School Factors That Promote Teacher Collaboration: Results from the Tennessee Instructional Partnership Initiative

KRISTEN CARROLL, SUSAN K. PATRICK, and ELLEN GOLDRING
Vanderbilt University

Policy implementation research indicates that local contexts and school factors shape how teacher collaboration efforts are implemented in schools. By evaluating a statewide teacher collaboration initiative in Tennessee known as the Instructional Partnership Initiative (IPI), this article provides insight on the school-level factors that are associated with participating teachers' frequency of IPI collaboration activities and a collaborative focus on instructional practices. We estimate a series of regression models and find that school supports and characteristics of teacher partnerships were significant predictors of the frequency of collaborative activities, focus on instructional activities, and perceptions of IPI as beneficial. Commonalities among partner teachers like subject/grade taught were also associated with teachers' perceptions of IPI as beneficial. Our results contribute to the broader understanding of how schools can encourage teacher engagement in collaborations that focus on instructional improvement.

Education leaders and state policy makers are increasingly concerned with improving teacher effectiveness through ongoing professional learning. In 2018, almost all states had submitted plans under the Every Student Succeeds Act (ESSA) proposing to use federal funds to support professional learning systems for teachers (Doiron and Reedy 2018). Notably, ESSA redefined professional development (PD) as being "sustained (not stand-alone, 1-day, or short-term workshops), intensive, collaborative, job embedded, data driven, and classroom focused" (US Department of Education 2016). This redefinition reflects decades of research on the features of effective professional learning opportunities (Darling-Hammond et al. 2017; Garet et al. 2001; Hawley and Valli 1999). However, as states implement and plan to improve their statewide professional learning systems, policy implementation research suggests that numerous factors

Electronically published July 12, 2021
American Journal of Education 127 (August 2021)

0195-6744/2021/12704-0001$10.00

will shape how such efforts are implemented and the ultimate effectiveness of these systems as experienced by teachers (Coburn and Russell 2008; Desimone et al. 2002; Harris and Jones 2010).

Prior research indicates that both teachers' backgrounds and school conditions shape how teachers engage in professional learning (Opfer and Pedder 2011). At the individual level, teachers' experiences and perceptions of their peers may influence how they engage in professional learning opportunities and whether they regard those opportunities as helpful (Choy et al. 2006; Penuel et al. 2009; Spillane et al. 2018; Wei et al. 2010). For example, novice teachers are more likely to report participating in formal mentoring and development programs but less likely to report engaging in peer observation or team-based collaboration (Choy et al. 2006; Wei et al. 2010). Numerous social and structural conditions within schools may also facilitate or constrain professional learning opportunities, especially when those opportunities rely on effective collaboration among teachers. Studies of professional learning communities (PLCs)—one of the most common forms of instructionally focused collaboration—suggest that these collaborative efforts are most fruitful in schools with trusting and positive working relationships among staff, structured time and dedicated resources to facilitate collaboration, and active support from school leaders (Stoll et al. 2006; Talbert 2010).

In this article, we focus on a collaborative professional learning program that leverages teacher evaluation data to support instructionally focused partnerships among teachers. The Instructional Partnership Initiative (IPI), introduced statewide by the Tennessee Department of Education (TDOE) in 2015, is a voluntary program in which principals are provided suggested partnerships between teachers in their school who have low evaluation scores in particular instructional domains, such as grouping or presenting instructional content, and other teachers in their school who have demonstrated mastery in those same domains. The program, modeled after a successful pilot program in a small number of Tennessee districts (see Papay et al. 2020), was designed to offer a way for principals to support instructionally focused partnerships between teachers in their school.

KRISTEN CARROLL is a former Institute of Education Sciences postdoctoral scholar at Vanderbilt University. She is currently the executive director of data strategy at Douglas County School System in Georgia as a Harvard University–Center for Education Policy and Research Strategic Data Fellow. SUSAN K. PATRICK is a postdoctoral scholar at the Tennessee Education Research Alliance at Vanderbilt University. ELLEN GOLDRING is the Patricia and Rodes Hart Professor of Education Policy and Leadership and executive associate dean, Peabody College, Vanderbilt University. Her research focuses on school improvement and district-level change, with emphases on school leadership.

Although an initial pilot found IPI to be effective in improving student achievement and teacher evaluation scores (Papay et al. 2020), it is likely that teachers' engagement in IPI—or similar collaborative models—will vary depending on teachers' own background and perception of their partnering teacher, as well as supports for collaboration provided by their school or principal. Given the potential benefits for both students and teachers, it is important to understand how schools can encourage teacher engagement in collaborative professional learning that focuses on instructional improvement. This study seeks to explore the extent to which certain teacher characteristics, partnership characteristics, and school supportive conditions are associated with teachers' engagement in IPI.

In this study, we address three specific research questions:

1. What teacher characteristics, partnership characteristics, and school conditions are related to teachers' engagement in IPI activities?
2. What teacher characteristics, partnership characteristics, and school conditions are related to the likelihood that teachers' IPI collaboration focuses on instructional domains from the Tennessee evaluation system?
3. What teacher characteristics, partnership characteristics, and school conditions are related to the degree to which teachers perceive IPI collaboration as beneficial?

We categorize IPI as a collaborative professional learning approach meant to support instructional improvement. As IPI shares commonalities with other collaborative learning approaches (such as professional learning communities, peer assistance and review, and classroom observation programs), we build on prior research that examines how supportive conditions within schools and individual characteristics may influence teacher engagement in these approaches (e.g., Bolam et al. 2005; Goldstein 2003; Horn et al. 2018; Saunders et al. 2009; Talbert 2010). Unlike other collaborative learning approaches, IPI uses domain-specific evaluation data in matching teachers and encourages teachers to collaborate specifically on those instructional domains. Thus, this exploratory analysis examines factors associated with teachers' reported engagement in IPI and their perceptions of its benefits.

Teacher Collaboration as Professional Learning

Professional learning for teachers can take many forms (Darling-Hammond et al. 2017). Here we focus on formal professional learning approaches meant to support instructionally focused collaboration among teachers. We define this form of collaborative professional learning as structured and sustained efforts—

often guided by school leaders—to encourage teachers to work together on instructional improvement. This definition comprises many popular professional learning models, such as professional learning communities (McLaughlin and Talbert 2006; Vescio et al. 2008), peer coaching and observation programs (Goldstein 2003; Showers and Joyce 1996), and other reforms meant to encourage professional communities that support instructional improvement (Coburn and Russell 2008; Supovitz 2002).

Such approaches are meant to create on-the-job learning opportunities to develop teachers' knowledge and skills supporting instructional practice (Parise and Spillane 2010). Instructionally focused collaboration is a mechanism for teachers to transfer helpful information, gain access to their peers' expertise and resources, take up new instructional ideas or reforms, and discuss problems of practice (Little 2012; Penuel et al. 2009; Spillane et al. 2012). Such collaboration creates opportunities to foster more reflective and analytic instructional choices (Bryk et al. 1999; Horn et al. 2017). Instructionally focused collaboration is also associated with higher student achievement (Goddard et al. 2015; Ronfeldt et al. 2015).

However, not all collaborative professional learning approaches lead to improvements in instructional practice (Hargreaves 2000; Supovitz 2002). We seek to distinguish collaborative engagement most likely to support instructional improvement. First, frequent and sustained collaborative time affords teachers more opportunities to work collectively on instructional issues, to meaningfully engage around specific problems of practice, and to promote deeper professional learning (Goddard et al. 2015; Stoll et al. 2003). As Horn and colleagues conclude, "effective collaborative work is time consuming," and teachers may benefit most from collaboration when they can regularly work with the same colleagues (Horn et al. 2018). Next, teachers likely benefit more when they focus their collaborative activities around particular aspects of teaching and learning rather than school operations, logistics, or curriculum pacing (Horn et al. 2017; McLaughlin and Talbert 2006; Stoll et al. 2006; Vescio et al. 2008). In fact, higher student achievement outcomes may only occur when teacher teams created by specific collaborative professional learning programs consistently focus on instruction and student learning (Saunders et al. 2009; Supovitz 2002). Finally, these approaches may best support teacher development when they offer opportunities to deprivatize and deeply discuss their teaching practices (Little 2003; Louis et al. 1996). Collaborative activities such as coteaching and peer observation allow teachers to focus on specific instructional strategies, to develop a common language around instruction, and to reflect on their choices (Horn et al. 2017; Little 2003). Unfortunately, peer observation and coteaching are often encumbered by structural barriers—such as the lack of dedicated time or resources to allow for regular observations—and professional norms that emphasize teacher autonomy and privacy (Hargreaves 2010; Horn et al. 2017; Little 1990).

We posit that these features are important markers of collaborative professional learning programs that are more likely to support teacher development and learning. In this analysis, we focus on measuring the teacher-reported frequency of collaborative partnership work, distinguish between different types of activities that may focus more closely on teaching and learning, and measure the extent to which teachers report that their partnership work focuses on specific instructional indicators.

Factors Promoting the Implementation of Collaborative Professional Learning Programs

Existing research on the implementation of collaborative professional learning programs suggests that certain supportive conditions enable more effective instructionally focused collaboration and that teachers may engage differently in these programs based on their own personal background (Horn et al. 2018; Louis et al. 1996; Ronfeldt et al. 2015). In the sections below, we briefly review prior research that informs our own exploratory analysis of which supportive conditions and teacher characteristics predict the nature of teacher engagement in IPI.

Supportive Conditions

A broad base of research on the implementation of PLCs (Bolam et al. 2005; McLaughlin and Talbert 2006; Vescio et al. 2008) and other collaborative professional learning programs (Bolam et al. 2005; Coburn and Russell 2008; Horn et al. 2018; Saunders et al. 2009) highlights numerous school conditions that support successful implementation of these programs, including the professional climate among teachers, strong leadership, and structural resources. First, the established professional climate within schools may shape how teachers collaborate, including levels of trust and respect, collegiality, and shared commitment to instructional improvement (Bolam et al. 2005; Goddard et al. 2015; Tschannen-Moran 2001).

School leaders also play an integral role in developing conditions that encourage collaboration, including a shared sense of purpose and expectations that collaborative efforts focus on instruction (Charner-Laird et al. 2017; Horn et al. 2018; McLaughlin and Talbert 2006; Scribner et al. 1999). Leaders mediate the implementation of externally developed collaborative professional learning approaches by conveying their expectations about how teachers take up the new program and marshaling school resources to support it (Coburn and Russell 2008). Leaders can signal the importance of collaborative programs and provide sufficient resources to support their implementation without relying on

bureaucratic management strategies focusing primarily on compliance (Horn et al. 2018; Talbert 2010). Leaders must often creatively find dedicated time during the school day that is crucial to implementation (Horn et al. 2018; Little 2012; Stoll et al. 2003, 2006). Leaders can also encourage teachers to participate in collaborative activities when they are embedded within and counted toward required PD as determined by their school or district (Bolam et al. 2005; McLaughlin and Talbert 2006).

Teacher Characteristics

Teachers' backgrounds and relational dynamics among collaborating teachers may also influence how they engage in and perceive collaborative professional learning efforts. Although many posit that teachers' professional experience shapes how they collaborate with colleagues (e.g., see discussion in Opfer and Pedder 2011), the empirical research is mixed. In studies that capture teacher-reported frequency of collaboration, novice teachers have reported spending less time engaged in peer collaboration and observation (Choy et al. 2006; Wei et al. 2010), whereas other studies found novice teachers to spend similar amounts of time engaged in collaboration (Ronfeldt et al. 2015).

Collaboration is, by definition, a relational activity, and dynamics among teachers undoubtedly affect how they work together. When teachers are able to work with colleagues who teach similar content, collaborations are more likely to focus on content knowledge, instructional practices, and the specific needs of the students (Garet et al. 2001; Horn et al. 2018; Stoll et al. 2006; Vescio et al. 2008). Indeed, many collaborative programs are organized around grade levels or subject areas. The role of the teacher within the collaborative partnership may also influence how beneficial teachers find collaborative work. Research on mentoring relationships indicates that teachers differentially participate and benefit depending on their position (Ehrich et al. 2004; Ingersoll and Strong 2011). Teachers who are mentees may be more likely to find these partnerships beneficial to their work and instructional improvement than teachers who are identified as mentors, especially if the program is framed only as a way to support the mentee's instructional improvement. However, other research on peer assistance finds that mentor teachers—who are experienced teachers positioned as experts who observe and evaluate their peers—hold more positive opinions of the efficacy of this collaborative approach (Goldstein 2003).

Building on this prior research, this article contributes to the knowledge base about teacher collaboration in several ways. Much of the prior work identifying supportive conditions in collaborative professional learning programs relies on case studies within one or a few schools or districts. Our analysis differs from this approach in that we examine the implementation of IPI as reported by teachers

in more than 100 schools. Thus, our analysis can explore associations between these supportive conditions and teacher-reported implementation of IPI across many different teaching contexts. In addition, IPI differs from other well-studied professional learning models in its use of evaluation data to pair teachers for targeted collaborative partnerships, the voluntary nature of its implementation, and its emphasis on flexibility for participating leaders and teachers. Given the unique nature of IPI, we position our analyses as exploratory rather than confirming hypotheses built from prior research.

Context and Data

Our analysis focuses on teachers in a subset of Tennessee schools that implemented IPI during the 2017–18 school year. We use survey data collected as part of the 2018 Tennessee Educator Survey (TES), an annual survey of all public school teachers in Tennessee that is administrated through a partnership between TDOE and the Tennessee Education Research Alliance (TERA). We draw on survey responses from 436 participating teachers across 102 Tennessee schools who reported on their experiences with IPI. By examining the relationships between teacher characteristics, teacher-reported school supports, and teachers' reported engagement in IPI, this research provides insight on the conditions that may support the implementation of instructionally focused collaborative partnerships among teachers.

Context

In 2011, Tennessee was an early adopter of a multiple-measure teacher evaluation system that assesses teacher effectiveness using a combination of students' academic growth and scores from formal instructional observations. Leaders at TDOE have committed considerable resources to the evaluation system but were concerned that the existing system did not offer enough opportunities for teachers to get formative feedback supporting improvement. Thus, during the 2015–16 academic year, TDOE introduced the voluntary statewide collaborative professional learning program known as IPI. An initial pilot study found that participation in IPI had a positive impact on teacher evaluation scores, student achievement, and teacher perceptions of state evaluation systems (Papay et al. 2020). IPI is an initiative meant to harness teacher evaluation data to support improvement-focused collaborative partnerships between teachers. In its design, the initiative identifies teachers with lower observation scores in specific domains of instructional practice (e.g., "Questioning" or "Lesson Structure and Pacing") and recommends partner teachers in the same school who

have demonstrated success in those domains, as evidenced by relatively higher observation scores. TDOE creates these proposed matches and then sends them to school principals via a web-based portal. Principals are encouraged to revise the proposed matches based on their knowledge of their teachers.

Through its use of domain-specific evaluation data to suggest partnerships, IPI creates a mechanism for principals to leverage teachers' evaluation data to support instructional improvement. Because of the program's design, IPI partnerships are intended to focus teachers' collaborative effort on improving in specific areas of practice. The program materials suggest numerous activities that can be implemented to create learning opportunities, including peer observation, structured feedback, and common lesson planning. The program's materials and TDOE's communication around IPI emphasize flexibility on the part of principals and teachers to adapt the program to their needs and context. As a result, the implementation of the program, by design, did vary across schools (see Cannata et al. 2019). In this analysis, we leverage this variation to explore associations between school, teacher, and partnership characteristics and teachers' reported engagement with IPI.

Data

We use data collected through the TES during the 2017–18 school year as well as statewide administrative data managed by TERA.[1] Administered annually to all public school educators since 2012, TES asks educators about their individual professional experiences, satisfaction, school environment, and perceptions of state programs (Bailey and Booker 2018). The survey has included a subset of questions specifically for teachers participating in IPI since the statewide implementation of the initiative during the 2015–16 academic year.

After using a set of screening questions to identify participating teachers, survey respondents were directed to a specific set of survey questions regarding their experience with IPI, including what activities they engaged in, how helpful they perceived those activities, and their overall evaluation of their experiences. Our study draws on the survey data collected from the broader survey (questions asked of all responding teachers) and the IPI-specific module (questions asked of teachers who indicated they were participating in IPI).

Sample

Our analytic sample includes 102 schools that participated in the IPI.[2] Among the participating schools, the survey response rate among teachers was 59%.

This sample includes 430 teacher responses from the TES. Although these 102 schools represent a wide range of teaching contexts (e.g., geographic contexts across the state and different school levels), schools in urban areas are underrepresented and elementary schools are overrepresented when compared with all schools in the state.[3]

Measurement

We implemented factor analysis to operationalize the outcome variables in this study: the frequency of IPI activities, the focus on IPI instructional domains, and the perceived benefit of IPI. Our predictor variables include teacher-reported school supports, teacher experience, and teacher partnership characteristics that prior research would suggest influence the implementation of collaborative professional learning programs.

Outcome Variables

The three outcome variables are the frequency of IPI activities, the focus of IPI activities on instructional domains, and the perceived benefit of IPI (see table 1). To estimate how frequently teachers engaged in 10 different types of IPI activities with their IPI partner on a scale from "never" to "once a week or more," we complete exploratory factor analysis that identified three clear factors (see table 2). The first factor characterizes initial meeting activities, such as meeting with the teacher partner, discussing specific indicators, and discussing partnership goals (eigenvalue of 2.84; Cronbach's alpha = .89). The second factor characterizes planning for instructional improvement activities such as planning lessons together, developing materials and activities, and providing feedback (eigenvalue of 2.62; Cronbach's alpha = .92). The final factor characterizes classroom activities such as coteaching and observing classrooms (eigenvalue of 1.66; Cronbach's alpha = .81). We create three scales and have standardized each for ease of interpretation.[4]

These three factors broadly represent three levels of collaboration that increasingly focus on instruction. The first factor (initial meeting activities) comprises introductory activities that may help build a foundation for a successful collaborative partnership but does not include close examinations of teaching or learning. The second factor (planning for instructional improvement) and especially the third factor (classroom activities) include activities that provide greater opportunity for teachers to make visible their instructional practice and discuss particular problems of practice. Given that prior research indicates that these

TABLE 1

Mean Responses to Teacher Collaboration Activities

Variable	*N*	*M*	SD	Min	Max
"How often did you and your IPI partner teacher do each of the following activities this year as part of IPI?" (1 = never, 2 = once or twice a semester, 3 = about once a month, 4 = two or three times a month, 5 = once a week or more)					
Initial Meeting Activities Scale		2.82			
Meet or do activities together	426	2.70	1.34	1	5
Communicate about classrooms or professional learning	426	3.33	1.32	1	5
Set or discuss goals for the partnership	428	2.71	1.29	1	5
Discuss specific indicators from teacher evaluation rubric	427	2.52	1.28	1	5
Planning for Instructional Improvement Scale		2.41			
Review student assessment data to make instructional decisions	427	2.51	1.40	1	5
Plan a lesson together	426	2.12	1.42	1	5
Provide and receive feedback about instructional practices and activities	427	2.63	1.33	1	5
Work to develop materials or activities for particular classes	428	2.38	1.45	1	5
Classroom Activities Scale		1.88			
Coteach	425	1.62	1.16	1	5
Observe one another's classrooms to get ideas for instruction or to offer feedback	428	2.13	1.16	1	5

NOTE.—IPI = Instructional Partnership Initiative.

closer examinations of instruction create more opportunities for learning (Horn et al. 2017; Little 2003), we are particularly interested in the predictor variables associated with the frequency of teachers' engagement with planning and classroom activities.

The second outcome variable is whether IPI activities focus on specific instructional domains, as identified by Tennessee's observational rubric. Teachers were asked "approximately what percentage of [their time in IPI activities was] focused on specific indicators from the teacher evaluation rubric" (with five options ranging from "none of our time" to "76%–100% of the time"). Because IPI is designed to pair teachers specifically based on these instructional domains, partnerships that focused their collaborative activities on specific evaluation indicators met the intended goals of IPI. For this reason, we collapse survey responses into a dummy variable. Teachers that focused on evaluation

TABLE 2

Rotated Factor Loadings for Teacher Collaboration Activities

Variable	Factor 1	Factor 2	Factor 3
Initial meeting activities:			
a. Meet or do activities together	.67		
b. Communicate about classrooms or professional learning	.62		
c. Set or discuss goals for the partnership	.72		
d. Discuss specific indicators from teacher evaluation rubric	.69		
Planning for instructional improvement:			
a. Review student assessment data to make instructional decisions		.57	
b. Plan a lesson together		.72	
c. Provide and receive feedback about instructional practices and activities		.59	
d. Work to develop materials or activities for particular classes		.76	
Classroom activities:			
a. Coteach			.68
b. Observe one another's classrooms to get ideas for instruction or to offer feedback			.69
Eigenvalue	2.84	2.62	1.66
Cronbach's alpha	.89	.92	.81

indicators "none of the time" were assigned a 0. All other teachers were assigned a 1, indicating a focus on evaluation indicators some or all of the time (table 3).

The final outcome variable is teachers' perception of the benefit of IPI. Teachers were asked a series of five questions on the perceived benefit of IPI on a scale from strongly disagree to strongly agree. We apply exploratory factor analysis (table 4), and the five questions load on one factor with high internal consistency (eigenvalue of 4.25; Cronbach's alpha = .97).

Predictor Variables

The predictor variables are organized into three broad categories: teacher-reported supportive conditions of schools, teacher partnership characteristics, and teacher background characteristics. In table 5, we provide further description and summary of the predictor variables.

Supportive conditions.—We define supportive conditions as the social and structural resources that can support effective implementation. First, we measure teachers' perceptions of professional climate using a series of five survey questions that asked teachers about the atmosphere of trust and respect at their

TABLE 3

Mean Teacher Responses to Focus on Instructional Domains and IPI Benefit

Variable	*N*	*M*	SD	Min	Max
Focus on instructional domains:					
Time spent with IPI partner focused on specific indicators from the teacher evaluation rubric (0 = none of our time, 1 = some or all of our time)	436	.78	.41	0	1
IPI benefit: Please indicate the extent to which you agree or disagree with the following statements about IPI (1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree)					
My IPI partnership benefits my teaching practice	430	2.90	.81	1	4
I would take part in an IPI partnership again next year	430	2.80	.88	1	4
IPI has improved the culture of collaboration in my school	430	2.77	.83	1	4
Because of IPI, I have a better understanding of what effective teaching looks like	430	2.75	.84	1	4
IPI has helped me learn specific classroom strategies	430	2.81	.82	1	4

NOTE.—IPI = Instructional Partnership Initiative.

school, cooperation among staff, and general satisfaction on a 4-point scale. In an exploratory factor analysis, these questions loaded on one factor (eigenvalue of 3.37; Cronbach's alpha = .91). Given prior research (Bolam et al. 2005), we anticipate that teachers with more positive perceptions of professional climate may report engaging more frequently in IPI activities and have more positive perceptions of its benefits. We also measure teachers' perceptions of administrative support using a series of three survey questions that asks teachers about

TABLE 4

Mean Teacher Responses and Factor Loadings for IPI Benefit

Please indicate the extent to which you agree or disagree with the following statements about IPI (1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree)	Factor 1
My IPI partnership benefits my teaching practice	.88
I would take part in an IPI partnership again next year	.90
IPI has improved the culture of collaboration in my school	.94
Because of IPI, I have a better understanding of what effective teaching looks like	.96
IPI has helped me learn specific classroom strategies	.94
Eigenvalue	4.25
Cronbach's alpha	.97

NOTE.—IPI = Instructional Partnership Initiative.

TABLE 5

Mean Responses for Survey Questions and Control Variables

Variable	Obs.	Min	Max	*M*	SD
School supportive conditions:					
Perception of evaluation systems: Indicate the extent to which you agree or disagree with the following statement about IPI (1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree):					
The processes used to conduct my teacher evaluation are fair to me	436	1	4	2.91	.77
In general, the teacher evaluation process used in my school has led to improvements in my teaching	436	1	4	2.93	.74
In general, the teacher evaluation process used in my school has led to improvements in student learning	436	1	4	2.89	.74
Perception of professional culture: Indicate the extent to which you agree or disagree with the following statement about IPI (1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree):					
There is an atmosphere of trust and mutual respect within this school	436	1	4	3.19	.72
Staff at this school have an effective process for making group decisions to solve problems	436	1	4	3.13	.74
Teachers are encouraged to participate in school leadership roles	436	1	4	3.25	.73
The staff at this school like being here; I would describe us as a satisfied group	436	1	4	3.16	.76
I feel appreciated for the job that I am doing	436	1	4	3.15	.76
Perceptions of administration support: Indicate the extent to which you agree or disagree with the following statement about IPI (1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree):					
School leadership encourages collaboration among teachers in this school	436	1	4	3.29	.64
School leadership communicates that they value teachers working together on instructional issues	436	1	4	3.25	.68
School leadership encourages teachers with different levels of expertise to work together	436	1	4	3.27	.67
Release time from teaching was available	436	0	1	.47	.49
Professional development credit was available	436	0	1	.29	.45
Common planning time was shared with IPI partner	436	0	1	.36	.48
Partnership characteristics:					
Perception of partner teacher: Indicate the extent to which you agree or disagree with the following statement about IPI (1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree):					
This teacher has useful knowledge in my content area or subject	436	1	4	3.08	.87
This teacher has useful knowledge about good teaching practice	436	1	4	3.29	.69
I feel comfortable asking this teacher for advice/talking with him or her about my teaching challenges	436	1	4	3.28	.73

TABLE 5 (*Continued*)

Variable	Obs.	Min	Max	*M*	SD
This teacher and I have similar beliefs about good teaching	436	1	4	3.27	.67
This teacher is an effective instructor	436	1	4	3.33	.66
This teacher and I are a good match	436	1	4	3.21	.78
I get along well with this teacher	436	1	4	3.42	.59
Individual teacher characteristics:					
Novice teacher with <3 years of experience	436	0	1	.39	.48
Mentor partner	436	0	1	.16	.37
Mentee partner	436	0	1	.23	.42
Same grade or subject level taught by IPI partner	436	0	1	.66	.47
School environment controls:					
Enrollment (logged)	436	4.91	7.69	6.30	.51
Urban schools	436	0	1	.14	.36
Elementary school	436	0	1	.41	.49
Middle school	436	0	1	.19	.39
High school	436	0	1	.23	.42
K–8/K–12/Other school	436	0	1	.17	.38
Missing prior-year performance data	436	0	1	.33	.47

NOTE.—IPI = Instructional Partnership Initiative.

school leadership's role in encouraging collaboration among teachers. These questions loaded on one factor (eigenvalue of 2.57; Cronbach's alpha = .95). We expect that teachers' perceptions of administrative support will be associated with teacher-reported engagement in IPI (Charner-Laird et al. 2017; Scribner et al. 1999; Talbert 2010). Teachers' perceptions of evaluations were also measured using factor analysis on three survey questions that asked teachers their perceptions about the fairness and usefulness of the teacher evaluation process (eigenvalue of 2.32; Cronbach's alpha = .91). Because IPI was designed around the state evaluation system and original pairings were made based on evaluation scores, teachers who perceive the evaluation system to be fair and helpful may engage more within their IPI partnerships and find more benefit in IPI.

Among school supports, we also include variables that capture additional resources for teacher partners that may help facilitate teacher engagement. First, we consider the presence of release time from teaching to participate in IPI, PD credits for participation, or sharing a common planning time with their IPI teacher. We measure all three supports using binary indicators that indicate whether a teacher reported having that specific support available for IPI. We anticipate that the presence of these resources will provide teachers with the structured time and structural incentives to engage in IPI (Horn et al. 2018; McLaughlin and Talbert 2006).

Teacher and partnership characteristics.—For each teacher, we create a dummy variable indicating novice teachers (those teachers in their first 3 years of teaching). We have chosen 3 years of experience because Tennessee teachers can qualify for a professional licensure after 3 years of teaching. Although prior research is mixed (Choy et al. 2006; Wei et al. 2010), we anticipate that novice teachers may report that participation in IPI is more beneficial for their practice. Because principals differed in whether they introduced IPI partnership as mentorships (in which one teacher was tapped to support their partner's improvement) or equal partnerships (in which both teachers were working to support each other's improvement), we also include indicators for whether a teacher reported they were the mentor partner or mentee partner in their IPI partnership. The reference category is equally matched partners, or those teachers who perceived neither to be the mentor/mentee. Given the design of IPI, we anticipate that mentee teachers may find IPI more beneficial.

We also include variables that capture the relational dynamics within an IPI partnership to assess whether these partnership characteristics are associated with teachers' reported engagement in or perceived benefits of IPI. First, perception of partner teacher is a variable measuring the extent to which teachers evaluate their partner teacher's expertise and effectiveness as a match. Following an exploratory factor analysis, the questions load on one factor (eigenvalue of 5.29; Cronbach's alpha of .95). Finally, we include a binary variable for whether a teacher reported that their partner teacher currently teaches or previously taught the same grade or same subject. Because teachers are more likely to report collaboration with colleagues in their same grade (Spillane et al. 2012), we anticipate that paired teachers who currently teach or previously taught the same grade or subject may engage more frequently in IPI or report greater benefit.

Control variables.—Last, we include control variables that capture school environmental characteristics. First, we control for school type (elementary, middle, high, K–8/K–12). We also control for urban schools (1) compared with nonurban schools (0). We also include a variable for school size (measured by logged student enrollment) and an indicator for whether school was missing prior-year school performance data (as measured by Tennessee's accountability system).

Analytical Approach

To address our research questions, we ran a series of ordinary least squares (OLS) and logistic regression models estimating engagement in the IPI collaboration (frequency of activities, focus on instructional domains, and benefit). Our unit of analysis is the individual teacher, and all outcome and predictor variables of

interest are measured at the teacher level. Equation (1) describes a basic model that is used to address all research questions.

$$\text{IPI Outcome}_i = \beta_0 + \beta_1 S_i + \beta_2 P_i + \beta_3 B_i + \beta_3 X_s + \varepsilon \quad (1)$$

This equation models our outcomes of interest (IPI activities, IPI focus on instructional domains, or IPI benefit), as a function of school supportive conditions (S_i) as reported by teacher i, teacher partnership characteristics (P_i), teacher characteristics (B_i), and school environmental characteristics (X_s). School supportive conditions (S_i) include social resources within the school (teacher perception of professional climate, teacher perception of administrative support, teacher perception of evaluation) and structural resources (PD credit, release time from teaching, common planning time). Teacher partnership characteristics P_i describe whether teachers were matched for IPI within the same grade/subject and teachers' individual perceptions of their partner teacher. Individual teacher characteristics (B_i) include a teacher's level of experience and if the teacher was a mentor or mentee teacher with the collaboration pair. Finally, school environmental characteristics (X_s) include the school control variables that describe the school where a teacher is employed, including the school type (elementary, middle, high), urbanicity, and school size or enrollment. The only variables measured at the school level are the control variables. Last, our models include standard errors that are clustered at the school level to address homoscedasticity and potential error correlation among teachers within the same school.[5]

To analyze the factors related to the frequency of IPI activities and perceived benefit of IPI, we use OLS regression analysis. Because we operationalize the frequency of IPI activities and perceived benefits as standardized scale measures, OLS provides an appropriate analysis. To analyze whether teachers report IPI activities focused on instructional domains, we use a logistic regression analysis because we operationalize this outcome variable as a binary indicator capturing if the teacher reported focusing on evaluation indicators during their collaboration activities. For ease of interpretation, we include average marginal effect estimates within table 6.

Results

Our results find three leading relationships between teacher characteristics, school conditions, and teacher engagement in IPI. First, the results describe that school supports and the characteristics of teacher partnerships were some of the most meaningful predictors of IPI collaborative activities, focus on instruction, and perceptions of IPI as beneficial. Second, teachers' perceptions of state

evaluations are significantly and positively related to increasing the odds of focusing on IPI indicators. Last, commonalities among partner teachers like subject/grade taught significantly influenced whether or not teachers perceived IPI to be beneficial. In the following section, we explain these relationships in detail.

Engagement in IPI Activities

First, we describe the overall frequency of engagement, focus on instructional domains, and perceived benefit of the IPI. Average teacher responses (table 1) revealed that teachers engaged in initial collaboration activities (e.g., setting goals, reviewing student data, and discussing evaluation feedback) slightly more frequently than planning and classroom collaboration activities. On a 5-point scale ("never" to "once a week or more"), teachers reported an average of 2.82 on all initial planning activities. Activities related to planning for instructional improvement (e.g., lesson planning, giving and receiving feedback about instruction, and developing instructional materials) are slightly less frequent (an average of 2.41 on a 5-point scale). Importantly, these planning activities are more likely to provide opportunities for specific discussion of instructional strategies and choices in ways that initial planning activities do not. In comparison, teachers report less frequent engagement in coteaching and peer observation (an average of 1.88 on a 5-point scale, which falls between a response of "never" and "once or twice a semester"). These classroom activities place instructional practice at the forefront and provide opportunities for teachers to deprivatize their teaching and receive immediate feedback.

We then examined associations between our key predictor variables—school supportive conditions, partnership characteristics, and teacher characteristics—and the frequency of teacher engagement in these three types of IPI activities. As shown in columns 1–3 of table 6, we find that perceptions of professional climate, administrative support, and evaluation are not consistently associated with the frequency of all types of activities. Perception of administrative support is positively associated with frequency of initial meeting activities and planning for instructional improvement activities but not with the frequency of classroom activities. Notably, a standard deviation increase in administrative support for collaboration is related to roughly 20% standard deviation increase in planning for instructional improvement. Perceptions of professional climate and perceptions of evaluation are both significantly associated with the frequency of classroom activities but not with the frequency of either initial meeting activities or planning for instructional improvement. On average, teachers with more positive perceptions of the evaluation system also reported more frequent co-observations and coteaching with their IPI teachers.

TABLE 6

Factors Related to Teacher Collaboration Activities, Focus, and Perceived Benefit of IPI

	Initial Meeting Activities (1)	Planning for Instr. Activities (2)	Classroom Activities (3)	Focus on Instr. Domains (4)	Marginal Effects (5)	Perceived Benefit of IPI (6)
School supportive conditions:						
Perception of prof. climate	−.03	−.06	−.14*	−.18	−.02	.05
	(.05)	(.06)	(.06)	(.16)		(.05)
Perception of admin. support	.09^{+}	.18**	−.02	.38*	.05	.17**
	(.05)	(.05)	(.05)	(.15)		(.05)
Perception of evaluation system	.05	.04	.13*	.61**	.08	.18**
	(.04)	(.04)	(.06)	(.15)		(.04)
PD credit	.23*	.08	.27**	.76*	.10	.06
	(.09)	(.08)	(.10)	(.35)		(.06)
Release time from teaching	.03	.09	.26**	−.10	−.01	.17*
	(.08)	(.09)	(.10)	(.36)		(.07)
Common planning time	.30**	.53**	−.01	.92**	.12	.03
	(.09)	(.12)	(.11)	(.26)		(.06)
Teacher partnership characteristics:						
Perception of partner teacher	.23**	.07^{+}	.06	.44**	.06	.34**
	(.04)	(.03)	(.04)	(.15)		(.05)
Same grade or subject pair	.14^{+}	.37**	−.04	.21	.03	.11
	(.08)	(.09)	(.07)	(.24)		(.07)

Individual teacher characteristics:						
Novice teacher	−.04	.16*	−.06	.49+	.07	−.06
	(.09)	(.06)	(.09)	(.29)		(.07)
Mentor						.06
						(.10)
Mentee						.21**
						(.08)
Initial meeting activities						.21**
						(.04)
Planning activities						.09*
						(.04)
Classroom activities						.07+
						(.04)
Focus on instructional domains						.30**
						(.09)
Observations	425	425	425	436		417

NOTE.—IPI = Instructional Partnership Initiative. Standard errors are in parentheses. All models include school environmental characteristics as control variables, including indicators for urban schools, school level, logged student enrollment, and prior-year school performance level, as measured by the Tennessee Value-Added Assessment System (TVAAS) score. Beta coefficients are not reported in the table.

+ $p < .10$.

* $p < .05$.

** $p < .01$.

The frequency of IPI activities is also positively related to teachers' reported structural supports. Receiving PD credits and release time from teaching are both positively and significantly associated with more frequent engagement in IPI classroom activities. These associations are notable given that coteaching and peer observations are both low-incidence activities in this sample. Sharing common planning time with their IPI partner is also positively and significantly associated with more frequent initial meeting and planning activities. Common planning time, in fact, has the strongest correlations with the frequency of initial meeting and planning for instructional improvement activities. On average IPI teachers with common planning time report half a standard deviation more frequent planning activities than IPI teachers without common planning.

Next, the analyses found that partnership and teacher characteristics are associated with the frequency of IPI activities but not consistently across all three types of activities. On average, teachers' perceptions of their partner teacher are positively associated with engagement in all three types of activities, but this association is only statistically significant at conventional levels for initial meeting activities. Teachers paired with their same grade/subject also reported engaging more frequently in planning for instructional activities than teachers paired across grades or subjects (an estimated difference of .37 standard deviations). All else equal, we find that novice teachers report more frequent engagement in planning activities when compared with their more experienced peers (an estimated difference of .16 standard deviations), but there are no significant differences between novice and experienced teachers in the reported frequency of initial meeting activities or classroom activities.

Focus on Instructional Domains

IPI is designed to encourage strategic partnerships that focus on specific instructional domains based on teachers' evaluation ratings. These evaluation indicators also represent specific areas of instructional practice in which at least one teacher has been identified as in need of improvement. Seventy-nine percent of teachers reported focusing on evaluation indicators for some or all of the time during IPI activities. In table 6 (column 4), we address our second research question and present the logistic regression analysis that models teachers' reported focus on evaluation indicators during collaboration activities. Marginal effects from this analysis are presented in column 5.

The analysis suggests that certain supportive conditions can increase the odds that teachers focus on instructional domains during IPI collaboration, all else equal. Teacher perceptions of administrative support for collaboration and perceptions of the evaluation system are both positively associated with the likelihood of focusing on instructional domains. On average, for every one

standard deviation increase in teacher perceptions of administrative support for collaboration, teachers increased their likelihood of focusing on instructional domains by 5 percentage points. Similarly, a one standard deviation increase in teachers' perception of evaluations is associated with an increase by 8 percentage points in their likelihood of focusing on instructional domains. Finally, teachers who shared common planning time with their IPI partner or who received PD credit for their participation in IPI have greater odds of focusing on instructional domains during their IPI work. Marginal effects predictions indicate that providing PD credits for IPI increased the likelihood of teachers' focusing on instructional domains by about 10 percentage points. Teachers with common planning time were 12 percentage points more likely to focus on instructional domains during IPI. Less experienced teachers and those with more positive perceptions of their partner teacher were also more likely to focus on instructional domains in their IPI partnership (at a *p*-value of .10).

Perceived Benefit of IPI

Our final research question examines which factors are related to the perceived benefit of IPI. More than half of the teachers within the sample agreed or strongly agreed with all statements assessing the benefits of IPI. The results of this final regression analysis are presented in table 6, column 6. Teachers' perceptions of administrative support for collaboration, perceptions of the evaluation system, and release time from teaching are all positively associated with perceived benefits. Certain teacher and partnership characteristics are also related to the perceived benefits of IPI. Not surprisingly, teachers with more positive perceptions of their partner teacher reported greater benefits of participation in IPI, all else equal (the strongest association within this model). Notably, teachers partnered within the same grade/subject did not have significantly more positive perceptions of IPI's benefits than teachers partnered across grade/subject, when controlling for all other variables. Although we did not find significant differences between novice and more experienced teachers in perceived benefits, we did find that teachers who designated their role as a mentee perceived IPI to be more beneficial compared with teachers who reported working in equal partnerships.

Last, we find that engagement in IPI activities and focus on instructional domains during those activities are all significantly and positively related to perceptions of IPI being beneficial for one's teaching practice. We anticipated that IPI activities focused more on instruction (i.e., planning for instructional improvement activities and classroom activities) would demonstrate a stronger relationship with a teacher's perceived benefit of IPI. However, we find the

strongest correlation between the frequency of initial meeting activities and perceived benefits of IPI. Interestingly, we also find that teachers who focused on instructional domains from the evaluation rubric also rated their experience in IPI as more beneficial than teachers whose partnerships did not focus on instructional domains (an estimated difference of .30 standard deviations).

Discussion

Given the increased policy focus on job-embedded professional supports for teachers, it is important to understand how schools encourage engagement in collaborative professional learning approaches. This study examines the case of Tennessee's IPI to explore factors that may facilitate teacher engagement in these approaches. Our findings suggest that certain supportive conditions can encourage more frequent engagement in collaborative activities that focus on instructional improvement.

We find that teacher-reported social and structural conditions within schools are associated with engagement in IPI and its perceived benefits. Our analysis underscores the importance of school leadership in supporting the implementation of collaborative professional learning approaches. Teachers' perception of administrative support is positively associated with the frequency of instructional planning activities (e.g., common lesson planning or giving/receiving instructional feedback), whether teachers report focusing on specific instructional domains during their IPI collaboration, and the perceived benefits of participating in IPI. This finding aligns with research on other collaborative professional learning programs that suggests that supportive leadership is critical to successful and sustained implementation of a new program (Bolam et al. 2005; Horn et al. 2018; McLaughlin and Talbert 2006). Given that research on instructional leadership connects support for collaborative work to instructional improvement and student achievement (Goddard et al. 2015; Louis et al. 2010; Supovitz et al. 2010), these findings emphasize how supportive implementation of collaborative professional learning programs can offer leaders a mechanism to promote learning in their schools.

Although our analysis is unable to precisely characterize the nature of administrative support for collaboration, prior research suggests that leaders can encourage successful implementation by conveying clear expectations about teacher participation, modeling the importance of collaborative learning, and marshaling school resources to support their implementation (Charner-Laird et al. 2017; Coburn and Russell 2008; Talbert 2010). Indeed, our analysis also finds that structural supports are positively associated with teachers' engagement in IPI. All three supports—PD credit for participation in IPI, release time from teaching, and common lesson planning time—are mechanisms that district or

school leaders can leverage to create structured time for teachers to engage in IPI. Notably, PD credits and release time are both positively associated with the frequency of classroom activities. Given that peer observation and coteaching are low-incidence activities in our analysis and in prior research (Johnston and Tsai 2018; Wei et al. 2010), these structural supports may be particularly important in facilitating opportunities for teachers to engage in collaborative work not often done in schools.

Unlike more commonly studied collaborative professional learning programs, IPI leverages teachers' prior evaluation scores in specific instructional domains to suggest teacher partnerships. Tennessee has invested significant resources in implementing a multimeasure teacher evaluation system (Putnam et al. 2018), but teachers have not always universally embraced this new system (Pepper et al. 2015). Given this design element, we expected that teachers who held more positive perceptions of the state's evaluation system would be more likely to engage in IPI activities and to focus on instructional domains from the evaluation rubric during their collaboration. We find that perceptions of the evaluation system are positively related with how frequently teachers report participating in classroom activities (but not planning for instructional improvement activities), whether teachers focus on instructional domains in their IPI work, and the extent to which teachers report positive benefits of participating in IPI. If teachers do not find the evaluation system fair or effective, teachers may be wary of IPI and may not be interested in collaborating on specific instructional domains as defined and measured by the observation rubric. Prior research suggests that teachers may resist efforts in which other teachers are positioned as evaluating their peers (Goldstein 2003). It may be that teachers participating in IPI in schools with more positive cultures around evaluation (e.g., viewing evaluation as supporting their own improvement) are more likely to embrace collaborative efforts that include reflection and critical feedback related to their instruction.

Our analyses also highlight how partnership characteristics among teachers are related to teachers' engagement in IPI and perception of its benefits. Although IPI partnerships within the same grade/subject reported more frequent engagement in instructional planning activities (e.g., common lesson planning, giving or receiving instructional feedback), this characteristic was not associated with the likelihood of focusing on instructional domains or perceived benefits of IPI. We anticipate that teachers participating in IPI who were partnered within grade/subject may have already engaged in these planning activities, as grade-level and subject-area collaborative meetings are commonly reported among Tennessee teachers (Patrick 2019). Thus, teachers in same grade/subject partnerships may be less likely to engage in collaborative work more unique to IPI's design, including focusing on specific instructional domains and classroom activities (e.g., coteaching or peer observation).

Limitations

Before turning to potential implications, we want to acknowledge certain limitations of our analysis. First, we rely on teacher survey data to measure both supportive conditions and implementation of IPI. Although our data allow us to look across many different teaching contexts, they do not offer a nuanced understanding of how IPI unfolds in schools. Qualitative research on IPI largely triangulates our survey findings, especially in regard to the importance of leadership support and school structures (e.g., release time from teaching or common planning time) that integrate IPI into the existing work of teaching (Cannata et al. 2019). We also construct both predictor and outcome variables from the same survey, which creates concern about common source bias that could inflate the correlation among these variables. In table 7, we provide a correlations matrix of all variables to illustrate that most variables exhibit weak to moderate correlation. We also conducted various robustness checks, including using school-level averages for predictor variables like professional climate, administrative support, and perceptions of evaluations. The results remain similar, although relationships are slightly attenuated, in these supplemental analyses.

Second, there are multiple considerations regarding generalizability. IPI differs from other collaborative professional learning approaches in that participation was voluntary and its adaptability was emphasized in communication to school and district leaders. Our findings may be less relevant in contexts in which all schools or districts are mandated to implement a specific collaborative program. Although many schools across the state opted to implement IPI, a larger percentage of schools chose not to participate. Our sample is not representative of all Tennessee schools, and participating schools may differ on certain observed and unobserved characteristics. For example, to better understand the negative associations found here between professional climate and engagement with IPI, we compared teacher responses in participating schools and schools that chose not to participate and found that participating schools had lower average ratings of professional climate. Thus, the negative relationships identified between professional climate and IPI engagement may be a result of selection into the program and not a generalizable finding.

Implications

The findings highlight important factors that policy makers and education practitioners can consider when implementing collaborative professional learning programs. Primarily, collaboration partnerships are a space where teachers will learn to improve their instructional practice. The design of collaborative teacher

TABLE 7

Correlation of Variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
(1) Initial activities	1.00																			
(2) Planning activities	.23	1.00																		
(3) Classroom activities	.11	.16	1.00																	
(4) Focus on instr. domains	.41	.14	.11	1.00																
(5) Perceived benefit of IPI	.47	.37	.15	.42	1.00															
(6) Perception of prof. climate	.13	.11	−.1	.14	.38	1.00														
(7) Perception of admin. support	.16	.23	0	.18	.40	.50	1.00													
(8) PD credits	.17	.13	.23	.15	.15	.03	0	1.00												
(9) Release time	.15	.18	.21	.12	.31	.22	.18	.33	1.00											
(10) Common planning time	.25	.38	.05	.21	.20	−.04	.05	.14	.14	1.00										
(11) Perception of partner teacher	.35	.25	.06	.26	.60	.29	.18	.02	.13	.16	1.00									
(12) Same grade/subject	.18	.29	−.01	.12	.25	.03	.03	0	.06	.18	.24	1.00								
(13) Mentee	.03	0	−.04	.05	.18	.05	.06	.07	−.01	−.01	.15	.07	1.00							
(14) Mentor	.01	.08	.05	.04	−.08	−.06	−.06	.02	−.05	0	−.19	−.04	−.24	1.00						
(15) Perception of evaluation	.18	.17	.11	.27	.47	.42	.36	.10	.22	.06	.27	.03	.11	−.09	1.00					
(16) Urban school	−.07	−.13	.01	−.10	−.21	−.18	.01	−.03	−.09	.07	−.11	−.09	−.07	−.02	−.09	1.00				
(17) Novice teacher	.10	.21	.01	.15	.19	.17	.11	.10	.12	.17	.19	.06	.34	−.18	.16	−.02	1.00			
(18) School type	.08	−.03	−.02	.05	−.03	.05	−.04	.09	−.03	.04	.05	−.05	−.07	.01	−.08	−.18	−.03	1.00		
(19) Enrollment	−.01	.12	.10	−.13	−.08	−.15	−.14	.11	−.05	.06	−.03	−.03	.04	.03	−.14	.20	.02	−.04	1.00	
(20) Missing TVAAS	−.03	−.10	.10	−.10	−.24	−.13	−.12	.10	−.14	−.03	−.13	−.10	−.04	.06	−.18	.25	−.05	.13	.33	1.00

NOTE.—IPI = Instructional Partnership Initiative; PD = professional development; TVAAS = Tennessee Value-Added Assessment System.

partnerships and collaborative time should be designed in intentional ways that may support instructional improvement. For instance, organizing collaborative pairs among teachers who share teaching experiences, teachers who share a common planning time, and/or teachers who have identified instructional skills for improvement can potentially produce collaboration partnerships that engage teachers in effective and beneficial PD.

Yet these approaches are unlikely to be successful without support by school leadership. Before implementation of collaborative professional learning programs, policy makers and school leaders should evaluate if schools can make supports available to teachers that will allow them to actively and beneficially engage in collaboration. Without school supports like release time from teaching or integration into the existing PD system (e.g., receiving PD credits or hours), the capacity to engage in various collaborative activities may be limited for many teachers.

Within this study, we highlight a distinctive collaborative professional learning program meant to complement ongoing evaluation and accountability systems. Like peer assistance and review (Goldstein 2003), IPI's direct connection to the evaluation system may offer an opportunity for schools and districts to better integrate their evaluation and professional learning systems. These systems have been largely disconnected (Darling-Hammond 2015), and some principals struggle to use evaluation to meaningfully support teacher development because they lack time, training, and expertise to provide in-depth instructional feedback (Hallinger et al. 2014; Kraft and Gilmour 2016). If implemented under supportive conditions, IPI and similar programs can create opportunities for teachers to reflect on their instructional practices and receive formative feedback from their peers that relates to the same instructional domains rated by administrators in their summative evaluation. This model for collaborative professional learning also creates opportunities for teachers and administrators to build and refine common language about instruction, which has been identified as an advantage of both evaluation systems (Kraft and Gilmour 2016) and instructionally focused collaboration that engages specific problems of practice (Horn et al. 2017; Little 2003).

Our results indicate that supportive conditions and teacher partnership characteristics can contribute to more frequent and instructionally focused collaboration among teacher peers. As policy makers and educators continue to implement collaborative professional learning programs to increase instructional improvement, understanding how these factors contribute to teacher collaboration and professional learning is imperative.

Notes

We would like to thank Jason Grissom and John Papay for their contribution, feedback, and support throughout the development of this research. The research

reported here was supported by the Institute of Education Sciences, US Department of Education, through Grant R305E150005 to Brown University and Grant R305B170009 to Vanderbilt University. The opinions expressed are those of the authors and do not represent views of the Institute or the US Department of Education.

1. Survey questions are developed, tested, and validated through an annual process managed by TERA, a partnership between TDOE, Vanderbilt University, and other external researchers. Numerous research studies have developed measures from TES responses (Grissom et al. 2018; Koedel et al. 2019), but the IPI-specific measures have been developed for this analysis.

2. Because IPI is a voluntary initiative, TDOE did not require that schools submit any specific documentation of participation in IPI. We used a variety of data sources—including user data from the IPI website, correspondence between TDOE and principals who received IPI matches, and survey data from principals and teachers in IPI—to construct a take-up sample of schools that participated in IPI.

3. In an additional analysis, we modeled how well school characteristics such as school type, performance, and urbanicity predict the likelihood of IPI participation. The only statistically significant predictor of IPI take-up is school geographic context.

4. The three factors that measure frequency of various IPI activities are all positively yet weakly correlated. Initial meeting activities and planning for instructional improvement activities maintained the highest correlation coefficient at .24.

5. As a robustness check and to potentially address school-level group effects, we also implemented a multilevel model (MLM). The results of the MLM analyses remain the same in magnitude and statistical significance.

References

Bailey, Isaiah, and Laura Booker. 2018. "Reflections over Time: Tennessee Educator Survey 2018 Results in Context." Tennessee Department of Education, Nashville, TN.

Bolam, Ray, Anges McMahon, Louise Stoll, Sally Thomas, Mike Wallace, Angela Greenwood, Kate Hawkey, Malcolm Ingram, Adele Atkinson, and Michele Smith. 2005. *Creating and Sustaining Effective Professional Learning Communities*, vol. 637. Research report. University of Bristol, Department for Education and Skills, Bristol.

Bryk, Anthony, Eric Camburn, and Karen Seashore Louis. 1999. "Professional Community in Chicago Elementary Schools: Facilitating Factors and Organizational Consequences." *Educational Administration Quarterly* 35 (5): 751–81.

Cannata, Marissa, Ellen Goldring, Michael A. Neel, Susan K. Patrick, Molly Rubin, and Kristen Carroll. 2019. "Implementing an Evidence-Based Program: The Role of Tight and Loose Coupling." Paper presented at University Council for Educational Administration, New Orleans, November.

Charner-Laird, Megin, Monica Ng, Susan Moore Johnson, Matthew A. Kraft, John P. Papay, and Stefanie K. Reinhorn. 2017. "Gauging Goodness of Fit: Teachers' Responses to Their Instructional Teams in High-Poverty Schools." *American Journal of Education* 123 (4): 553–84.

Choy, Susan P., Xianglei Chen, and Rosio Bugarin. 2006. "Teacher Professional Development in 1999–2000: What Teachers, Principals, and District Staff Report."

Statistical Analysis Report, NCES 2006–305, National Center for Education Statistics, Washington, DC.
Coburn, Cynthia E., and Jennifer Lin Russell. 2008. "District Policy and Teachers' Social Networks." *Educational Evaluation and Policy Analysis* 30 (3): 203–35.
Darling-Hammond, Linda. 2015. *Getting Teacher Evaluation Right: What Really Matters for Effectiveness and Improvement.* New York: Teachers College Press.
Darling-Hammond, Linda, Maria E. Hyler, and Madelyn Gardner. 2017. *Effective Teacher Professional Development.* Palo Alto, CA: Learning Policy Institute.
Desimone, Laura, Andrew C. Porter, Beatrice F. Birman, Michael S. Garet, and Kwang Suk Yoon. 2002. "How Do District Management and Implementation Strategies Relate to the Quality of the Professional Development That Districts Provide to Teachers?" *Teachers College Record* 104 (7): 1265–312.
Doiron, Trevor A., and Marcy Reedy. 2018. "Principal Preparation, Development, and Quality and Effectiveness." University Council for Educational Administration, Charlottesville, VA. http://www.ucea.org/2018/10/15/essa-brief-series-investments-school-leadership/.
Ehrich, Lisa C., Brian Hansford, and Lee Tennent. 2004. "Formal Mentoring Programs in Education and Other Professions: A Review of the Literature." *Educational Administration Quarterly* 40 (4): 518–40.
Garet, Michael S., Andrew C. Porter, Laura Desimone, Beatrice F. Birman, and Kwang Suk Yoon. 2001. "What Makes Professional Development Effective? Results from a National Sample of Teachers." *American Educational Research Journal* 38 (4): 915–45.
Goddard, R., Y. Goddard, E. Sook Kim, and R. Miller. 2015. "A Theoretical and Empirical Analysis of the Roles of Instructional Leadership, Teacher Collaboration, and Collective Efficacy Beliefs in Support of Student Learning." *American Journal of Education* 121 (4): 501–30.
Goldstein, Jennifer. 2003. "Making Sense of Distributed Leadership: The Case of Peer Assistance and Review." *Educational Evaluation and Policy Analysis* 26 (2): 173–97.
Grissom, Jason A., Richard S. L. Blissett, and Hajime Mitani. 2018. "Evaluating School Principals: Supervisor Ratings of Principal Practice and Principal Job Performance." *Educational Evaluation and Policy Analysis* 40 (3): 446–72.
Hallinger, Philip, Ronald H. Heck, and Joseph Murphy. 2014. "Teacher Evaluation and School Improvement: An Analysis of the Evidence." *Educational Assessment, Evaluation and Accountability* 26 (1): 5–28.
Hargreaves, Andy. 2000. "Contrived Collegiality: The Micropolitics of Teacher Collaboration." *Sociology of Education: Major Themes* 3:1480–503.
Hargreaves, Andy. 2010. "Presentism, Individualism, and Conservatism: The Legacy of Dan Lortie's Schoolteacher: A Sociological Study." *Curriculum Inquiry* 40 (1): 143–54.
Harris, Alma, and Michelle Jones. 2010. "Professional Learning Communities and System Improvement." *Improving Schools* 13 (2): 172–81.
Hawley, D. W., and L. Valli. 1999. "The Essentials of Effective Professional Development: A New Consensus." In *Teaching as the Learning Profession: Handbook of Policy and Practice*, ed. L. Darling-Hammond and G. Sykes. San Francisco: Jossey-Bass.
Horn, Ilana Seidel, Brette Garner, Britnie Delinger Kane, and Jason Brasel. 2017. "A Taxonomy of Instructional Learning Opportunities in Teachers' Workgroup Conversations." *Journal of Teacher Education* 68 (1): 41–54.
Horn, Ilana S., Britnie D. Kane, and Brette Garner. 2018. "Teacher Collaborative Time: Helping Teachers Make Sense of Ambitious Teaching in the Context of Their

Schools." In *Systems for Instructional Improvement: Creating Coherence from the Classroom to the District Office*, ed. Paul Cobb, Kara Jackson, Erin Henrick, Thomas M. Smith, and the MIST Team. Cambridge, MA: Harvard Education Press.

Ingersoll, Richard M., and Michael Strong. 2011. "The Impact of Induction and Mentoring Programs for Beginning Teachers: A Critical Review of the Research." *Review of Educational Research* 81 (2): 201–33.

Johnston, William R., and Tiffany Tsai. 2018. *The Prevalence of Collaboration among American Teachers: National Findings from the American Teacher Panel*. Santa Monica, CA: RAND.

Koedel, Cory, Jiaxi Li, Matthew G. Springer, and Li Tan. 2019. "Teacher Performance Ratings and Professional Improvement." *Journal of Research on Educational Effectiveness* 12 (1): 90–115.

Kraft, Matthew A., and Allison F. Gilmour. 2016. "Can Principals Promote Teacher Development as Evaluators? A Case Study of Principals' Views and Experiences." *Educational Administration Quarterly* 52 (5): 711–53.

Little, Judith Warren. 1990. "The Persistence of Privacy: Autonomy and Initiative in Teachers' Professional Relations." *Teachers College Record* 91 (4): 509–36.

Little, Judith Warren. 2003. "Inside Teacher Community: Representations of Classroom Practice." In *Connecting Policy and Practice: Challenges for Teaching and Learning in Schools and Universities*, ed. Pam M. Denicolo and Michael Kompf. New York: Routledge.

Little, Judith Warren. 2012. "Professional Community and Professional Development in the Learning-Centered School." In *Teacher Learning That Matters: International Perspectives*, ed. Mary Kooy and Klaas van Veen. New York: Routledge.

Louis, Karen Seashore, Beverly Dretzke, and Kyla Wahlstrom. 2010. "How Does Leadership Affect Student Achievement? Results from a National US Survey." *School Effectiveness and School Improvement* 21 (3): 315–36.

Louis, Karen Seashore, Helen M. Marks, and Sharon Kruse. 1996. "Teachers' Professional Community in Restructuring Schools." *American Educational Research Journal* 33 (4): 757–98.

McLaughlin, Milbrey Wallin, and Joan E. Talbert. 2006. *Building School-Based Teacher Learning Communities: Professional Strategies to Improve Student Achievement*, vol. 45. New York: Teachers College Press.

Opfer, V. Darleen, and David Pedder. 2011. "Conceptualizing Teacher Professional Learning." *Review of Educational Research* 81 (3): 376–407.

Papay, John P., Eric S. Taylor, John H. Tyler, and Mary E. Laski. 2020. "Learning Job Skills from Colleagues at Work: Evidence from a Field Experiment Using Teacher Performance Data." *American Economic Journal: Economic Policy* 12 (1): 359–88.

Parise, Leigh Mesler, and James P. Spillane. 2010. "Teacher Learning and Instructional Change: How Formal and On-the-Job Learning Opportunities Predict Change in Elementary School Teachers' Practice." *Elementary School Journal* 110 (3): 323–46.

Patrick, Susan K. 2019. "Trends in Professional Learning: A Tennessee Educator Survey Snapshot." Tennessee Education Research Alliance, Nashville.

Penuel, William R., Margaret Riel, Ann Krause, and Kenneth A. Frank. 2009. "Analyzing Teachers' Professional Interactions in a School as Social Capital: A Social Network Approach." *Teachers College Record* 111 (1): 124–63.

Pepper, Matthew J., Mark W. Ehlert, Eric S. Parsons, Seth W. Stahlheber, and Susan F. Burns. 2015. "Educator Evaluation in Tennessee: Findings from the

2014 First to the Top Survey." Tennessee Consortium on Research, Evaluation and Development, Nashville.
Putnam, Hannah, Elizabeth Ross, and Kate Walsh. 2018. *Making a Difference: Six Places Where Teacher Evaluation Systems Are Getting Results*. Washington, DC: National Council on Teacher Quality.
Ronfeldt, Matthew, Susanna Owens Farmer, Kiel McQueen, and Jason A. Grissom. 2015. "Teacher Collaboration in Instructional Teams and Student Achievement." *American Educational Research Journal* 52 (3): 475–514.
Saunders, William M., Claude N. Goldenberg, and Ronald Gallimore. 2009. "Increasing Achievement by Focusing Grade-Level Teams on Improving Classroom Learning: A Prospective, Quasi-Experimental Study of Title I Schools." *American Educational Research Journal* 46 (4): 1006–33.
Scribner, Jay Paredes, Karen Sunday Cockrell, Dan H. Cockrell, and Jerry W. Valentine. 1999. "Creating Professional Communities in Schools through Organizational Learning: An Evaluation of a School Improvement Process." *Educational Administration Quarterly* 35 (1): 130–60.
Showers, Beverly, and Bruce Joyce. 1996. "The Evolution of Peer Coaching." *Educational Leadership* 53:12–16.
Spillane, James P., Chong Min Kim, and Kenneth A. Frank. 2012. "Instructional Advice and Information Providing and Receiving Behavior in Elementary Schools: Exploring Tie Formation as a Building Block in Social Capital Development." *American Educational Research Journal* 49 (6): 1112–45.
Spillane, James P., Matthew Shirrell, and Samrachana Adhikari. 2018. "Constructing 'Experts' among Peers: Educational Infrastructure, Test Data, and Teachers' Interactions about Teaching." *Educational Evaluation and Policy Analysis* 40 (4): 586–612.
Stoll, Louise, Ray Bolam, Agnes McMahon, Mike Wallace, and Sally Thomas. 2006. "Professional Learning Communities: A Review of the Literature." *Journal of Educational Change* 7 (4): 221–58.
Stoll, Louise, Dean Fink, Lorna Maxine Earl, and Lorna Earl. 2003. *It's About Learning (and It's About Time)*. London: Psychology Press.
Supovitz, Jonathan, Philip Sirinides, and Henry May. 2010. "How Principals and Peers Influence Teaching and Learning." *Educational Administration Quarterly* 46 (1): 31–56.
Supovitz, Jonathan A. 2002. "Developing Communities of Instructional Practice." *Teachers College Record* 104 (8): 1591–626.
Talbert, Joan E. 2010. "Professional Learning Communities at the Crossroads: How Systems Hinder or Engender Change." In *Second International Handbook of Educational Change*, ed. Andy Hargreaves, Ann Lieberman, Michael Fullan, and David Hopkins. Dordrecht: Springer.
Tschannen-Moran, Megan. 2001. "Collaboration and the Need for Trust." *Journal of Educational Administration* 39 (4): 308–31.
US Department of Education. 2016. "Non-Regulatory Guidance for Title II, Part A: Building Systems of Support for Excellent Teaching and Leading." https://www2.ed.gov/policy/elsec/leg/essa/essatitleiipartaguidance.pdf.
Vescio, Vicki, Dorene Ross, and Alyson Adams. 2008. "A Review of Research on the Impact of Professional Learning Communities on Teaching Practice and Student Learning." *Teaching and Teacher Education* 24 (1): 80–91.
Wei, Ruth Chung, Linda Darling-Hammond, and Frank Adamson. 2010. *Professional Development in the United States: Trends and Challenges*, vol. 28. Dallas: National Staff Development Council.