluation can be ethically and sensitively undertaken without violating professional standards for evaluation. We believe there is great promise in using SNA to study school reform initiatives and that the challenges are not insurmountable. Future studies will need to be undertaken to determine whether we are correct and under what range of contexts SNA can be used for program evaluation.

Note

1. "Centers" are actually programs within the National Science Foundation and the Department of Energy. These agencies have funded evaluations of particular center programs, which typically include multiple centers in a portfolio.

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