Investigating instructional influence in teachers' social networks

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Received 16 November 2020
Revised 8 April 2021
Accepted 25 May 2021

Abstract

Purpose – This study investigates the reasons teachers seek instructional assistance from their colleagues. By examining both the reasons why teachers seek assistance and considering which reasons for seeking assistance predict shifts in teaching practice, this analysis provides new insights into how schools can leverage teachers' social networks for organizational change.

Design/methodology/approach – Drawing on interview and survey data from a sample of 52 schools across seven districts in the United States, we first qualitatively explore the reasons teachers seek instructional assistance, based on patterns in teachers' self-reported descriptions of their instructional advice-seeking. Then, we apply hierarchical linear models to predict which individual characteristics and organizational features influence the reasons' teachers seek assistance and which reasons for seeking assistance influence their subsequent shifts in teaching practice.

Findings – Teachers' positions in their social networks, their experience levels and their organizational contexts predict the reasons for which they seek instructional assistance. In addition, teachers seeking advice based on perceptions of their peers' experience or resource access predicts positive shifts in teaching practice; however, fewer than half of teachers' instructional-advice seeking ties reported in our sample were motivated by either of these two reasons.

Practical implications – The findings highlight the potential for school leaders and policymakers to improve teaching practice by making educators' experience and resources more accessible within schools and creating structures that enable collaboration.

Originality/value – This paper addresses a gap in social network literature by moving beyond a structuralist analysis of teachers' collegial networks to investigate teachers' motivations for pursuing advice-seeking ties.

Keywords Social network theory, Social capital, Instructional influence, Organizational change

Paper type Research paper

Introduction

There is a growing focus in educational research and practice on attending to relationships within schools as a means of driving organizational improvement (Daly *et al.*, 2009). Teachers' collegial relations can be a powerful lever of instructional influence (Supovitz *et al.*, 2010). Through collegial networks, teachers influence their peers by directly sharing instructional resources – e.g. information, materials and expertise (Coburn *et al.*, 2013) – and cultivating a sense of collaboration (Bryk and Schneider, 2002). Networks of relations have empirically been found to drive teachers' shifts in practice (Coburn *et al.*, 2012; Penuel *et al.*, 2012), teachers' uptake of reform (Daly *et al.*, 2009; Daly and Finnigan, 2009) and changes in student achievement (Bryk and Schneider, 2002; Daly *et al.*, 2014; Leana and Pil, 2006).

The focus of this scholarship is largely on the *structures* of teachers' social networks, and there remains a dearth of research on "what actually happens in network transactions – what resource flow or what knowledge is shared and how" (Coburn *et al.*, 2013, p. 331). According to

Design and data collection for this work was supported by the Nellie Mae Education Foundation, Grant 024137. Analysis and writing was supported by the Institute of Education Sciences, U.S. Department of Education, through Grant R305B200035 to the University of Pennsylvania. The opinions expressed are those of the authors and do not represent views of the Institute or the U.S. Department of Education.

Journal of Professional Capital and Community

2056-9548
DOI 10.1108/JPCC-11-2020-0086

Coleman's (1990) notion of "appropriability," relational ties can be leveraged for different purposes, which have implications on their influence. Investigating why teachers' social networks emerge in the first place – i.e. the reasons why teachers seek instructional assistance – can both deepen conceptual understandings of the nature of social capital in schools, and provide practical insights on how to more effectively leverage teachers' collegial relationships for organizational change.

This paper takes up this gap in the literature by empirically investigating the reasons teachers seek instructional influence in a sample of seven school districts across the United States. Drawing on Supovitz's (2008) typology of instructional influence, we classify teachers' advice-seeking ties by their "reasons" for seeking instructional assistance from their colleagues – i.e. friendship, proximity, resource access, experience, formal authority, and expertise – to share deeper insights into an additional dimension of teachers' social networks, and examine how that dimension shapes how teachers' collegial relationships influence teachers' shifts in practice.

We begin by presenting a literature review and a conceptual framework on the relationship between teacher's reasons for seeking instructional assistance, individual teacher and school characteristics, and teachers' shifts in practice. Then, we describe the data and methods employed in the study, and present the results. We conclude with a discussion of the implications and limitations of the study.

Theoretical framework and literature review

This analysis is theoretically grounded in social network theory. The rich history of education scholarship applying social network theory to study how teachers exchange social capital through their collegial relations builds off of an understanding that teachers' collegial relations serve as the foundation of teachers' collective work and professional leadership (Little, 1990), and can be the primary lever of instructional influence within schools (Coburn *et al.*, 2013). Social network theory builds upon this conception of social influence to map out and quantify the structures of teachers' informal and formal networks to better understand how influence flows within schools (Daly *et al.*, 2009). Rather than consider schools or individuals as the unit of analysis, social network theory "shifts the angle of vision to the system of social relations within which action[s are] embedded" (Coburn *et al.*, 2012, p. 142).

This scholarship focuses largely on how the *structures* of teachers' collegial relationships – e.g. the strength and span of relational ties, the diversity of ties and teachers' access to expertise – shape the influence of these relationships on teachers' shifts in practice (Coburn and Russell, 2008; Coburn *et al.*, 2013; Comstock *et al.*, in press). As is the case with social network methodology more broadly, scholarship on teachers' social networks presents a limited understanding of other dimensions of networks beyond their structure (Borgatti *et al.*, 2014). There is a danger in these limitations; as Coburn *et al.* argue, "making inferences about social network transactions from the structures of networks alone may be limited; it misses variability in crucial processes that are likely related to the social network outcomes we seek to explain" (2013, p. 331). The existence of teachers' social ties is understood to be a necessary but insufficient condition for the exchange of social capital (Moolenaar, 2012). As such, there is a need to attend to factors that influence the nature of teachers' social ties.

One such factor to consider is examining what motivates the formation of teachers' informal advice-seeking networks in the first place. Previous scholarship has examined how teachers' reasons for seeking assistance predicts *who* teachers seek assistance from (Deal and Celotti, 1980; Elmore, 2000; Frank *et al.*, 2004; Galvez-Hjorenevik, 1986; Moolenaar, 2012). For example, teachers' advice-seeking can be driven homophily – i.e. they seek assistance from teachers who are similar to themselves (Moolenaar, 2012). Teachers are also more likely to seek assistance from peers who are physically proximate to them (Spillane *et al.*, 2017). These

patterns of instructional influence can vary by subject area (Spillane *et al.*, 2003). Further, these reasons for seeking assistance shape the degree to which advice-seeking influences teachers' shifts in practice (Frank *et al.*, 2004; Penuel *et al.*, 2010).

No studies to our knowledge look across the reasons which teachers seek assistance and the influence of that assistance together in an integrated model that allows for comparisons of both the patterns and the relative influence of each reason for advice-seeking. Understanding *why* teachers seek assistance and *the degree to which* that assistance influences their practice in one complete model could provide key insights into the nature of instructional influence in schools.

In this paper, we present a comprehensive framework for understanding the relative influence of the reasons that motivate teachers to seek assistance and their relative effects on practice. Our analysis extends Supovitz's (2008) qualitative work examining teachers' advice-seeking ties, which presents a typology of "reasons" teachers seek instructional assistance from their colleagues, including: resource access, expertise, formal authority, experience, friendship and proximity. This work builds on prior research about the sources of influence in organizations (French and Raven, 1959). Our analysis operationalizes these six reasons for seeking assistance on a larger scale to quantitatively examine the frequency of different motivations for advice-seeking ties and their relative influence on instructional practice. In so doing, we take up Coleman's (1990) argument that the purpose of relational ties informs their influence and dive deeper into the variability within teachers' social networks.

Drawing on organizational theory more broadly, we further situate teachers' reasons for seeking assistance within teachers' organizational and individual contexts. In terms of organizational context, a number of key dimensions shape teachers' professional communities, such as school sector, professional norms, subject area and the formal organization of schools (Spillane *et al.*, 2003, 2015; Talbert and McLaughlin, 1994). Teachers' perceptions of trust in their schools also play a key role in shaping the nature of resource flow (Bryk and Schneider, 2002; Penuel and Riel, 2007). Higher levels of trust can enable teachers to interact in ways more conducive to instructional change (Spillane *et al.*, 2017). Network characteristics – e.g. individuals' centrality in networks and network density – also influence resource flow between colleagues (Daly *et al.*, 2009). Previous findings also highlight that demographics such as a teacher's gender, age and teaching experience influence who they choose to seek for assistance (Moolenaar, 2012). Given that organizational context plays a role in shaping teachers' social networks, we posit that such factors will also influence the reasons that teachers seek assistance from their colleagues.

Conceptual framework

Our conceptual framework (Figure 1) situates the six reasons teachers may choose to seek instructional assistance which Supovitz (2008) identifies within their schools' organizational contexts. We also posit that the influence of relationships on teaching practice is shaped by their organizational context, the individual characteristics of the teachers seeking assistance and teachers' reasons for seeking assistance.

Methods

This analysis is guided by three research questions:

RQ1. Who do teachers seek instructional assistance from and why do they seek assistance?

RQ2. To what extent do individual teacher and school characteristics predict the reasons teachers seek instructional assistance from their colleagues?

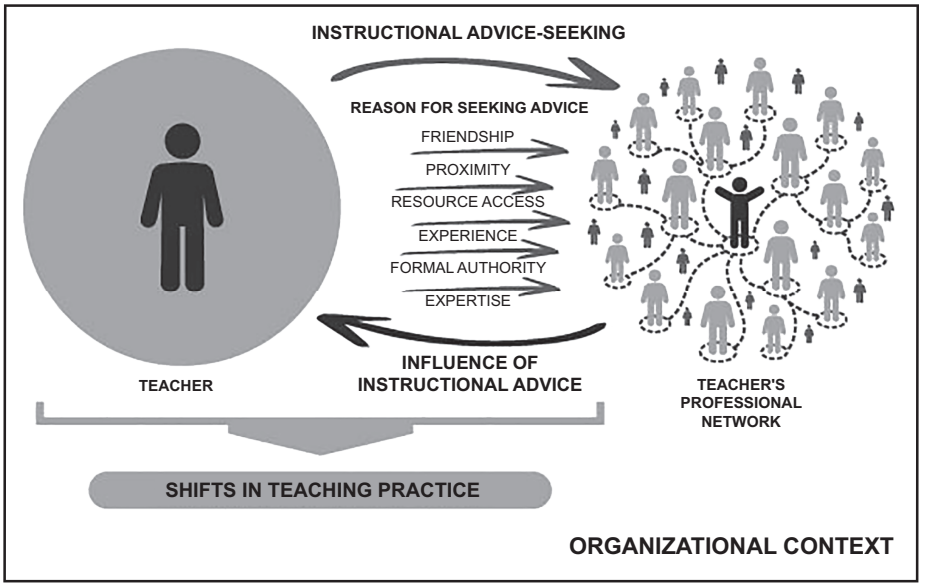

Figure 1.
Conceptual framework

RQ3. To what extent do teachers' reasons for seeking instructional assistance predict their shifts in teaching practice?

To answer these questions, we draw on qualitative and quantitative data from seven school districts across the United States, collected as part of a broader study of district-based teacher leadership programs (Berg *et al.*, 2019; Supovitz and Comstock, 2021). The seven districts are distributed across three states in geographically diverse locations across the United States, and several were selected based on a national scan of teacher leadership programs in the United States (Author, 2019). While these programs provided the impetus for our data collection, our focus here is on the informal professional networks that underlie the districts studied. All analyses draw on the quantitative data from this study, and our analysis for RQ1 also integrates the qualitative data.

Sample

The quantitative data employed in this analysis come from an online survey conducted between November 2018 and May 2019 of 1,323 teachers across 52 schools in seven school districts in the United States. In six of the districts, we surveyed the population of schools. In one larger district, we used a stratified sampling approach based on variation in school performance. The overall response rate was 75.69% and the response rates by school ranged from 50% to 100%. The descriptive findings in RQ1 draw on the full dataset of 1,323 teachers. For the sample used to address RQ2 and RQ3, 32 teachers were dropped because of nonresponse on the dependent variable in RQ3, and 122 teachers were dropped due to their nonresponse of covariates in RQ2 and RQ3. The final dataset used for RQ2 and RQ3 was composed of 1,169 teachers [1].

The qualitative interview data for this analysis is drawn from a sub-set of 20 interviews and 28 focus groups with educators from across four of the seven districts. In these districts, we worked with district personnel to include a representative mix of elementary and secondary schools. We visited each school at three different points

in the school year (fall, winter and spring) and interviewed teachers, teacher leaders, and administrators. For the purposes of this study, we draw on interview and focus group data from teachers and teacher leaders only. Both the interviews and focus groups were conducted with a similar instrument which asked teachers to describe the nature of instructional assistance they received and the influence of that assistance on their practice.

Measures

On the survey we asked teachers to identify up to eight other educators in their school who they "regularly turn to for advice about the major subject area that [they] teach," using a roster of all educators in their school that we provided to them [2]. For each reported tie, teachers were asked to identify the "major reason" they sought assistance from the associated individual from the following options:

(1) "They are a good friend" (Friendship)

(2) "They are physically nearby" (Proximity)

(3) "They provide me with resources that help me do my job" (Resource Access)

(4) "They have lots of experience" (Experience)

(5) "They are a formal leader in the building" (Formal Authority)

(6) "They have importance expertise" (Expertise) [3].

The order of these reasons was randomized each time a respondent encountered this question, assuring no item order bias. Additionally, we collected background information about the teachers – e.g. their education level, gender, teaching assignment, teaching experience and perceptions of school culture.

The key variables of the study are:

(1) The *number of advice-seeking ties* associated with each of the six reasons for seeking assistance served as the dependent variables for RQ2 and as an explanatory variable for RQ3.

(2) *Change in teaching practice* ($\alpha = 0.89$) is a seven-item scale adopted from Parise and Spillane (2010) and Supovitz *et al.* (2010), which asked teachers about the extent to which their instruction and their work with students changed over the past year. Responses were on a six-point ordinal continuum, ranging from strongly disagree to strongly agree. This served as the dependent variable in RQ3.

Drawing on our conceptual framework (Figure 1), we also collected data about teachers' individual characteristics and the organizational context by including a number of covariates in the models for both RQ2 and RQ3:

(1) Teacher background characteristics: *subject area*, *years of experience*, *education level* and *gender*.

(2) Teachers' *average perceptions of trust scale* ($\alpha = 0.83$) is a four-item scale of organizational climate derived from the Chicago Consortium for School Research (Sebastian *et al.*, 2016) which measured teachers' perception of trust among colleagues at their school. We used the school-level averages of teachers' perception of trust to reflect the perceived organizational climate in a school. Responses were on a six-point scale ranging from 1 to 6.

(3) Teachers' *in-degree centrality* is a continuous variable that measured the number of individuals who reported seeking out that teacher for assistance. This is an individual characteristic derived from network-level data. Networks were defined at the school-level.

(4) School's *network density* is a continuous variable that measured the number of ties in each instructional network, relative to the potential ties for that network.

(5) School characteristics: *school type (PreK-8/Elementary, Middle, High), school enrollment, percent free- and reduced-priced lunch, percent students of color, percent student mastery in ELA.*

For the descriptive analysis in RQ1, we also looked at the total number of reported ties, disaggregated by the *role type (teacher, teacher leader, school administrator)* of the individuals who teachers reported seeking assistance from. We did not include the *role type* variable in the analysis for RQ2 and RQ3, for reasons discussed in the following section.

Analytic approach

To answer RQ1, we drew on both qualitative and quantitative data. First, we descriptively summarized teachers' total number of advice-seeking ties and disaggregated them by the role type of the individual from whom they sought assistance (based on roles identified in school-provided rosters; i.e. teacher, teacher leader or school administrator) and the reasons they sought instructional assistance from that individual. Second, to enrich the findings for RQ1, we analyzed the interview and focus group data in two steps. As part of our broader study, we deductively coded the data into various categories and sub-categories based on our conceptual framework and then synthesized patterns in the data based on teachers' reasons for instructional assistance (Miles *et al.*, 2013). We attended to different views expressed by teachers in the same focus groups in conducting this analysis. After generating our initial findings, we additionally returned to the data to check for disconfirming evidence. Finally, to understand if teachers' reasons for seeking assistance varied by the role type of the individuals from whom they sought assistance, we performed a two-way analysis of variance (ANOVA) test, which produced null results [$F(2, 1323) = 0.106$, $p = 0.90$].

To address RQ2, we constructed a series of six parallel two-level hierarchical linear models (HLMs), to account for the nested structure of teachers within schools. In each model, we regressed teacher's out-ties for one of the reasons that teachers sought assistance (expertise, formal authority, experience, resource access, proximity, and friendship) on teacher and organizational characteristics. Based on the null results from the two-way ANOVA in RQ1, we did not disaggregate results by the role type of the colleagues that teachers sought for assistance. All of these models included the same set of individual- and school-level independent variables, allowing for comparisons of the relative magnitudes and significance of the covariates across models.

Finally, to answer RQ3, we regressed teachers' reported shifts in practices on the number of out-ties associated with each of the six reasons for seeking assistance, in a two-level HLM. By including all six reasons for seeking instructional assistance in the same model, we were able to compare their relative magnitude and significance. We included the same set of individual and school covariates as in RQ2.

Descriptive statistics

Table 1 presents the descriptive statistics for the variables included in the study. On average, teachers in the sample reported the greatest number of ties associated with resource access

Teacher shift in practice scale	4.009 (1.356)
Teachers' Number of Advice-Seeking Ties	
Friendship	0.278 (0.725)
Proximity	0.186 (0.491)
Resource Access	0.558 (0.857)
Experience	0.522 (0.792)
Formal Authority	0.329 (0.643)
Expertise	0.390 (0.740)
Teachers' Subject Area	
General Education	32.05%
ELA	13.23%
Mathematics	10.13%
Science	7.26%
Social Studies	3.70%
Other	34.62%
Years of Teaching Experience	12.845 (9.344)
Education Level	
Associates or Bachelors	41.59%
Masters	40.38%
Masters plus or above	20.79%
Gender	
Female	85.94%
Male	14.06%
Teacher's In-degree Centrality	1.467 (1.508)
Network Centrality	0.071 (0.059)
Teachers' Average Perception of Trust	4.908 (0.328)
School Type	
PreK-8 & Elementary Schools	61.45%
Middle Schools	18.22%
High Schools	20.33%
School demographics	
Enrollment	718.660 (457.663)
Percent free-and reduced-price lunch	31.916 (22.638)
Percent students of color	36.093 (23.414)
Percent Student Mastery in ELA	51.935 (22.210)

Note(s): (1) All descriptive statistics are reported as % or M(SD). (2) Percentages may not add to 100% due to rounding. (3) Sample sizes vary slightly by item and scale due to within survey non-response

Table 1.
Descriptive statistics (N = 1,323 teachers)

and experience. On average, 32% of teachers taught general education and 35% taught non-major subject areas. Teachers had 12.8 years of experience, on average, and the majority of teachers held at least a Master's degree (61%). Teachers were largely female (86%) and had 1.47 other colleagues seek their assistance, on average.

The second part of Table 1 shows school characteristics from the sample. Schools had an average trust rating of 4.91 (on a 6-point scale), with a SD of 0.33. The majority of schools that teachers worked in were PreK-8 or elementary schools (60%) – with the remaining schools split nearly evenly between middle and high schools. Teachers, on average, taught in schools with an enrollment of 719 students – on average, the student population was composed of 32% of students qualified for free-and reduced-price lunch, 36% students of color and 52% students testing at the mastery level of ELA.

Results

Here, we present our results, organized by research question.

RQ1. Who do teachers seek instructional assistance from and why do they seek assistance?

In total, teachers reported 2,995 instructional advice-seeking ties across all surveyed schools. The majority of teachers' instructional advice-seeking ties were with other teachers (95%), with fewer ties reported to formal leaders in their schools – i.e. teacher leaders (5%) and school administrators (<1%). The reasons for this are likely manifold, but several teachers shared that they preferred assistance from other teachers or teacher leaders because they perceived them to be more accessible than school administrators – both due to their position within the school organization, and because teachers believed their colleagues better understood the work of teaching. One teacher reflected on these dynamics in the context of professional development sessions:

> Our principal and assistant principal are in there and they say what they need to say. Then we are actually getting to talk to teachers, who say, "Okay, this is how they say this works. I've tried this in my classroom, and it works this way. So, it's not just somebody saying," "Hey, you should try this." [but instead], "I've actually done it, and it's pretty beneficial."

Similarly, a middle school teacher in another district shared that they preferred instructional assistance from colleagues who had a better understanding of their own day-to-day work:

> [School administrators] are into whatever they have to be doing, and they forget that we are teachers or they were teachers. [. . .] Having another teacher working with you makes you feel comfortable.

Teachers also perceived their peers to hold more relevant expertise. An additional barrier in teachers approaching administrators for assistance, as articulated by one high school teacher, was the power dynamics that underlay those relationships:

> There is a definite perceived wall between administration and teachers and so I think people would feel more comfortable not going directly to an administrator first but going to an instructional coach and having that as a defined "not-administrative" role that they can seek out help without feeling like they're being judged and evaluated.

Several teachers attributed their relative "comfort" with other teachers and/or instructional coaches to the higher levels of trust that they felt with these colleagues than with administrators.

Examining teachers' reasons for seeking assistance, the greatest percent of instructional advice-seeking ties were for resource access (25%), followed closely by experience (23%) and then expertise (17%) (Figure 2). In other words, the majority of teachers' requests for instructional assistance were due to teachers' perceptions that the colleague they were seeking assistance from could offer them resources or expertise, or were experienced in their work. Teachers' least common reason for seeking instructional assistance was physical proximity to the colleague from whom they sought assistance (8%).

It is notable that each of the top three reasons teachers reported for seeking instructional assistance – resource access, experience and expertise – were directly associated with the professional assets the teacher sought to access from the advice-seeking tie; whereas, the least common reasons for seeking instructional assistance – formal authority, friendship and proximity – were a function of the nature of the teacher's personal relation to the colleague from whom they sought assistance. Teachers commonly shared that they sought access to resources they could utilize to directly inform their lesson planning. For example, one middle school teacher shared:

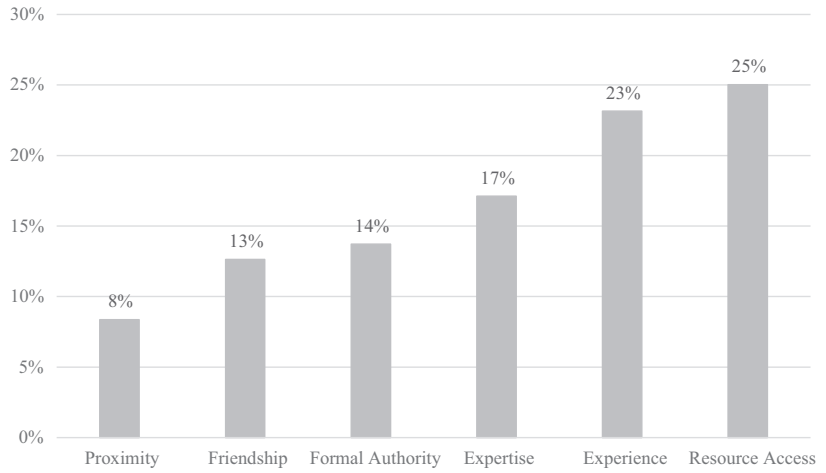

Figure 2.
Percentage of instructional advice-seeking ties by teachers' reason for seeking assistance

> I've come to [my colleague] several times and said, "I need help. Help me." So, she was able to pull some resources, and get some together and make suggestions, and give me ideas, and I loved it, because [. . .] it saved me a lot of time, because she already had access to all that information, and I wasn't starting from ground zero, trying to dig through and find it.

Additionally, our qualitative findings reveal that teachers sought instructional assistance from their colleagues with *expertise* and/or *experience* when they were being asked by their district and/or school to implement new instructional strategies. In these cases, teachers reported that they appreciated having the opportunity to observe their colleague model the integration of these new practices or programs into their instruction to better understand how to shift their own teaching practice.

When teachers sought instructional assistance from colleagues due to proximity or friendship, they were still seeking some form of professional capital; however, they were not always able to get the assistance that could meaningfully support their instructional practice. For example, one ELA teacher shared that she frequently sought out assistance from a math teacher who was physically closest to her in her school building – even despite their subject area difference, because she appreciated the general collegial support. From the perspective of an instructional coach, friendship was actually a barrier to providing effective instructional assistance to teachers:

> It's also hard when you're in a coaching conversation [with] somebody who is your friend [. . .] Normally, you are emotionally there for them to support them in different ways, and as a friend, you would want to support them this way, but as a coach, you have to be like, "No, this is what we need to do for kids."

Thus, while friendship may offer comfort, it could also serve as a barrier to instructional improvement efforts. As our analysis investigates, these dynamics have implications on the extent to which seeking instructional assistance is associated with shifts in teaching practice.

Finally, the results of the two-way ANOVA suggested that the different reasons that teachers sought assistance from their colleagues did not vary by the role type of their colleague [$F(2, 1323) = 0.106$, $p = 0.90$]. In other words, teachers were not more likely to reach out to other teachers rather than teacher leaders or administrators, or vice versa, for any given reason (i.e. friendship, proximity, resource access, experience, formal authority, expertise). Because there was not a strong relationship between reason and role type, and

because there were so few cases of instructional advice seeking from administrators, we do not distinguish the role type of colleague's providing assistance in the remainder of our analyses. To understand the individual and organizational predictors of each of these six reasons that teacher seek instructional assistance, we turn to RQ2.

RQ2. To what extent do individual teacher and school characteristics predict the reasons teachers seek instructional assistance from their colleagues?

The analyses for this question, shown in Table 2, show that both individual and school characteristics predicted the reasons teachers sought assistance. Notably, teachers' in-degree centrality, defined as the number of people who sought them out for assistance, was the most consistent predictor of why teachers sought assistance. Greater in-degree centrality was associated with more ties sought due to expertise, experience, resource access and friendship. Greater in-degree centrality was also associated with *fewer* ties motivated by formal authority. These findings may suggest that, when teachers have more people seeking them out for assistance, they have a better sense of where resources or expertise lie in their school. The fact in-degree centrality did not predict advice-seeking associated with proximity could reflect the fact that any teacher, irrespective of their centrality, is capable of seeking advice from their proximate peers. On the flip-side, that may mean that teachers with low in-degree centrality are less able to identify more targeted resources. The finding regarding friendship, on the other hand, is somewhat surprising, as one might expect that teachers with more ties with their colleagues would have more relationships to choose from when seeking advice, and thus rely less on friendship as the primary reason for seeking assistance. This finding may instead be evidence of teachers' leveraging "multiplex ties" – i.e. ties that serve the purpose of both friendship and advice (Ibarra, 1993) – when they have greater in-degree centrality.

Additionally, there were significant differences in the reasons' teachers sought assistance by subject area and school context – suggesting that there may be different organizational routines for advice-seeking within different academic departments and organizational contexts. For example, general education teachers had fewer expected ties associated with expertise, and social studies teachers had a greater number of expected ties associated with resource access, when compared to ELA teachers. These results build upon previous findings that instructional leadership routines vary by subject area (Spillane, 2005), and highlight the key role of subject area as relevant context of teachers' work. Additional factors associated with schools' organizational context – e.g. school type, school size and student demographics/performance – also influenced advice-seeking patterns.

Finally, the experience and education level of teachers predicted their reasons for advice-seeking, even when controlling for organizational features of their schools. More experienced teachers had fewer predicted ties associated with resource access and experience, and more educated teachers additionally had fewer predicted ties with resource access and expertise. This may suggest that experienced teachers are less likely to seek assistance from within their social networks and may instead benefit from more specialized instructional resources.

Together, these findings indicate that teachers' positions within their social networks, as well as their experience levels and organizational contexts, influence the reasons they seek out others for assistance.

RQ3. To what extent do teachers' reasons for seeking instructional assistance predict their shifts in practice?

To address the third research question, we predicted teachers' self-reported shifts in practice based on their reports of each of the six reasons for seeking assistance. Notably, the reason for seeking support that predicted the greatest shifts in teaching practice was *resource access:* each additional instructional advice-seeking tie that a teacher sought for *resources* was associated with a 0.25-unit increase in change in teaching practice (Table 3).

Table 2. Predictors of the reasons teachers seek instructional assistance (N = 1,169)

	Model 1 Expertise	Model 2 Formal Authority	Model 3 Experience	Model 4 Resource Access	Model 5 Friendship	Model 6 Proximity
Level 1: Individual characteristics						
Teachers' Subject Area						
Mathematics	−0.160~ (0.084)	−0.158* (0.069)	0.165~ (0.087)	−0.118 (0.100)	−0.145~ (0.083)	0.030 (0.057)
General Education	−0.199* (0.073)	−0.121* (0.060)	−0.122 (0.076)	−0.060 (0.090)	−0.027 (0.074)	0.052 (0.050)
Science	0.064 (0.093)	−0.186* (0.077)	−0.080 (0.097)	−0.108 (0.110)	−0.097 (0.093)	−0.004 (0.063)
Social Studies	0.103 (0.126)	−0.084 (0.104)	−0.006 (0.130)	0.391** (0.148)	−0.017 (0.125)	−0.035 (0.086)
Other	0.004 (0.070)	−0.113* (0.058)	−0.061 (0.072)	−0.131 (0.082)	−0.013 (0.070)	0.047 (0.048)
Years of Experience	0.002 (0.003)	−0.002 (0.002)	−0.021*** (0.003)	−0.007* (0.003)	−0.003 (0.002)	0.001 (0.002)
Teachers' Education Level						
Bachelors or Associates	−0.011 (0.049)	−0.077~ (0.040)	−0.013 (0.051)	−0.045 (0.058)	0.082~ (0.049)	−0.029 (0.033)
Masters plus and beyond	−0.133* (0.060)	−0.049 (0.050)	0.045 (0.063)	−0.164* (0.071)	0.051 (0.060)	−0.042 (0.041)
Female	0.134* (0.066)	0.003 (0.054)	0.009 (0.068)	0.114 (0.077)	−0.084 (0.065)	0.000 (0.045)
In-degree Centrality	0.041** (0.015)	−0.037** (0.012)	0.030~ (0.015)	0.045** (0.017)	0.049*** (0.015)	−0.009 (0.010)
Level 2: School Characteristics						
Network Density	−0.089 (0.709)	0.348 (0.580)	0.551 (0.730)	0.116 (0.830)	0.693 (0.771)	0.321 (0.506)
Teachers' Average Perception of Trust	−0.168* (0.078)	0.057 (0.064)	−0.001 (0.088)	0.114 (0.091)	0.085 (0.086)	0.041 (0.056)
School Type						
PreK-8 & Elementary School	0.105 (0.075)	0.012 (0.061)	0.094 (0.077)	−0.096 (0.088)	−0.146~ (0.085)	−0.111* (0.056)
High School	−0.014 (0.082)	0.107 (0.067)	−0.035 (0.085)	−0.071 (0.096)	−0.035 (0.096)	−0.050 (0.062)
Enrollment (in hundreds)	0.002 (0.007)	−0.022*** (0.006)	0.024** (0.008)	0.010 (0.009)	0.013 (0.009)	0.000 (0.006)
Percent free-and reduced-price lunch	0.003 (0.002)	0.001 (0.002)	0.001 (0.002)	0.003 (0.002)	0.000 (0.002)	−0.001 (0.002)
Percent students of color	0.001 (0.002)	0.003** (0.001)	0.000 (0.002)	−0.002 (0.002)	0.000 (0.002)	0.001 (0.001)
Percent Student Mastery in ELA	0.005** (0.002)	−0.001 (0.002)	0.003 (0.002)	0.002 (0.002)	0.003 (0.002)	0.000 (0.001)
Intercept	0.660 (0.437)	0.348 (0.581)	0.348 (0.451)	−0.007 (0.512)	−0.306 (0.488)	0.064 (0.318)

Note(s): (1) Regression coefficients shown in table (standard errors reported in parentheses). ~$p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-tailed test). (2) Omitted reference categories are ELA teachers, teachers with a Master's degree, male teachers and teachers in middle schools

Variables	Shifts in teaching practice
Level 1: Individual Characteristics	
Teachers' Number of Advice-Seeking Ties	
Expertise	0.037 (0.054)
Formal Authority	0.008 (0.064)
Experience	0.146** (0.051)
Resource Access	0.248*** (0.045)
Friendship	0.018 (0.053)
Proximity	0.097 (0.077)
Teachers' Subject Area	
Mathematics	−0.039 (0.153)
General Education	−0.059 (0.134)
Science	0.250 (0.169)
Social Studies	−0.031 (0.227)
Other	−0.060 (0.128)
Years of Teaching Experience	−0.012* (0.005)
Education Level	
Associates or Bachelors	0.068 (0.089)
Masters plus or above	−0.186∼ (0.110)
Female	0.301* (0.119)
Teacher's In-degree Centrality	−0.076** (0.028)
Level 2: School Characteristics	
Network Density	1.444 (1.352)
Teachers' Average Perception of Trust	−0.019 (0.151)
School Type	
PreK-8 & Elementary School	−0.173 (0.147)
High School	−0.062 (0.164)
Enrollment (in hundreds)	−0.014 (0.015)
Percent free-and reduced-price lunch	0.001 (0.004)
Percent students of color	−0.003 (0.003)
Percent Student Mastery in ELA	0.001 (0.004)

Table 3.
Predictors of teachers' shifts in teaching practice ($N = 1{,}169$)

Note(s): (1) Regression coefficients shown in table (standard errors reported in parentheses. $\sim p < 0.10$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$ (two-tailed test). (2) Omitted reference categories are ELA teachers, teachers with a Master's degree, male teachers and teachers in middle schools

In other words, teachers who sought resources from four additional colleagues reported, on average, an increase of 17% in self-reported change in practice (i.e. a one-point change on the six-point scale). Experience was the only other reason for seeking assistance that predicted positive shifts in teaching practice, and it had half of the influence on changes in practice as did resource access. Considering this finding in concert with the findings from RQ1 suggests that, although fewer than half (48%) of teachers' advice-seeking ties were associated with resource access or experience, these are the only reasons for seeking instructional assistance that predicted shifts in teaching practice, after controlling for individual- and school-level factors. All other reasons for seeking assistance – including expertise, formal authority, friendship and proximity – did not predict teacher reported improvements in teaching practice. Although subject area was a strong predictor of the reasons that teachers sought assistance (in RQ2), only the reasons themselves predicted teachers' shifts in practice [4].

In terms of individual characteristics, teachers' gender, years of teaching experience and in-degree centrality influenced shifts in practice. More experienced teachers have lower predicted

shifts in practice, and female teachers have larger predicted shifts in practice. Interestingly, teachers' in-degree centrality was negatively associated with shifts in practice. Given that one of the most common reasons for soliciting advice was experience, high in-degree centrality might indicate that teachers were more experienced and thus perceived to have less room to improve their practice. Finally, none of the school-level covariates were significantly associated with teacher reports of change in practice, indicating that teachers across different school contexts did not differentially report changes in practice.

Study limitations

This study is not without limitations. First, because of the nature of information we collected from schools on educators' role types (i.e. from rosters), we had incomplete information on individuals' role types – especially if they were school administrators. Therefore, we may have underreported the percentage of ties associated with school administrators in RQ1. Given the unequal and low samples of individuals we had across various role types, there may therefore also have been differences in advice-seeking by role type that our analysis was unable to pick up on. Second, the change in practice data was self-reported and measured at a single point in time. Having baseline data may have changed our results. Third, our interview protocol did not explicitly ask teachers to share the reasons they sought assistance from particular colleagues; as such, we have qualitative data from those who spoke to these reasons, but others in our sample who chose not to discuss *why* they sought assistance may have other reasons. Finally, the qualitative data was only collected in four of the seven districts of the study. As such, our qualitative findings are potentially limited by this sampling strategy.

Discussion

Education scholars have well established that social networks are a means by which resources are shared in schools, yet far less is known about why teachers choose to seek assistance from any given individual. In this study we contribute to this gap in knowledge by examining not just who teachers go to for instructional assistance, but the reasons that motivate their connection – and the relative influence of advice-seeking on teachers' shifts in practice, based on those reasons.

Consistent with previous findings that teachers' informal collegial relationships are a mechanism of instructional influence in schools (Author, 2008; Coburn *et al.*, 2012; Cross *et al.*, 2001; Daly *et al.*, 2009; Penuel *et al.*, 2012), the descriptive findings from RQ1 highlight the prevalence of teachers' informal advice-seeking ties on instructional matters. As the qualitative findings emphasize, these dynamics are partially associated with the fact that teachers often perceive their direct peers to be best suited to provide them with instructional assistance and/or they see them as more approachable than formal leaders in their school. This is consistent with previous findings that teachers may be less likely to approach formal school leaders because they perceive them to be removed from the daily experiences of teaching (Elmore, 2000); instead, teachers go through a process of "social selection" to identify who they will interact with in their social networks (Penuel *et al.*, 2010). On the other hand, school administrators may intentionally enact norms in their school to encourage teachers to seek assistance from one another, such that questions do not directly go to their principal (Comstock and Margolis, 2020).

Additionally, our findings suggest that teachers' instructional advice-seeking is motivated by reasons associated both with their individual attributes and the organizational conditions in which they operate (RQ2). Notably, previous research has found that teachers' instructional leadership networks are structured differently by subject

area (Spillane, 2005). Our findings build on these findings to shed light on what motivates teachers in different subject areas as they seek instructional advice. These findings suggest the need for additional research to understand whether subject areas have different norms or structures in place that influence their reasons for seeking advice.

Further, we find that seeking instructional advice-seeking due to resource access and experience predicts positive shifts in teaching practice. When teachers go to their peers because they perceive them to have resources to provide or are experienced, teachers report significantly greater positive shifts in practice. As the qualitative findings highlight, advice-seeking ties associated with resource access and expertise were more focused on directly sharing professional assets. Despite this finding, fewer than half of the total reported ties in the dataset were associated with these two reasons. Although seeking assistance due to friendship, proximity, formal authority or expertise might create opportunities for colleagues to interact, the findings do not suggest that the professional capital that flows through such interactions will shift teachers' practice.

These findings also raise the key question of why teachers do not go to their colleagues more for reasons that are related to shifts in practice (RQ3). Our study focuses on only ties teachers report for the purpose of seeking instructional advice; however, not all of those ties are effective at actually shifting their practice. One potential explanation is that teachers do not know where resources lie in their organization (Coburn *et al.*, 2013) and are not aware of their peers' levels of experience (Moolenaar, 2012). This explanation is bolstered by the fact that teachers with higher in-degree centrality sought more ties due to experience and resources, suggesting that, by being better connected with their colleagues, they knew where to find the resources that they may need for their own improvement. A second related explanation is that, even when teachers do know where resources or experience lie, there may be structural barriers to accessing that professional capital – e.g. teachers may not feel comfortable reaching out to certain colleagues, or they may not have the time to consult with them (Penuel *et al.*, 2007). Third, given findings from RQ2 that teachers' experience, subject areas and school characteristics (e.g. teachers' average perceptions of trust and student enrollment) predict their reasons for seeking assistance, more closely examining the organizational routines – especially those endemic to particular subject areas – might help shed light on which organizational norms and routines facilitate teachers' ability to identify and access resources and expertise (Horn and Little, 2010).

Given previous findings that policy has the power to transform the structures of teachers' collegial networks (Coburn *et al.*, 2013), our findings highlight the potential for school leaders to help teachers identify resources and experienced colleagues in schools, such as during shared collaboration time, to make it easier for other teachers to more readily identify how to access key social capital within their schools. Further, policies can not only make this professional capital more visible, but can also directly connect colleagues with their more experienced peers to receive instructional assistance by attending to the formal organization of schools (Moolenaar, 2012).

This study's findings provide new insight into the nature of resource flow within teachers' informal advice-seeking social networks. We find that the reasons teachers seek assistance play a significant factor in their instructional advice networks and are shaped by both individual and organizational factors. Studying these reasons helps illuminate the "variability" in social processes that explain key outcomes of teachers' social networks, such as shifts in practice (Coburn *et al.*, 2013). Future studies might examine other dimensions of social networks – e.g. the material resources that flow from relationships (e.g. lesson plans and other resources to support teaching), and the relationship between organizational norms and routines and teacher's networks (especially as they relate to subject area) – to continue to build deeper methodological and practical understandings of the complex dynamics underlying teachers' social networks.

Notes

1. *T*-tests of the difference between the full and reduced sample showed no significant differences in the sample from RQ1 and the final sample used for RQ2 and RQ3, indicating no bias associated with the sample attrition.
2. Because general education teachers did not have a single subject area, they could list up to eight individuals they sought assistance from in math and eight individuals they sought assistance from in ELA, and we took an average value of their number of ties across subject areas, so as to not overrepresent them in our final dataset.
3. For each item, the survey only included the text in quotation marks. The text in parentheses represents the "reasons" for seeking assistance that we operationalize in our analyses.
4. We checked our model for numerous interactions terms – e.g. between trust and resource access – and did not find any interaction terms that were statistically significant.

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