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Building Teachers' Data-use Capacity: Insights from Strong and Developing Coaches

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Abstract: Coaching has become a central strategy in district and school efforts to build teacher capacity to interpret and respond to student learning data. Despite their popularity, there is limited research on the implementation of these initiatives. This article begins to addresses this gap by examining the elements of a coach's practice that appear to build teachers' skills and knowledge to use data to guide instructional decisions. Drawing on sociocultural learning theory and interview and survey data collected in four middle schools—two with "strong" coaches and two with "developing"

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coaches—we find that coaching to build data-use capacity appears to rely less on the official title or model (i.e., data coach vs. instructional coach) and more on the diversity of coach practices as well as content area and interpersonal expertise. Further, administrators play an important role in shaping the work of a coach through their mediation of political dynamics in a school. The article concludes with implications for coaching practice, as well as suggestions to guide future research and theory development.
Keywords: Data coach; instructional coach; data use; data-driven decision making; politics; school context; principal-coach relationship; teacher-coach relationship

Construcción de la capacidad de los profesores para el uso de datos: Reflexiones de entrenadores "fuertes" y "en desarrollo"

Resumen: El coaching/entrenamiento se ha convertido en una estrategia central en escuelas y distritos para aumentar la capacidad de los docentes para interpretar y responder a los datos de aprendizaje de los estudiantes. A pesar de su popularidad, no hay muchos estudios sobre la utilización de estas iniciativas. Este artículo comienza a atender esta brecha mediante el examen de los elementos que componen la práctica de un entrenador para desarrollar habilidades y conocimientos de los profesores para utilizar datos para orientar las decisiones de instrucción. Sobre la base de la teoría del aprendizaje sociocultural y entrevista y encuestas realizadas en cuatro escuelas medias y dos con los entrenadores "fuertes" y dos en "desarrollo" -nos encontramos con que el coaching para desarrollar la capacidad de utilización de datos parece depender menos el título oficial o modelo (es decir, el entrenador de datos vs entrenador de instrucción) y más en la diversidad de las prácticas, así como el área de contenido y experiencia interpersonal. Además, los administradores tienen un papel importante en la configuración del trabajo de un entrenador a través de su mediación de la dinámica política en una escuela. El artículo concluye con implicaciones para la práctica de coaching, así como sugerencias para guiar la investigación futura y el desarrollo de la teoría.
Palabras clave: entrenador de datos; entrenador de instrucción; uso de datos, toma de decisiones basada en datos; política; contexto escolar; relación director-entrenador; relación profesor-entrenador

A capacitação dos professores para utilizar os dados: Reflexões dos treinadores "fortes" e "em desenvolvimento"

Resumo: O treinamento/coaching tornou-se uma estratégia central nas escolas e distritos escolars para aumentar a capacidade dos professores para interpretar e responder aos dados da aprendizagem dos alunos. Apesar de sua popularidade, há poucos estudos sobre o uso dessas iniciativas. Este artigo começa a abordar esta lacuna através da análise dos elementos da prática de treinadores para desenvolver habilidades e conhecimentos dos professores para utilizar os dados para orientar as decisões de instrução. Com base na teoria da aprendizagem sociocultural e entrevistas e pesquisas em quatro escolas de ensino médio e dois treinadores "fortes" e dois "em desenvolvimento" achamos que o coaching para desenvolver a capacidade de usar os dados parece depender menos no título oficial ou modelo (ou seja, o treinador de dados vs. Treinador de instrução) e mais na diversidade de práticas e áreas de conteúdos e experiência interpessoal. Além disso, os administradores têm um papel importante na definição do trabalho de um treinador através da mediação da dinâmica política em uma escola. O artigo conclui com implicações para a prática do coaching, bem como sugestões para orientar a pesquisa e a teoria futuro desenvolvimento.

Palavras-chave: gerenciador de dados; treinador de instrução; uso de tomada de decisão com base em dados de dados; política; contexto escolar; relacionamento gerente-técnico; relação professor-treinador

Introduction

In the United States and abroad, teachers are widely called upon to use student data to guide their instruction. A common "mantra" of the modern day educator (Ikemoto & Marsh, 2007; see also Coburn & Turner, 2011, 2012; Hamilton et al., 2009; Mandinach, 2012), being "data driven" is not only an expectation, but also increasingly a formal criteria used in teacher evaluations. Yet, research suggests that although teachers appreciate having access to various types of data—including metrics from classroom assessments, common grade assessments, teacher observations, interim or benchmark assessments, state tests—they often struggle to use data due to a lack of skills and knowledge to formulate questions, select indicators, interpret results, and develop instructional responses (Cosner, 2012; Kerr et al., 2006; Means, Chen, DeBarger, & Padilla, 2011; Olah, Lawrence, & Riggan, 2010; Supovitz & Klein, 2003).

In response, coaching has become a central strategy in district and school efforts to build teacher capacity (Means, Padilla, DeBarger, & Bakia, 2009). Two popular coaching positions, data coach and instructional coach, have been at the forefront of these efforts to build teacher data-use skills and knowledge. For years, instructional coaches have been a strategy for school improvement in large scale reform efforts, such as America's Choice, national grant programs like Reading First, and large state literacy initiatives (Galm & Perry, 2004; Marsh, McCombs, & Martorell, 2012; Moss, 2008; Russo, 2004). Data coaching positions have also become more widespread, as demonstrated by Delaware's dedication of $8.2 million of their Race to the Top funds to a data coaching program throughout the state (McCann & Kabaker, 2013). These coaches often play multiple roles: they assist in connecting teachers with student data, interpreting data, applying new information to classroom practice, facilitating constructive dialogue, and identifying instructional responses (Carlisle & Berebitsky, 2011; Coburn & Woulfin, 2012; Lachat & Smith, 2005; Kruse & Zimmerman, 2012; Means et al., 2009). The coaching role is considered central to developing teachers' data-use literacy, something with which teacher preparation programs have struggled (Mandinach & Gummer, 2013).

Given the prevalence of these positions nationwide, there is a need for research that examines the implementation of coaching as a strategy for building teachers' data-use capacity. More general literature on instructional coaching and other related forms of in-house professional development suggest that coaching may be an effective strategy to influence teacher practice (Carlisle & Berebitsky, 2011; Cohen & Hill, 2000; Cronen et al., 2008; Neufeld & Roper, 2003; Rodgers & Rodgers, 2007). However, existing research fails to examine in-depth the elements of a coach's practice that make her effective in building teachers' skills and knowledge to use data to guide and improve instruction. We begin to fill this gap by answering the questions, *how do coaches work with teachers to build capacity to use data to guide instruction,* and *what conditions support this process?*

In the remainder of the paper, we review extant literature on instructional and data coaches. We draw on sociocultural learning theory to frame our understanding of how coaches work with teachers to build capacity for data use and outline our methods and data sources for this study. Our analysis unfolds from four cases: two strong cases of coaching and two cases of developing coaches. Based on these four cases, we describe how coaching to build data-use capacity varies along multiple dimensions: coach practices, artifacts, and contextual factors. We find that successful coaching to build data-use capacity appears to rely less on the official title or model (i.e., data coach vs. instructional coach), and more on the variety of coaching practices and contextual factors influencing coach-teacher relationships. The diversity of coach practices, as well as content and

interpersonal expertise, appears to greatly influence perceived impact on teacher practice. Further, administrators play an important role in shaping the work of a coach through their mediation of political factors in the school. We conclude with a set of implications for policy and practice.

How Coaches may Support Teachers' Data-Use Capacity

Recent research demonstrates that classroom and school improvements can be made through data analysis (Ikemoto & Marsh, 2007; Herman, Wardrip, Hall, & Chimino, 2012). Data collection and analysis is one of the common explanations for the academic improvement in schools and districts (e.g., Snipes, Doolittle, & Herlihy, 2002; Wayman, Cho, & Johnston, 2007; Zavadsky, 2009). Research suggests that certain types of data use can improve students' learning, as seen in Black and Wiliam's (1998) meta-analysis on the benefits of formative assessment on teaching and learning. For teachers, data can be useful in multiple ways, such as setting goals, tracking student progress, and adjusting curriculum and content sequencing (Beaver & Weinbaum, 2013; Datnow, Park & Kennedy-Lewis, 2012; Kerr et al., 2006).

At the same time, we know that not all teachers are equipped to analyze and use data to adjust their planning and instruction (Cosner, 2012; Heritage, Kim, Vendlinski, & Herman, 2009; Kerr et al., 2006; Means et al., 2011; Marsh, Pane, and Hamilton, 2006; Oláh et al., 2010; Supovitz & Klein, 2003). One study found that while most teachers were capable of finding information on a graph, they had difficulty comprehending complex data displays and showed a limited understanding of key statistical concepts of test validity, score reliability, and measurement error, leading to invalid inferences (Means et al., 2011). Teachers can have difficult connecting the gap between identified problems represented in student learning data and the appropriate instructional response (Goertz et al., 2009). Another set of challenges arises as teachers work to incorporate these new expectations for data use into their practice, making sense of them in relation to their current beliefs and expectations (Young, 2006).

One way that districts and schools have attempted to build teachers' data-use capacity is through the employment of instructional and data coaching positions. Coaches in these roles take on a variety of assignments in their positions. Instructional coaches are often expected to identify teachers that could benefit from coaching support, visit classrooms, model lessons, gather data, and connect teachers to resources which could benefit their practice (Camburn, Kimball, & Lowenhaupt, 2008; Gallucci, Van Lare, Yoon, & Boatright, 2010; Knight, 2006). While the focus of an instructional coach is primarily on pedagogy and content-specific curriculum, data are generally the central facet of a data coach's role. The data coach position is often leveraged to increase problem solving related to data and improve the use of data for monitoring and planning student growth (Lachat & Smith, 2004).

Although there is limited research available on how coaches may support teachers' data use abilities, we can draw some conclusions from the broader coaching literature about the factors that enable or constrain coaches' work. For instance, the content knowledge of an instructional or data coach plays an important role (West & Staub, 2006). For instance, one study of a reading coach program found that teachers' perceptions of coaches' skills and experiences were correlated with their ratings of coaches' influence on instructional change (Marsh, McCombs, & Martorell, 2012). In other words, when teachers believed that their coach had adequate knowledge and expertise to assist them, they felt that the coaches had a greater impact on their practice. However, many principals often use their own criteria to hire coaches, which may not align with the necessary content knowledge of the position (Roller, 2006). Coaches may therefore arrive at their position without complete knowledge of the content that they are to be coaching (Frost & Bean, 2006).

Scholarship indicates that a coach's interpersonal skills are as important to her role as is content knowledge (Brown, Reumann-Moore, Hugh, du Plessis, & Christman, 2006; Ertmer et al., 2005). Instructional and data coaches must also be able to effectively build relationships with the teachers with whom they work (Knight, 2006; Neuman & Cunningham, 2009; Neumerski, 2013; Matsumura, Garnier, & Resnick, 2010). Arguing from a network theory standpoint, Daly (2012) argues, "a coach's ability to move information and strategies may be dependent on whether the coach has adequate social ties to diffuse resources throughout a system; absent those relationships, the expertise and knowledge of the coach may remain personal assets" (p. 6). Indeed, as coach expertise is primarily shared through interactions with teachers, a coach's ability to work with adult learners has a significant influence on fulfilling their responsibilities (Bean & Eisenberg, 2009).

Contextual factors may also play an important role in mediating coach interventions. As with other policies, coaching can be influenced by the political climate surrounding implementation (Marsh, 2002). Teachers who are influential within a school's political culture may sway others to allow or rebuff a coach's interventions (Stoelinga, 2008). As micropolitics within the school effect the everyday interactions of professionals, studies suggest that successful coaches are sensitive to approach their work in ways that are perceived as non-threatening to individual teachers (Lachat & Smith, 2005). If teachers are reluctant to work with their coaches, their perceptions of the coach's effectiveness are diminished (Marsh et al., 2008). These political tensions may be heightened in instances where data are seen as valuable sources of influence, power, and advantage within a school or district (Henig, 2012).

One important element of the school context that influences coach practice is principal leadership. Research suggests that a principal who is actively supportive of an instructional leadership position may be associated with increased effectiveness (Bean et al., 2010; Mangin, 2007, 2008). For example, Matsumura et al.'s (2009) found that teachers were more likely to participate in a new literacy coaching program when their principal endorsed the coach's expertise in the content area. In addition, teachers were more likely to actively engage with coaches when the principal approached their leadership position collaboratively, giving the coach more autonomy in their position (Matsumura, 2010). These findings indicate that principals play a critical role in the implementation of coaching programs.

While current research describes a number of factors that enable or constrain coach practice, none specifically address what factors set exemplary coaches apart in building teacher capacity, particularly in relation to data use. The research on data-use interventions (i.e., coaching) provides little information on what constitutes effective capacity building for data use and under what circumstances it occurs (Coburn & Turner, 2011; Little, 2012; Marsh, McCombs, & Martorell, 2012; Spillane, 2012; Young & Kim, 2010). We intend to fill this gap by utilizing a theoretical framework grounded in sociocultural learning to identify practices and contextual factors that shape coaches' work with teachers around data.

Conceptual Framework

The conceptual framework for this study builds on several theoretical traditions, including the theory of action for data-use and sociocultural learning theory (SCLT).

Data Use Theory of Action

The theory of action for data use promoted by data advocates and adapted from the literature suggests that data alone do not ensure use (Ackoff, 1989; Kerr et al., 2006; Mandinach, 2012). Instead, data need to be collected, organized, and analyzed to become information, and then combined with stakeholder understanding and expertise to become actionable knowledge (center

box in Figure 1). A teacher is then expected to apply this knowledge to instructional practice. Depending on how this process plays out, the same raw data may point to very different solutions and actions depending on the situation and judgment of data users. Once a teacher has acted and outcomes have resulted, these results and new data can be collected to assess the effectiveness of actions, leading to a continuous cycle of collection, organization, and synthesis of data in support of instruction and improvement.

As illustrated in Figure 1, one can imagine multiple opportunities to assist a teacher in this process and to build stronger data literacy and instructional knowledge. As marked with bold, dotted lines, a coach may support teachers in accessing or collecting data (1); organizing, filtering, and analyzing it into information (2); combining information with expertise and understanding to become actionable knowledge (3); knowing how to respond and adjusting their instruction (4); and evaluating the effectiveness of the response or outcomes that result (5) (Marsh, Bertrand, & Huguet, in press). Applied to the joint work of teachers and coaches, this model recognizes that the data-use process is not necessarily linear or continuous.

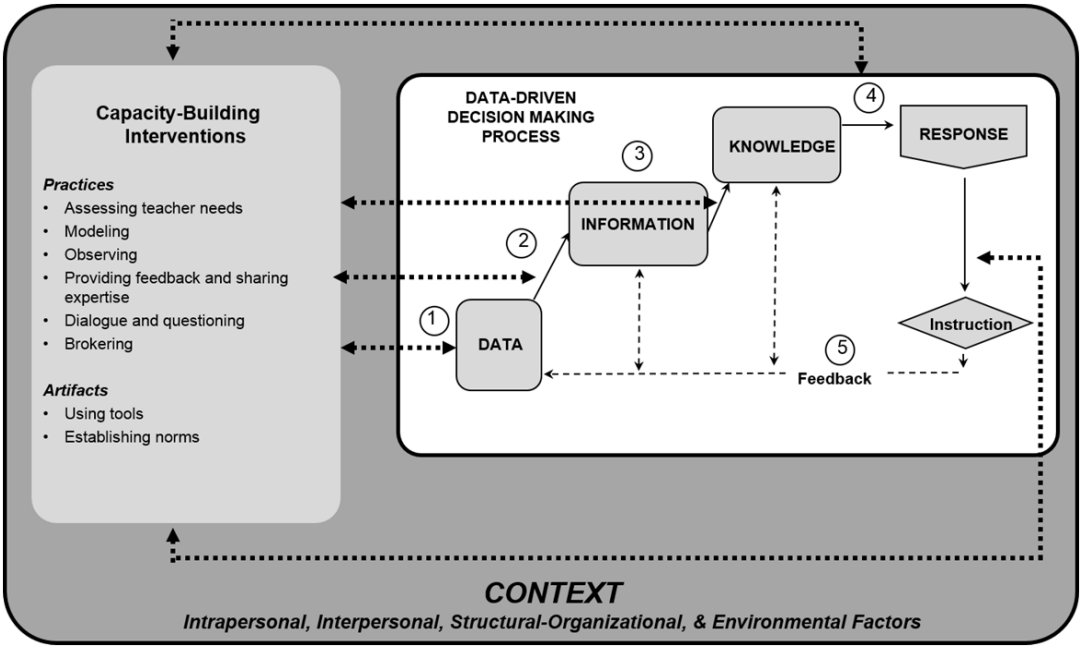

Figure 1. Conceptual framework.

Sociocultural Learning Theory

Drawing on the framework from Marsh and Farrell (in press), SCLT provides further insights into the capacity-building process and factors that might differentiate strong coaches from others in their data-use work with teachers. Originally developed by Vygotsky (1978), SCLT asserts that learning happens as a social process, occurring among peers and within an environmental context. Because the theory suggests that learning is social, the approach allows for inclusion of artifacts, activities, and organizational influences as mediators upon individual growth (Gallucci et al., 2010; Knapp, 2008; Marsh and Farrell, in press).

One way that learning may occur is through interactions with a "more knowledgeable other" (Vygotsky, 1978). From Vygotsky's (1978) original writings, a teacher or "more knowledgeable other" played a key role in supporting learning, where he or she assists, models, discusses, and supports an activity to increase the learner's understanding and independent performance. Other

scholars further developed this idea of a mentor-apprentice relationship as a "model of instruction that works to make thinking visible . . . [by] showing the apprentice how to do a task and helping the apprentice to do it" (Collins et al., 1991: 1-2). A mentor offers not only specific domain knowledge—the concepts, facts, and routines within a content area—but also heuristic strategies ("tricks of the trade") and meta-cognitive strategies (Collins et al., 1991; Tharp & Gallimore, 1988). Although some describe this relationship in one-way, novice-expert terms, it can also be framed as a dynamic, two-way relationship in which both parties strengthen their knowledge, skills, and thinking (Rogoff, 1990, 1993; Tharp & Gallimore, 1988; Vygotsky, 1978). In our study, the coach may be seen as the "more knowledgeable other," assisting in the development of teacher data-use knowledge. SCLT also recognizes that learning is dynamic, and not one way; in other words, through teacher interactions, the coach is also learning and sharpening his or her own skills (Marsh & Farrell, in press). Figure 1 illustrates the potential for two-way learning to occur between teachers and coaches, as demonstrated by the double sided arrows on the bold dotted lines.

The figure also highlights ways that coaches interact with teachers, varying according the practices and artifacts used. Coach practices are one dimension likely to vary among coach- teacher interactions. According to Gallucci et al. (2010), the term *practice* refers to "content and pedagogy of what coaches do as they interact in instructional settings with teachers" (p. 924). The practices highlighted in our framework include: *assessing teacher needs*, which allows a coach to address areas in which teachers are successful and where they may need to grow; *modeling*, or demonstrating a lesson or a data analysis practice so that teachers may examine how it is successfully employed; *observing* teacher work; *providing feedback* and *sharing expertise* to assist in teacher learning; engaging in *dialogue and questioning* with teachers; and *brokering* between individuals in different roles (e.g., teachers and their administrators) to build common ground between separate communities of practice on a school campus.

Another dimension of this work includes the artifacts that coaches use with teachers. Artifacts are both physical and symbolic tools created to assist in the coach's practice (Marsh & Farrell, in press; Vygotsky, 1978). These may include *tools* or resources that the coach provides to immediately assist the teacher in their development (Grossman et al., 1999) or *norms* that, in the longer term, guide interactions between coaches and teachers (Wenger, 1998). Finally, SCLT suggests that multiple dimensions of a learner's environment will mediate coach-teacher interactions and learning (Vygotsky, 1978). These contextual influences include: 1) intrapersonal (e.g., coach characteristics, such as background and expertise), 2) interpersonal (e.g., coach- teacher relationships, trust), and 3) organizational and environmental (e.g., school leadership, political climate) factors.

In the next section, we describe our research methods. We then employ our framework to analyze our cases and identify factors that influence a coach's ability to build teacher data-use capacity.

Methods

This research draws from a larger study investigating data use through comparative case studies of six low-performing middle schools committed to supporting teachers with the use of data during one academic year (2011-2012). The initial focus of our study was on the role of coaches and professional learning communities (PLCs) in improving teachers' capacity to use data to improve language arts instruction. As such, districts and schools were purposefully selected to maximize the conditions identified by prior research as supporting effective data-use interventions (i.e., ongoing professional development and guidance for the lead educators), to ensure that the intervention had been in place for a minimum of two years, and to provide variation in characteristics of coaches and

PLC leaders (e.g., content-area expertise).[1]

For the purpose of this paper, highlighting the coach-teacher relationship, we focus on four schools that utilized either a data or instructional coach. Below, we describe our rationale and methodology for selecting these four cases. While the size of these case study schools varied, all four enrolled significant proportions of low-income students of color and/or English language learners and had failed to meet state accountability targets for more than five years (see Table 1).

Table 1.
Description of Focal Case Study Districts and Schools

DISTRICT	**Mammoth**	**Sequoia**	**Rainier**	
Number of Students	21,000	22,000	23,000	
Number of Schools	28	34	32	
SCHOOL	**Green**	**Sherman**	**Cascades**	**Emmons**
Grade Levels	6-8	7-8	6-8	6-8
Number of Students	800	460	850	700
Free/Reduced Lunch (%)	80	90	80	80
English Lang. Learners (%)	27	25	27	35
Race/Ethnicity (%)				
African American	2	0	5	5
Asian/Pacific Islander	4	0	5	5
Latino/a	90	95	85	85
White	4	5	5	5
Percent At or Above Proficiency (all grades)				
Language Arts/ Reading	40	55	45	45
Number of Years In Need of Improvement under NCLB	5+	5+	5+	5+
Type of coach	*Instructional*	*Instructional*	*Data*	*Data*

Note: While the numbers have been slightly altered to maintain anonymity, the basic proportions remain true. All names of districts, schools, and individuals included herein and throughout the paper are pseudonyms.

Data Collection

We visited each school three times during the academic year. At each site, we selected three case study teachers who primarily taught language arts and who would be working with the coach over the course of the year. During our visits, we interviewed the principal (n=8), the coach (n=12), and the three case study teachers (n=36). We also administered a monthly, online survey to each coach and case study teacher[2], observed meetings, and shadowed the coach, when appropriate. Interview protocols and surveys elicited information about coach-teacher interactions (i.e., frequency and focus of meetings, strategies employed, perceptions about influence), interpretations of and responses to various types of data, and factors affecting this work.

[1] For a description of the initial sample and broader study findings, see Marsh & Farrell, in press.

[2] On average across the year, we received completed surveys for 94% of the case study teachers and 91% of the coaches.

Data Analysis

Data analysis occurred concurrently with data collection in a continuous and iterative manner (Miles & Huberman, 1994). We used NVivo, a qualitative methods analysis software package, to organize and code all open-ended survey responses, transcripts, fieldnotes, documents, and case study records. We developed an initial *a priori* coding list to encompass the domains of the conceptual framework. Codes were revised, expanded, and collapsed into more refined categories. These included coach practices (e.g., modeling, assessment of teacher need), artifacts, and organizational and environmental factors.

Overview of the Four Cases

After conducting this initial analysis, we noted that two coaches (one data coach, one instructional coach) appeared to be having a greater reported impact on teacher practices than others, while two coaches (one data coach, one instructional) seemed to be less effective. We chose to focus on these four coaches as a way to explore more deeply the factors contributing to these differences. Table 2 summarizes the professional background of these four coaches.

Table 2.
Summary of Coach Experience

	Instructional Coaches		**Data Coaches**	
	Olivia Green	**Sarah** Sherman	**Emilia** Emmons	**Violet** Cascades
Coach classification	*Strong*	*Developing*	*Strong*	*Developing*
Number of years at current school	3	5	6	5
Professional background	Middle school language arts teacher District literacy "demonstration" teacher	Middle school math teacher Middle school math coach	Elementary school teacher Middle school English teacher Site assessment coordinator Mentor for newly credentialed teacher	Elementary school teacher Middle school math and science teacher School administrator Mentor for newly credentialed teachers

Based on these initial patterns, we analyzed several additional sources of data to confirm or disconfirm our initial categorization of coaches, triangulating across our data sources: case study

teacher survey responses, coded interview transcripts, and observations of teacher and coach interaction. From this analysis, we identified patterns in the perceptions of coaches' influence on data-use practices and literacy instruction the related practices, artifacts, and organizational and environmental conditions. We created case study memoranda, recording notes about strengths and areas of growth for the coaches. These memoranda formed the basis for our identification of two "strong" and two "developing" coaches as cases (Ragin & Becker, 1992; Yin, 2003). These data are summarized in Figure 2, and described further below.

	Instructional Coaches		**Data Coaches**	
	Olivia Green	**Sarah*** Sherman	**Emilia** Emmons	**Violet** Cascades
Coach classification	*Strong*	*Developing*	*Strong*	*Developing*
Surveys: Teacher reported impact on teacher data use	High 3.8	Moderate 2.8	Moderate 3	Moderate 2.6
Surveys: Teacher reported impact on general instructional practice	High 3.7	Moderate 2.9	High 3.2	Low 1.5
Surveys: Teacher reported impact on literacy instruction	High 4	Moderate 2.8	Moderate 2.7	Low 1.25
Interviews: Teacher reported impact on data use	High	Low - Coach provided *access to data*, but did not build new skills.	High	Low - Coach provided *access to data*, but did not build new skills.
Interviews: Teacher reported impact on literacy instruction	High	Low	High	Low

Notes: Survey items were rated on a scale of 1 to 4: 1=no impact, 2=small impact, 3=moderate impact, 4=great impact.

*Instructional coach Sarah, recorded in the second column, was a leader of the professional learning community (PLC) at her school. At this site, our primary investigation was around the capacity building effects of the PLC, rather than her coaching specifically. As such, the survey questions asked teachers to rate how their experience in the PLC—of which the coach was a leader—affected their literacy instruction and data use, rather than specifically inquiring about her work as a coach. However, through our interviews at the school, we were able to also identify teachers' perceptions of how Sarah influenced their practice. Therefore, we weight more heavily the interview and observation data in determining the reported influence of this coach.

Figure 2. Summary of survey and interview data on case study coaches' reported impact

The first row of Figure 2 illustrates average responses to survey questions about the effect that coaches had on teacher *data use*. The questions asked teachers to rate to what extent working with the coach "improved my ability to analyze classroom assessment data," "improved my ability to identify trends in student understanding," "improved my ability to make meaning of student work," "helped me use data to rethink and improve my teaching practices," and "improved my ability to analyze standardized test score results." Teachers were instructed to rank their coaches on a scale of 1 – 4, 1 indicating that the coach had little to no impact, and 4 indicating that the coach had a significant impact on their literacy instruction The range of average responses to this question were notable, the highest of which was Olivia (3.8), and the lowest was Violet (2.6).

The second row in Figure 2 represents the average of case study teacher responses[3] to three statements about the effect that the coach had on their *instruction*. The questions asked to what extent the coach "helped me plan my lessons more effectively," "helped me tailor my instruction to student needs," and "caused me to adjust my classroom practices" over the course of the year. The third row specifically addresses teachers' perceptions about how much their coach influenced their *literacy instruction*, responding to the statements that my coach "improved my ability to teach literacy and reading to students" and "deepened my understanding of literacy and reading, and literacy and reading best practices." Again, in these categories teachers were asked to answer utilizing the same scale of 1-4 described above. There was a particularly large range in the literacy instruction category, with one coach (Olivia) ranked at a 4, and another (Violet) ranked at an average of 1.25.

In the remaining two rows of Figure 2, we drew on extensive coded interview data to classify teachers' perceptions of coach impact on their data use and literacy instruction. First, we provide illustrative quotes from coded text passages of teacher sentiment about coaches' influence on their data-use capabilities. For Olivia, our strong instructional coach, teachers had positive feedback and felt more confident utilizing data to improve their instruction after working with her. One teacher noted, "We all know that data should guide your instruction. [...] But was I actually doing it? I hadn't really done it, and she helped me see that I could do it, and I guess kind of pushed me in to my first steps, try it on, and I saw that I could then. It made more sense." Teachers reported that Olivia not only assisted them in accessing their data, but also in investigating what the data meant and how to best respond to it in their classrooms. In contrast, the teachers that worked with Sarah, our developing instructional coach, reported that while she helped them access the data and printed reports for them, she did not play a major role in helping them understand and respond to them.

As for the data coaches, Emilia was seen to be more instrumental in how teachers utilized data than our developing coach Violet. For example, one newer teacher noted that her work with Emilia allowed her to understand student data at the level of her more experienced peers:

> I'm going to her [Emilia] quite a bit. The time that she sits one-on-one with me is important. I need to be able to see it and practice it. To go to a meeting and have everybody kind of show it to me and whatever and then not being able to practice it right away is not beneficial. It's more of a one-on-one.

In contrast, data coach Violet utilized her role much like Sarah did, generating reports from the school's data management system. According to one teacher at the school, Violet did not help them go into depth with data analysis:

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[3] The number of case study teachers responding to these survey items varied by school: on average, 3.5 teachers responded in Sherman, 3 in Emmons, 2 in Cascades, and one in Green. We recognize that the data from Green are limited by the single teacher perspective.

> I mean, she [Violet] just basically has the data there for us and asks us to analyze it with her, but like I said, the discussion needs to be taken further with us as teachers saying okay, how did you teach 1.7, and what's the best strategy, and applying of strategies. But the data coach hasn't really done that, or helped us do that with any of our standards. [...] I really – I mostly put the data that she gives us, I keep it in a folder.

The patterns were quite similar with regard to coaches' reported influence on literacy instruction. For example, teachers working with their instructional coach, Olivia, noted that she positively shaped how they approached literacy instruction. One teacher reported that her experience working with Olivia made her a more effective teacher:

> I could read a curriculum map, and I could see what I'm teaching. However, [I would think], "How am I going to teach it?" It's kind of like my decision [on] how to go about doing things. But if she [Olivia] comes in, and she has these ideas where they're more effective, I feel that that's how she's helped me in that way. It's made my lessons more effective, I feel.

Each of our case teachers working with Olivia shared similar reflections in our interviews.

On the other end of the spectrum, Sarah, a developing instructional coach, had consistently less positive feedback from teachers in their interviews. These teachers did not feel that she influenced their classroom practices. "As far as Sarah being the coach," noted one teacher, "she has more of a math background, so that's one of the things that I have a hard time connecting. Will I see her in her leadership role when I want language arts help? I go to [another teacher], who is a grammar queen, who will correct us even though we are English teachers." Similarly, the data coach that we classify as developing had decidedly less positive reported influence on teacher literacy instruction. When asked what kind of effect the coach had on their curriculum, one teacher responded, "I am serious, it has been a negative effect." Other teachers felt similarly, that the coach had not improved their ability to plan or deliver literacy instruction. Based on the patterns from the survey and interview data, we categorized each case study coach overall as either strong (Olivia, Emilia) or developing (Sarah, Violet).

Next, we seek to unpack the practices, artifacts, and contextual factors that account for these differences and may have influenced coaches' ability to support teachers' use of data to inform their literacy instruction. Given the obvious limitations of examining four case studies, our study is best understood as exploratory. Our research, nevertheless, is an important first step in examining the coaching practices and conditions that build teachers' capacity to use data and lays the groundwork for future studies in this area.

Findings

Drawing on our conceptual framework, we organize our findings around practices, artifacts, and contextual conditions that differentiate the strong and developing coaches in our study. Through this process, we uncover a set of coach actions and practices that appear to contribute to strong coaching for improving teacher data-use capacity: strong coaches utilized a variety of practices in their role, employed artifacts as teaching tools, and co-constructively approached norms. The coaches in our study who were reported to influence teacher practices had content expertise as well as well-developed interpersonal skills. Finally, principals mediated coach-teacher interactions through their influence on the political climate in each school.

Practices to Support Teachers' Data Use

Consistent with our conceptual framework, a core set of coaching practices appeared to contribute to capacity building for data use. This includes *assessing teacher needs* to create specific goals for data-use work with coaches, and *modeling* around data use, which involved both explaining and demonstrating ways to interpret, respond to, and act upon data. Coaches also *observed* teachers to monitor how they tried out or engaged in particular phases of the data-use cycle. *Providing feedback and sharing expertise* often involved suggested next steps for practice. *Dialogue and questioning* about data and instruction was a key practice providing teachers the necessary support to make changes in delivery (for more, see Marsh & Farrell, in press). Finally, all coaches engaged in *brokering* the divide between data and application through their ability to connect teachers to expertise and resources that support the data process, and to broker between different communities within schools or districts.

While both strong and developing coaches enacted these practices, they differed in the variety and frequency of practices employed (for more details on specific use of practices, Marsh, Bertrand, & Huguet, in press; Marsh & Farrell, in press). Our analysis of survey responses and interview and observation data indicate that strong coaches employed a broader range of practices with more frequency than did their developing counterparts.

For example, in our day of shadowing Olivia, we noted that she engaged in *all* of the practices in our conceptual framework. In the morning, she checked in with the principal about their upcoming staff meeting and what messages he would like her to convey to teachers about their upcoming state assessments (an instance of *brokering*). During this meeting, the principal indicated to us that Olivia was consistently moving around the campus: "You are going to need a pair of roller skates if you plan to keep up with Olivia all day." Following this interaction with the principal, Olivia briefly led a full staff meeting, where she fielded questions about the state test, and explained to teachers ways that they could continue to prepare students for this assessment. While walking back to her office from the meeting, Olivia spoke individually with teachers that she met in the hallway about their needs, mentioning specific books and resources she felt might assist them (*assessing teacher needs* and *sharing expertise*). Once in her office to prepare for the rest of the day, several teachers stopped by to discuss resources or current lessons that they were working on, and she provided them with articles and other tools they could use in the classroom (again, *providing feedback and sharing expertise*). She then *modeled* a lesson in one teacher's classroom, which she explained was based on a language arts state standard that the teacher was having difficulty delivering to her class, as identified through previous data analysis with Olivia. At the end of the period, Olivia met with the teacher to debrief the strategies used in the modeled lesson – such as utilizing a word wall and student questioning – and discuss how the teacher might use them on her own in the future (*providing feedback and sharing expertise*). Olivia later moved into a second classroom to *observe* a teacher deliver a lesson they had jointly developed. During this lesson, Olivia worked with a small group of four students who were struggling with the lesson content. Following the observation, she sat down with the teacher to review student work from the class period, identifying what was successful in the lesson delivery—based on her observations and their joint analysis of student learning demonstrated in their writing—and what the teacher might improve upon (*dialogue about data and instruction*). She then returned to her office briefly to print and staple a curricular calendar that she had developed for the language arts teachers during one of the monthly district meetings with other instructional coaches. Each calendar was complete with suggested resources for the teachers to utilize while planning their lessons (*sharing expertise and tools*). In sum, our day- long visit confirmed teachers' reports that Olivia engaged frequently in each of the practices outlined in the data-use framework.

In contrast, developing coaches in our study utilized a smaller set of practices with regularity

and tended to apply them at the beginning, analysis stage of the data-use cycle. Sarah (instructional coach) and Violet (data coach) modeled data-use strategies, observed teachers using data strategies, and provided data use tools, but did not necessarily carry these practices into the later knowledge-development and instructional response stages of the data-use cycle. Unlike Olivia, they did not commonly model lessons or address how the data was related to particular instructional strategies. For example, one teacher at Valerie's school stated,

> She just basically has the data there for us and asks us to analyze it with her, but like I said, the discussion needs to be taken further with us as teachers saying okay, well, how did you teach [standard] 1.7? And what's the best strategy? And applying the strategies. But the data coach hasn't really done that or helped us do that with any of our standards.

As this teacher argued, to complete the data-use cycle, the coach would have helped teachers translate information on student performance on an assessment to instructional responses, perhaps questioning how a teacher taught a particular standard and exploring other instructional options to address student needs reflected in the data. As we discuss later, the developing coaches' limited use of strategies tied to instruction (e.g., modeling and observing instruction, conducting dialogue about instruction, sharing content-area expertise) and limited involvement with carrying data analysis into the instructional realm may be related to their lack of expertise in the content area.

While Sarah and Violet were both reported to use a variety of strategies around data use, teachers in both of their schools often reported that these coaches' primary practice was one of brokering. For instance, Violet described her position early in the year to be a "sounding board" for teacher complaints. Rather than spanning boundaries between teachers and the administration to translate each party's expectations to the other, Violet was asked to enforce administrator- initiated projects that teachers found undesirable, e.g., district benchmark testing. For example, Violet explained that she worked with "A lot of angry teachers and resistant teachers, and things that don't sit well with teachers – the benchmark is one of those – that's a constant issue, [as is] knowing that you are powerless in changing it." While brokering is one component of the coaching position, it does not serve to directly influence classroom practice in the same ways as other practices such as assessing teacher needs and modeling practices that teachers may use to respond to data. Additionally, spending their time as "broker" may have limited their employment of other coaching practices, and may have created perceptions among teachers of the evaluative role of the coach, which may have caused reluctance among teachers to work with Sarah and Violet.

In sum, strong coaches Olivia and Emilia reportedly engaged in a diverse range of practices at varied stages in the data-use cycle. These two coaches were therefore able to support teachers in an assortment of ways, depending on teacher needs. Conversely, Sarah and Violet were more limited in the variety of interventions in which they engaged, focusing in particular on providing and analyzing student data, but not necessarily assisting teachers in carrying this information over into their instruction. Often, teachers referred to Sarah and Violet primarily as brokers between themselves and the administration. These findings indicate that it may not be a defined set of practices which, when utilized, set strong coaches apart. Rather, the difference may be in coaches' ability to engage in a diversity of practices and tailor them to particular teacher needs.

Artifacts

Coaches' interactions with teachers are also mediated by the types of artifacts used in their practice, including tools—which may be practical or conceptual, assisting actors to understand big-picture concepts (Grossman et al., 1999)—and norms (e.g., guidelines for interactions between individuals and among groups) (Wenger, 1998).

Tools. Strong coaches provided scaffolding that allowed teachers to access tools on their own. For example, each school in our study employed a type of data management program for organizing and analyzing student scores. Olivia and Emilia taught teachers how to utilize this data software, so teachers could sort and analyze their own results, rather than providing them with pre-sorted printouts. For instance, a teacher that Emilia worked with explained:

> Since I didn't know how to pull all of that data [on the data management system], she would then sit down with me and say, okay, let's look at your data, these kids are right on the cusp [of proficiency cutoff scores on an exam], they are ready to move in and expand. So she has actually helped me then learn how to identify them.

By modeling how to use these tools and teaching the underlying skills, these coaches may have fostered understanding and capabilities that teachers, unassisted, could apply to data analysis and practice in the future.

Developing coaches in our study also utilized the schools' data management system as a tool in their coaching practices, although they approached it differently. Sarah and Violet provided frequent "printouts" of student results. They disaggregated data using the software and presented teachers with graphs or charts, often color-coded, which simplified trends in the data for teachers' use. Teachers reported that the data Sarah provided were useful to assist them in understanding student performance. In an interview, one teacher showed us a color coded graph illustrating her class's performance on a recent assessment and explained, "Sarah generated this for us. She does all of these graphs we get from [the data management program]. And I just rate the data from there. But she actually generates these graphs, which actually they're great visuals for us." The graphs we were shown or told about at Sarah's school depicted within and between classroom results on teacher-created assessments, district benchmark assessments, and high stakes state tests, often disaggregated by state content standards or student characteristics.

For Violet, teachers reacted differently to reports that she generated from the data management system at her school. Two teachers mentioned that they were given too many handouts and often filed Violet's data printouts away without use. "I barely see her," said one teacher, "She goes to the data meeting. And then she gives us lot of paperwork, a lot of copies of data, and believe me, I have tons of papers and it's too much. ... I mostly put the data that she gives us – I keep it in a folder." While Sherman teachers viewed Sarah's dissemination of data reports as an asset, teachers were less approving at Violet's school, where they found the amount of paperwork disseminated to be overwhelming. In both cases, however, teachers interpreted their coaches' primary responsibility as providing disaggregated data. Neither Sarah nor Violet were reported to assist teachers in learning to access raw data or disaggregate data on their own.

In contrast to the depth with which the strong coaches employed tools, teachers working with Sarah and Violet reported limited influence on their practice, focused primarily on data access. While Olivia and Emilia provided access to data, they also taught teachers how to disaggregate and analyze data on their own, rather than providing them with already generated data reports, graphs, and tables. Given the utility of learning a skill, it was perhaps not surprising that teachers working with Olivia and Emilia were more likely to report that their coaches had strong influences on their data-use practices.

Norms. Across all four cases, group work norms were prevalent in coach-teacher interactions. However, strong coaches established these norms in ways that contrasted sharply with those of developing coaches. Notably, strong coaches approached norm-setting with little predetermined structure. For example, Sophia described norms as a "compromise," not a set of

guidelines for her to impose. Emilia also approached group norms collaboratively. One teacher recalled setting norms together during their first meeting of the year, "We spent some time on process norms of collaboration, setting our working agreements, doing those sorts of things." In Emilia's school, the teachers and the coach co-constructed norms for working groups.

The two cases of developing coaches lacked the same level of reciprocity in establishing norms. The PLC that Sarah led had been functioning for several years before her arrival, and it appeared that the norms had been set prior to her becoming the leader of the group. At the start of each meeting, teachers took turns reading these norms aloud in what appeared to be a perfunctory fashion (e.g., "We will begin and end on time," "We will listen respectfully"). While teachers working with Sarah did not appear to develop these group norms collaboratively, they nevertheless did not report any problems with them.

In contrast, norms created significant tension among Violet's Language Arts work group. A number of the teachers in this group had been working together for years – three of them for over a decade. Several teachers recounted a particular incident when they had a full day of group work scheduled, and Violet introduced norms she wanted to see followed for their collaboration. One teacher recalled,

> The data coach brought in certain norms of collaboration, because she was worried that some teachers were not going to collaborate during the meeting, and she wanted to go through those [norms]. But that was taking a long time, and the teachers felt that it was being imposed on them, and they had a disagreement about the fact that [Violet] perceived that we wouldn't be able to collaborate. But we all felt that we could collaborate. So it felt like somebody was imposing their perceptions on who we were as a department team.

Violet's introduction of norms to the work team was not well received by teachers, as they resisted her attempt to enforce predetermined guidelines for group work. Teachers' negative response to this approach to norm-setting may have shaped their responses to subsequent interactions with their coach.

Taken together, data from the four case studies indicate that a coach's approach to artifacts may be as significant to their perceived effectiveness as the variety or type of artifacts that they use. In terms of tools, both strong coaches utilized a common tool – their schools' data management systems – to scaffold data analysis with teachers. This allowed teachers to access, understand, and analyze data even when they were not side by side with their coaches. On the other hand, developing coaches were more prone to provide teachers with reports of already disaggregated data. While teachers at Sarah's school found her data printouts and graphs to be useful, they did not indicate a high degree of influence on their data-use practice. Further, coaches at Violet's school found her dissemination of data to be cumbersome. Strong coaches also approached work norms more collaboratively than did developing coaches, building what appeared to be greater buy-in. Teachers may have been more open to working with coaches that included them in co-constructing the rules and procedures for their time together, rather than imposing their own ideals onto groups, as seen in Violet's case.

Context

As our framework and SCLT posit, learning takes place within a broader context (Schunk, 2008; Vygotsky, 1978), and multiple contextual conditions can mediate the capacity-building process of coaches and teachers (Marsh & Farrell, in press). Our analysis of the four cases indicates that intrapersonal and organizational factors play a particularly important role in mediating coach

interactions with teachers around data use.

Intrapersonal factors. While both coach and teacher characteristics can mediate data-use capacity building, what stood out in our data were coaches' attributes. Two intrapersonal factors emerged as highly related to coaches' reported impact on teachers' literacy and data-use practices: coaches' content area and interpersonal expertise.[4]

Content area expertise. All four case study coaches were seen to have strong data expertise. However, our research indicated a very clear difference in literacy expertise between strong and developing coaches. The level of coach experience in language arts clearly related to teacher perceptions of coach credibility; of our four case coaches, Olivia (instructional coach) and Emilia (data coach) had strong backgrounds in teaching language arts, whereas Sarah (instructional coach) and Violet (data coach) came from math and science backgrounds (see Table 2). Given that the data-use cycle begins with a focus on data that later draws on content area knowledge and skills to translate information into actionable knowledge and instructional response, developing coaches may have demonstrated less influence on language arts teachers' data-use practices at the end of the cycle because of their limited knowledge, skills, and experience with literacy and literacy instruction.

For instance, teachers described Olivia as having extensive expertise in literacy instruction. They often cited her experience as a Language Arts teacher – which included six years in the classroom – as well as her knowledge of current literacy trends. One teacher stated that, "[Olivia] has all the experience. She has the time to look at research, she has all this time to look at techniques and [...] at other schools. So she has the knowledge, I see her as a go to person that has the knowledge to help me perfect my craft." Similarly, teachers spoke highly of Emilia's literacy expertise and her knowledge of the students and their needs; she taught in a variety of grade levels over six years. "She understands the content area," said one teacher working closely with Emilia, "and she knows how to [use] those lessons to increase the percentage in a certain standard when it comes to the data. She's been in the classroom for several years. She knows how to work with ELs. She knows that population." Across our cases, coaches' previous experiences appeared to greatly influence their credibility with teachers. Teachers reported seeking coaches' input when they saw them as well-informed and trustworthy sources of support, giving coaches the opportunity to intervene along more points along the data- use cycle.

Conversely, coaches Sarah and Violet did not have classroom experience in Language Arts. Sarah was not viewed as possessing strong content area knowledge; one teacher told us, "For language arts, I don't really see her as the expert. That was really rotten to say, but it's accurate. But if I had a question about math, I would go to her in a heartbeat." Because she had a mathematics background rather than literacy experience, teachers noted that they would reach out to fellow Language Arts teachers for assistance before approaching Sarah. Similarly, teachers at Cascades Middle School referenced Violet's lack of experience in literacy instruction, as she was previously a math and science teacher. "She is not an English teacher," said one teacher, "and I don't feel confident in asking her about that. She is not working with the students directly every day like I am. And I prefer to work with other teachers, not a person that is sitting in an office and dealing with data all the time." Teachers at these schools were not interested in seeking coaches' advice or support for responding to data, limiting coaches' opportunities to influence teachers' practice in all stages of the data-use cycle. As such, it is not surprising that teachers were less likely to report that Sarah and Violet influenced their instructional practices or their use of data to improve teaching

[4] For further discussion of the influence of expertise on capacity-building for data use, see Marsh, Bertrand, & Huguet, in press.

practices.

Interpersonal expertise. Consistent with past research, a coach's ability to work with adult learners also appeared to influence coach-teacher interactions (Marsh et al., 2008). Our cases confirm the importance of interpersonal knowledge and skills as a mediating factor in coaches' efforts to build teachers' data-use capacity—a process that for some teachers may be highly sensitive and threatening, in which one's performance is being judged, often publicly, by an analysis of student data.

On one end of the spectrum, teachers consistently praised Emilia's interpersonal skills. Before becoming a data coach, she worked as a mentor for new teachers undergoing their credentialing process, and teachers felt that Emilia's supportive skills carried across to this position. Teachers noted Emilia's ability to play the role of "site mentor." Similarly, teachers reported that Olivia had strong interpersonal skills. They mentioned on multiple occasions that she was highly accessible, made them feel as if she cared about their needs and their students, and did not react in ways that could be perceived as condescending. One teacher explained:

> I think it stems more to her personal skills. She is always available, always approachable; she has great feedback, that's not negative or condescending or condemning, but very constructive and positive. She is understanding. [She is] very forthcoming with strategies and problem solving skills, things that are logical and make sense.

Across the board, teachers working with Olivia reported feeling comfortable working with her, even in regards to sensitive data topics.

Olivia demonstrated a refined expertise in working with adult learners. She differentiated between using "heavy" and "light" coaching techniques which she had learned from professional reading, and utilized them while working with teachers. She described the difference between the approaches:

> [C]oaching light has more to do with being a support person, providing resource[s], gathering text, demo-ing lots of lessons, doing a lot of the work.... You're being the friend; you're being helpful; you're being supportive, which is part of the coach role. But on the heavy side, you're analyzing their practice; you're forcing them to reflect. You're asking them questions that push their comfort level.

Olivia found that teachers responded positively to light coaching techniques in the one-on-one setting. She utilized a heavier approach when working with groups of teachers, where she required teachers to reflect on the root causes of observed differences in student data across classrooms. Adding to these interpersonal skills, Olivia was also purposeful in how she physically interacted with teachers and how these movements affected teacher's responses and receptiveness to their work together (for a more detailed explanation of Olivia's approach to coaching, see Marsh, Bertrand & Huguet, in press). She explained,

> A lot of times I find that I lower myself or I kind of do this. [*She stood up from the table, approached the interviewer, and crouched down.*] And it's the weirdest thing, but I do think it's better than this type of thing [*stood up, leaned over the interviewer*], physically. It's just something I've noticed in myself that I do when you're looking at something like [student test results].

> In contrast, developing coaches varied in their interpersonal skills. Although teachers did

not describe Sarah as particularly strong or weak in her ability to work with adult learners, her principal summarized her ability by noting, "Sometimes she'll let teachers say whatever it is they want, and I think that building confidence is part of working with adults, and she's getting better with that as she goes." Sarah's interpersonal skill set was still developing and appeared to have neither positive nor negative effects on her interactions with teachers. In contrast, Violet appeared to lack skills and knowledge of how to work with adult learners and as a result, teachers indicated an extreme lack of trust in her. Although Violet was perceived to be a data expert, because teachers found her difficult to work with, she was largely unable to utilize this expertise. As one teacher explained, "As far as [data] goes, anything you need help with on the computer, she is a whiz kid. She is good, she is good. But not in a million years would I go to her and ask her advice." For example, after Violet attempted to introduce collaborative norms to an experience group of Language Arts teachers, as described earlier, her relationship with the teachers became rife with conflict. At one point in the year, the principal pulled Violet from working directly with teachers because their interactions became too problematic.

Violet provides a clear example of how a lack of interpersonal skills and understanding of how to work with adult learners can inhibit coach-teacher interactions. Without this foundational set of skills and the interpersonal trust that emerges from them, one can imagine how difficult it would be for teachers to learn much from working with such a coach. While a lack of literacy expertise prevents one from providing guidance later in the data cycle (moving from knowledge to response), poor interpersonal skills limit coach interactions at every step of the process.

Organizational factors. School contextual factors also mediated the work of coaches. In particular, the interaction of two key factors appeared to greatly influence coach-teacher interactions: political forces and administrators' support for coaches. Although power struggles among staff members in some cases thwarted coaching efforts, supportive principals were often able to mediate these school politics in ways that enabled coach-teacher relationships to thrive.

School site politics frequently shaped the nature of coaching relationships observed across sites—although playing a very different role for each of the four cases in our study. In Green Middle School, there were several teachers who did not work with Olivia. These teachers were resistant to having a coach observe their classrooms or provide recommendations on their practice. Olivia navigated this situation by continuing to offer support to these teachers, but not compel them to work with her. This was possible because Olivia was supported by the school's administrative team, who did not want her assistance to be seen as an obligation resented by teachers, the decision allowed Olivia to largely bypass political issues, as she was not expected to intervene with non-receptive teachers. As such, she concentrated her efforts on the many willing participants, who welcomed her intervention. By directing Olivia to focus on teachers interested in her assistance, the administrative team avoided power struggles that could have emerged between Olivia and a select number of teachers at the school.

A complex dynamic between political climate and administrative leadership was also evident in our other case schools. In the year our study was conducted, Emmons Middle School, where Emilia worked, received a new administrative team and was recovering from what many characterized as an environment of "political issues and distrust" the year before. "Things got really toxic last year between the assistant principal and the principal," explained the principal, "the admin team was just at each others' throats. [We came] into that atmosphere and are trying to keep it positive, and for the most part I think we are in a good place, but every once in a while, it will come to the surface again." In light of past struggles at the school, the new principal was hyper-aware of politics occurring within teams and between teachers, and worked closely with the English department to quell surfacing problems. Mid-year, the principal made staffing changes to the team,

moving teachers in an attempt to create better collaboration. This principal's proactive approach to addressing power dynamics may have allowed Emilia to focus on building relationships with teachers, rather than navigating the political landscape.

In contrast, the political climate at Sarah's school affected her position as coach. Sarah's primary challenge was that, as mentioned earlier, a number of teachers felt she was unqualified. Complicating this issue, Sarah was seen to have a close relationship with the school principal, who had selected her for the position, and teachers generally perceived her role as brokering between administration and teachers. As a result, power struggles ensued within the English department. One teacher asserted that she, not Sarah, was the "instructional lead" of the department's working group. Stating that Sarah could be considered the lead when it came to data analysis, this teacher considered herself the instructional expert on the team. This teacher's struggle for control of the learning community may have undermined Sarah's position as instructional coach. The principal at this school was decidedly hands-off with the department, and trusted them, including Sarah, to operate as they wanted. In response, Sarah began releasing some of her instructional coach responsibilities to the other teachers on the English team, in what could be seen as passively avoiding political confrontation. There was little recognition of this by the school principal, who throughout the year insisted that Sarah was the leader within that teacher group. Bypassing direct instructional assistance in this case may have prevented political conflict but also limited opportunities for Sarah to build teacher capacity.

Finally, Violet faced multiple political tensions within Cascades Middle School. Teachers at the site were not supportive of the district's push to use data such as district benchmark and state assessments to guide instruction and therefore resistant to working with the coach around these test results. Teachers felt that Violet pushed her own agenda when working with them, that she was not able to admit when she made a mistake, and that she did not respect their experience as long-time Language Arts teachers. To add to this environment, the principal at Cascades Middle School was also struggling to gain teachers' confidence. He was described as secretive, and teachers explained a lack of trust in his leadership. Midyear, the principal directed Violet to discontinue working directly with teachers because of the conflict that doing so created. When interviewed about what had led to this situation, one teacher responded that Violet had offended "the wrong teacher," a woman who had been working at the school for decades and had close ties with a number of other staff members. The principal's actions earlier in the year, requiring Violet to guide teachers in unpopular tasks, increased internal resistance to her and her position. One can imagine other approaches that may have more productively navigated the situation (e.g., mediating the relationship with teachers). Through the principal's decisions, tensions between Violet and the English teachers did not decrease, yet she was also unable to perform her duties as required as a coach.

In summary, school administrators facilitated or constrained coaches' interactions with teachers by structuring their job with sensitivity to the school's political environment and power dynamics. In the case of Olivia, the principal allowed her to avoid political confrontation by directing her to work primarily with teachers who were open to her assistance, whereas Emilia's principal intervened by maintaining a close watch on interactions between teachers and the coach. These organizational conditions appeared to shape coach-teacher relationships and teachers' reports of coach influence on their instructional and data-use practices.[5]

In contrast, Sarah and Violet were not seen to have strong effects on teacher practices', but were also limited in their ability to utilize their coaching potential by their context. Sarah's principal

[5] We recognize that Olivia's scope of influence was limited by only working with the receptive teachers, which we will return to in the discussion.

was hands-off, allowing other teachers' struggles for dominance within the group to limit her work with English teachers. In Violet's case, the political tensions—combined with her personal challenges in working with others—stifled her role as coach, and the principal, mired in his own set of political challenges, was simply unable to mediate in ways to preserve coach- teacher relationships. The political environment itself had an impact on the coaching practice, and as we see, administrators mediate such a force in multiple ways with mixed results.

Implications for Practice, Theory, and Future Research

Because of their prevalence in American schools, coaches are in a position to affect teacher practice on a wide scale. With an increased demand for teachers to use data to guide their instruction, coaches are a potential lifeline to building requisite skills and knowledge that help teachers access, interpret, and respond to data in ways that yield improvements in teaching and learning. As our research demonstrates, however, not all coaches are equally successful in building teacher data-use capacity. As districts and schools continue to invest in coaching, there is great potential to channel their roles to improve data use for instruction. Our research uncovered a set of practices and conditions that may help guide schools and districts in achieving this potential.

First, our two "strong" coaches drew on a large repertoire of practices and artifacts to tailor assistance to individual teachers. They assessed teacher needs and employed a wide variety of practices to fill the gaps in teacher knowledge and skills. They utilized a diverse set of tools targeting all stage of the data-use cycle, and viewed group norms as valuable only if co- constructed. In contrast, developing coaches were limited in the number of practices that they regularly engaged in with teachers. They presented tools – such as disaggregated charts of student data – to assist teachers, but did not necessarily support them on how to disaggregate data on their own. In some cases, the developing coaches were seen as "imposing" rules and norms upon the teachers. As such, coaches – and professional development for coaches – should consider development in a variety of practices relevant to all phases of the data-use cycle. They may also need to attend to the importance of approaching their roles collaboratively, building norms with their teachers rather than imposing them, and scaffolding their work with teachers.

Second, our findings indicate that strategies and environments conducive to successful data coaching are no different than those needed for successful instructional coaching. In an educational landscape that prioritizes data use in every subject, formal job titles that may technically define a different set of responsibilities and purposes – such as *instructional* coach and *data* coach – may not differ extensively in practice. Strong coaches of both types engaged in similar practices and relationship building. While coaches with a strong data background may be skilled in intervening at early stages of the data-use cycle, such as providing access to disaggregated data, our research indicates that other areas of expertise are necessary. Therefore, when recruiting and selecting coaches to build data-use capacity, districts and schools may want to consider more than data skills in their potential hires. Instructional content knowledge, strong interpersonal expertise, and knowledge of adult learning are likely needed for coaches to successfully support teachers in using data to inform instructional decision making.

Finally, strong coaches were supported by principals who helped them navigate the political landscapes at their schools. Principals and districts would benefit from further attending to how the duties of the coaching position interact with existing social structures and power dynamics. This may be especially critical when student learning data are involved. Analyzing and responding to data may be highly sensitive and threatening for some teachers, particularly when one's performance is being judged, often publicly, i.e., as part of an analysis of trends in student learning. Principals' relationships with data or instructional coaches may be especially critical in times where data are seen

as connected to influence, power, advantage, or evaluation.

Our research also contributes a theoretically driven conceptual framework to the largely atheoretical body of research on supporting teachers' data use. Specifically, SCLT provides a useful lens for understanding how coaches can best support teachers' use of data. Through this lens, capacity building is not conceived of as the transmission of a set of skills and body of knowledge, but instead as a learning process in which individuals make sense of information and construct new knowledge through activity and social interactions (Vygotsky, 1978). Taken together, the analysis of our four cases offers important insights into the coaching practices and conditions that enable such a learning process.

This research leaves us with other unanswered questions worthy of future research. Our study confirms that administrators can help coaches navigate school politics by restructuring their roles. However, if leaders avoid political conflict by allowing a coach to only work with teachers who are welcoming of the intervention, there will always be a group of teachers who are not receiving the intervention. If a coach or administrator wants to build capacity of an entire faculty, what strategies can effectively reduce teacher resistance and build buy-in? In addition, SCLT suggests that coaches are learning from teachers just as teachers are learning from coaches. What do we know about the coaches' own learning cycle as related to their practice? Practitioners would benefit from further research linking these aspects of a coach's role with growth in teacher skills. Although these and other questions remain, our research is an important first step in examining the coaching practices and conditions that build teachers' capacity to use data and lays the groundwork for future studies in this area.

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