Data in Practice: Conceptualizing the Data-Based Decision-Making Phenomena

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"Data use" and "data-based decision making" are increasingly popular mantras in public policy discourses and texts. Policy makers place tremendous faith in the power of data to transform practice, but the fate of policy makers' efforts will depend in great measure on the very practice they hope to move. In most conversations about data use, however, relations between data and practice have been underconceptualized. In this essay, I identify and discuss some conceptual and analytical tools for studying data in practice by drawing on work from various theoretical traditions. I explore some ways in which we might frame a research agenda in order to investigate data in everyday practice in schools. My account is centered on schoolhouse work practice, but the research apparatus I consider can be applied to practice in other organizations in the education sector and indeed to interorganizational practice, a critical consideration in the education sector.

Introduction

Policy makers increasingly place tremendous faith in the power of data to move practice, but the fate of policy makers' efforts will depend in great measure on the very practice they want to move. "Data use" and "data-based decision making" are popular mantras. Still, policy texts tend to be vague with respect to *how* data should be used, focusing instead on "broad forms of evidence" for particular types of decisions (Honig and Coburn 2008). Relations between data and local decision making are not elaborated or worked out in policy texts. Policy makers appear to work under the assumption that using data to make decisions about practice should be relatively straightforward; practitioners need to follow the guidance offered by data when making decisions.

There are several unexamined and potentially problematic assumptions

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here. To begin, data do not objectively guide decisions on their own—people do, and to do so they select particular pieces of data to negotiate arguments about the nature of problems as well as potential solutions. Further, schoolteachers, administrators, and policy makers draw on various sources of information in practice, not just social science research and student achievement data (Gonzalez et al. 2005; Kennedy 1982). Thus, data must also be considered in situ, that is, how practitioners notice and interpret new information in their daily practice. Further, using data is not an unqualified good: people can use data in ways that lead to unintended and negative consequences (Booher-Jennings 2006; Spillane and Diamond 2007).

I argue that researching data use should be in part about the study of practice in schools so that we can understand how school staff use data and what sorts of data they use in their everyday work. I consider the phenomena of data use from the perspective of practice, that is, the practice of those who policy makers hope will use data to make decisions about improving classroom instruction. For the purpose of this essay, I use practice to refer to more or less coordinated, patterned, and meaningful interactions of people at work; the meaning of and the medium for these interactions is derived from an "activity" or "social" system that spans time and space. A particular instance of practice is understandable only in reference to the activity system that provides the rules and resources that enable and constrain interactions among participants in the moment (Sewell 1992). The rules and resources of the activity system in turn are produced, reproduced, and sometimes transformed in interactions or instances of practice over time. Concretely, it is difficult to analyze the practice of a principal evaluating a teacher or a grade-level meeting where school leaders and teachers negotiate the meaning of a new district-reading policy without attention to the rules and resources from the activity system that spans place and time and enables and constrains the interactions among the participants.

My definition of practice does not preordain any one conceptual framework for researching practice: I sketch a conceptual framework anchored in organizational routines for investigating data use in practice in schools and, by extension, in other educational organizations. The framework centers on two

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aspects of organizational routines, the ostensive aspect and the performative aspect. While the ostensive aspect focuses on the idealized and abstracted script for a routine, the performative aspect focuses on the routine in practice in particular places at particular times. Although it is tempting to equate practice with the performative aspect of organizational routines, this would be inconsistent with my earlier definition of practice, as it fails to take into account how any one performance of an organizational routine relies not only on the ostensive aspect of that routine but also on the resources and rules that are part and parcel of an activity system that reach beyond the particular performance. While anchoring my conceptual framing in the ostensive and performative aspects of organizational routines, I draw on other conceptual tools from various theoretical traditions (e.g., distributed cognition, activity theory, symbolic interactionism, new institutionalism) to extend and enrich the framework. I use excerpts from observational studies of school practice to illustrate conceptual points.

Below I describe the elements of this framework and justify its utility for studying data in practice. I also consider the framework's blind spots, those aspects of the practice of data use that could be left in the background when using the organizational routine framing that I sketch here.

Marshaling Conceptual Tools for Studying Data in Practice

Social science research involves a conversation between ideas (i.e., social theory) and evidence (i.e., data) in order to generate images of a particular phenomenon (i.e., findings or assertions; Ragin 2004). Hence, the study of practice involves more than telling tales or relaying stories *about* practice. Scholars interested in studying practice need some sort of explicit framework to guide their data collection and focus their analysis. Theoretical, conceptual, and indeed practical frameworks are like the scaffolding builders use to repair buildings, allowing the builder to access and focus on those aspects of the building in need of work (Lester 1995). Conceptual frameworks provide "a skeletal structure of justification" rather than "structure of explanation" by drawing on work in various theoretical traditions (Eisenhart 1991, 210). Frameworks give us access to some key aspects of a phenomenon while leaving other aspects in the background. Here, I sketch a framework for studying data use in practice; this framework has several affordances, including drawing attention to patterned micro interactions in schools, acknowledging that virtual and material aspects of the situation are a critical consideration in understanding these interactions, and relating these interactions to the school's formal organizational structure and indeed activity systems that reach beyond the school to the education field and indeed potentially to other institutional sectors.

Organizational Routines

Organizational routines are an aspect of the school's formal organizational structure. We can define organizational routines as "a repetitive, recognizable pattern of interdependent actions, involving multiple actors" (Feldman and Pentland 2003, 311). Organizational routines structure day-to-day practice in schools by more or less framing and focusing interactions among school staff (March and Simon 1958; Nelson and Winter 1982). At the school level, organizational routines include school improvement planning, teacher hiring, teacher evaluations, and grade team meetings, among others. While I describe organizational routines in schools, readers should be mindful that these routines are staples in all organizations and can also structure intraorganizational work.

Organizational routines serve numerous purposes. Once implemented and institutionalized, they can enable efficient coordinated action among organizational members. They may also help reduce conflict about how to do organizational work, as school staff does not have to argue about the procedure for hiring a teacher or evaluating a teacher every time they engage in these activities. Organizational routines also store organizational experiences, and shifts in these routines can be thought of as evidence of organizational learning (Argote 1999). (Keep in mind that we learn ways of doing things that can be both beneficial and harmful.) Organizational routines might also contribute to preserving an organization's legitimacy by demonstrating institutional conformity (Meyer and Rowan 1977). And, routines can contribute to mindless action, deskilling of organizational members, demotivation, and inappropriate responses to problems (Levitt and March 1988; March 1991).

Organizational routines often get a bad rap, portrayed as inhibitors of change and preservers of the status quo in organizations (Cyert and March 1963; Nelson and Winter 1982). Still, recent work suggests that organizational routines can also be mechanisms for disrupting and transforming standard, taken-for-granted ways of working in schools (Feldman and Pentland 2003; Peurach and Glazer, forthcoming; Sherer and Spillane 2011; Spillane et al. 2011). Hence, organizational routines may be best thought about as mechanisms of both change and preservation.

There are both pragmatic and conceptual reasons for using organizational routines to frame research on data in practice. From a pragmatic standpoint, some research suggests that organizational routines are an important mechanism in school-level efforts to transform work practice in response to standards and high-stakes accountability, especially in promoting the use of student achievement data (Sherer and Spillane 2011). For example, some school leaders design organizational routines to produce their own data about teaching and student learning and to promote the use of data among school staff

(Spillane and Diamond 2007; Spillane et al. 2011). Further, organizational routines have featured prominently in external efforts to transform work practice in schools. For example, organizational routines, many of them designed to promote the production and use of data, are a key feature of many Comprehensive School Reform (CSR) models (Peurach 2011; Peurach and Glazer, forthcoming; Resnick and Spillane 2006). Similarly, state and district policy makers often mandate that schools implement particular organizational routines (e.g., school improvement planning, walk-throughs) in an effort to influence work practice in general and data use in particular in schools. Hence, if policy makers and reformers want more and better use of data in everyday practice in schools, organizational routines are likely to be an important mechanism in realizing their goal.

From a conceptual perspective, organizational routines have several affordances with respect to the study of data in practice. First, routines direct our attention to the interactions among school staff, getting us beyond behavior or even the actions of any one individual. It is in these interactions that school leaders and teachers negotiate about what data are worth noticing—meriting their attention—and what these data mean, if anything, for current practice at the school and classroom levels. Second, organizational routines focus our attention on "patterned" activity rather than unique occurrences (Kanter et al. 1992; Simon 1976; Stene 1940). Focusing on patterns of interaction is critical to both understanding how data currently *are* in practice and how efforts to transform that practice to promote data use might turn out. Organizational routines are a useful unit of analysis for studying data use because they focus our research on standard ways of doing things in the school and how, if at all, these standard ways of doing things change in response to data-use initiatives. In this way, routines center our attention simultaneously on both change and constancy in practice. Third, organizational routines enable us to examine relations between social structure and agency as dialectical: using an organizational routine frame, we are less likely to attribute change or constancy in practice entirely either to the proactive decisions of school heroes and heroines or to their reaction to social and organizational structures. Instead, practice is conceptualized as taking form in the interactions among school staff. These interactions are only possible because of the social structure made up of organizational routines, language, social norms, and so on. Social structure has both virtual or abstract components and concrete or actual components (Sewell 1992). Without social structure, meaningful patterned human interactions would be impossible. At the same time, social structure is maintained, reproduced, and sometimes transformed in practice, that is, through the everyday interactions among school staff (Giddens 1976, 1984).

Anchoring our framework in organizational routines draws attention to both the ostensive and performative aspects of data-use routines as well as relations

between the two. Building on Latour's (1986) analysis of power, we can frame organizational routines as existing in principle (i.e., their ostensive aspect) and in practice (i.e., their performative aspect) (Feldman and Pentland 2003). The ostensive aspect refers to "the ideal or schematic form of a routine . . . the abstract, generalized idea of the routine" (Feldman and Pentland 2003, 101). For example, the ostensive aspect of organizational routines such as "learning walks" or "walk-throughs" more or less outlines who should participate in a walk and how often, the steps involved in performing a walk, what data should be considered during classroom visits, and how participants should deliberate about their observations, among other things. The abstract character of these scripts is essential insofar as the ostensive aspect can serve as a guide for work practice in different times and places (Blau 1955). Viewed from the ostensive aspect, organizational routines are part of the formal structure just like formally designated positions (e.g., teacher, assistant principal) or formal documents (e.g., school improvement plans).

The performative aspect of organizational routines refers to "specific actions, by specific people, in specific places and at specific times. It is the routine in practice" (Feldman and Pentland 2003, 101). In coperforming an actual learning walk or walk-through, participants in a particular school have to improvise. For example, as they negotiate the diagnostic meanings of particular pieces of a student's writing or mathematics work in a particular classroom, the ostensive script offers only broad guidance (e.g., avoid evaluative statements), requiring participants to improvise.

Together, the ostensive and performative aspects incorporate the organizational routine by design and in use. Importantly, conceptualizing routines as both ostensive and performative allows us to explore relations between structure and agency in practice. As part of the social structure, the ostensive aspect provides a broad script that enables and constrains everyday practice. But, it is in the particular performances of the routine that actors have the potential to exercise some agency in shaping the particulars of the routine in practice at a certain time and place. The emergent nature of practice coupled with the abstract nature of ostensive scripts that makes them applicable in multiple places and times means that school staff must improvise in their coperformance of organizational routines. Sometimes these improvisations can contribute to changes in the ostensive aspect.

To develop an understanding of how organizations and their members use data in practice, I argue that research should focus on both ostensive and performative aspects of organizational routines. Below, I explore the affordances of the ostensive and performative aspects of organizational routines in framing studies of data use. While I organize my discussion of these two aspects separately below, both are integral and essential elements of the framework. Along the way, I also incorporate other tools to extend the conceptual and

analytical leverage of the ostensive and performative aspects of organizational routines. By including these other tools, my goal is not to be comprehensive but rather to illustrate how an organizational routine's framing might be extended, when necessary, with conceptual and analytical tools from various theoretical traditions. To illustrate how these conceptual tools frame practice, I include four excerpts from field notes and/or video transcripts of the performance of organizational routines in particular schools.

The Ostensive Aspect of Organizational Routines

Framing research on data use by the ostensive aspect has several affordances. First, it directs our attention to an aspect of the formal organizational structure that school leaders (and external policy makers and reformers) use as a vehicle for changing everyday work practice. In this way, it gives us a window into how the formal organizational structure is intended and designed, so as to enable and constrain data production and use. Second, framing by the ostensive aspect focuses our attention simultaneously on efforts by school staff (and others) to design and redesign organizational routines in order to transform practice as well as on extant, often taken-for-granted routines that conserve practice even in the face of pressures to transform it. Third, framing by the ostensive aspect enables us to examine how school-level design and redesign efforts are informed by, and come to embody, aspects of the institutional environment: how the macro informs the micro. Using the constructs of institutional logics and mediational means, I extend the ostensive framing for two reasons. First, I want to draw attention to relations between school-level design efforts and the broader institutional environment. Second, I want to enrich our conceptualization of relations between the ostensive and performative aspects of organizational routines. To illuminate my argument, I draw on data from a study of work practice in urban schools.

Staff in these four schools designed organizational routines to transform work practice in their schools especially in order to give instruction and data about student learning a more central role in school and classroom practice. In some cases, school leaders used student achievement data to justify and motivate these design initiatives. At Kosten School, for example, Ms. Koh used student achievement data to argue that there was a problem with the school's instructional program, a problem that she diagnosed as resulting from teachers' low expectations for students, unfocused classroom instruction, inattention to state and district standards, and limited communication about instruction among teachers. Ms. Koh transformed the formal organizational structure by implementing new organizational routines that she hoped would transform school practice, including regular grade-level meetings, morning

rounds, report card review, grade book review, and lesson plan review (Spillane et al. 2011). At nearby Adams School, these organizational routines included the five-week assessment, breakfast club, grade-level meetings, teacher talk, teacher leaders, literacy committee, and mathematics committee (Sherer and Spillane 2011).

School leaders designed some of these routines to be directly responsive to state and district instructional polices related to the use of student achievement data. For example, at Adams School, leaders reported designing and implementing the five-week assessment routine to produce regular data on students' mastery of those skills assessed on annual state assessments. It involved testing students in grades 1–8 every five weeks on mathematics, reading, and writing. School leaders at Adams used the state assessment to design their five-week assessment, and this routine in turn enabled them to produce data that they used for both diagnostic and prognostic purposes with respect to content coverage, teaching strategies, and teacher professional development. School leaders used these data in other organizational routines (e.g., grade-level meetings, literacy committee meetings) to frame and focus their work with teachers in diagnosing problems with their instructional program, developing prognosis, and deciding on corrective action. The case of the five-week assessment illustrates how school staff can embed state policy proposals into the formal structure of their schools through the design of organizational routines.

Conceptually, here we can extend our use of the ostensive aspect of organizational routines to take a closer look at how the broader institutional sector provides raw material for school leaders' design work and thereby influences work inside schools. While some organizational routines, such as school improvement planning and teacher supervisions, were similar across schools, there were also considerable differences in the *form* of particular organizational routines. Breakfast clubs, for example, were unique to Adams. Still, despite some unique localized design efforts, similar logics appear to have motivated and structured the design of these routines across the schools. This is to be expected, as school staff were not working in an institutional vacuum but rather drawing on institutional logics from their institutional environment in their design efforts. Institutional logics specify legitimate goals and values and appropriate means for attaining them, serving as "organizing principles" that provide guidelines for actors and agencies in practice (Friedland and Alford 1991, 248). The ostensive aspect of local organizational routines that looked rather different in name and form was guided and motivated by similar institutional logics, including curricular standardization, using student achievement tests as measures of progress and guides in instructional decision making, and making classroom instruction more transparent. Even in three of the four schools where there was no threat from accountability policy because students performed well relative to other schools, these logics were embodied in the

organizational routines. At Kosten, Ms. Koh believed that the successful implementation of the routines she designed, for example, would standardize the instructional program within and across grades, making instruction more transparent and more easily monitored through the use of data.

School leaders used similar institutional logics from the dominant policy discourses in the institutional sector in designing organizational routines (Colyvas and Powell 2006; Spillane et al. 2011).[1] These logics entered local design efforts not just through government policy but also through other avenues such as professional preparation and development, the media, and so on. Moreover, these logics are not simply stimuli that prompt school staff to act but serve as the raw material for their local design efforts (Weber and Glynn 2006). Thus, while tempting to attribute substantial agency to school leaders based on the unique forms of their organizational routines, school leaders' local design efforts relied on similar raw material—similar institutional logics—in designing routines to serve similar functions. Thus, attention to the ostensive dimension of organizational routines can also provide insight into the ways in which the macro institutional environment becomes instantiated in everyday work inside schools. By combining the ostensive aspect of routines with the construct of institutional logics, we ensure that our studies of data use in local schools pay attention to the broader institutional environment that supplies the raw materials for school staff design efforts.

We can also extend the ostensive aspect conceptually by thinking about it not only as scripts, more or less codified, that individuals use to guide their coperformance of organizational routines but as a potential "mediational means" (Wertsch 1991, 12). As Wertsch notes, "much of what we do in the human sciences is too narrowly focused on the agent in isolation and that an important way to go beyond this is to recognize the role played by 'mediational means' or 'cultural tools' . . . in human action" (1998, 17). People acting or interacting with mediational means is a more appropriate unit of analysis. Mediational means can exist either virtually or concretely and include language, work protocols, work rules, work norms, and so on. People do not act directly on the world, nor do they interact directly with one another. Their interactions are enabled and constrained by various organizational, institutional, and cultural artifacts, many of which, such as language, we do not even notice. School leaders and teachers, for example, often take grade-level meetings and their affordances and constraints for granted. Specifically, the ostensive aspect of routines structures interactions in particular ways, enabling exchanges among teachers in the same grade but constraining interactions among teachers in different grades. Thus, while enabling the exchange and discussion of data within grades, the ostensive aspect of grade-level meetings can constrain intergrade exchanges among teachers about and with data. Such intergrade exchanges of information and data may be important for the ver-

1 First I would like to say congratulations to grade levels—all grade levels made some
2 improvements from the five-week assessments to the ten-week assessment which is a
3 reflection of your time and commitment to getting students to learn … Third through fifth
4 [grade students need to work on their] abilities to write descriptive words… Probably
5 lacking in vocabulary, ability to pick out details from the story. They [students] did a good
6 job identifying the problem and solution of the story. Which leads me to middle school.
7 Problem and solution didn't always match …this is truly a concern… [students had a] little
8 trouble determining the important information in the story. Questions most missed were
9 vocabulary questions … I have a packet with lessons on teaching vocabulary. I'll pass it
10 around and if you want me to make you a copy …

FIG. 1.—Field notes, Adams School

tical alignment of the curriculum that students experience as they progress from one grade to the next. In this way, ostensive aspects of routines may serve as mediational means for teachers and other school staff.

To illustrate, the five-week assessment routine at Adams shaped the day-to-day work of the literacy coordinator and teachers—especially how they structured and focused their time (Sherer and Spillane 2011). Teachers structured their language arts curriculum around the content that would be assessed in the five-week assessment every five weeks. School leaders and teachers at Adams, in coperforming other organizational routines, not just the five-week assessment routine, *saw* with the five-week assessment data: they used these data to negotiate meaning as the developed diagnosis and prognosis for Adams's instructional program. Consider figure 1 from a second-grade-level meeting where the literacy coordinator is discussing the writing assessment data from the five-week assessment. In this performance of the routine, the literacy coordinator uses data generated by the five-week assessment in an effort to shape what content teachers emphasized (fig. 1, lines 3–6) and their instructional approaches for teaching vocabulary (fig. 1, lines 8–10). Interactions among the literacy coordinator and teachers are framed and focused by the five-week assessment data that participants mostly accept as a legitimate measure of progress and a source for guiding instruction. Teachers and school leaders notice and interpret information and data not just with prior knowledge and mental scripts but also with mediational means—with the material and abstract tools such as the five-week assessment routine and the student data generated by that routine.

In response to state and district policy, school leaders designed these artifacts

to embody particular representations of learning, teaching, and student success (e.g., descriptive words, vocabulary) and neglect other representations (e.g., originality). The five-week assessment routine and its accompanying assessment instruments were not neutral on matters of teaching and the assessment of student learning: Under pressure from policy makers, school leaders designed the five-week assessment to reflect emerging policy discourses in the education sector—what skills were important for students to master in language arts and how these skills should be assessed using standardized assessments. Moreover, as discussed just above in terms of institutional logics, the five-week assessment also embodied particular institutional logics such as using student achievement data to standardize, measure, and guide instructional decision making.

We can think about the ostensive aspect of organizational routines then as mediational means, organizing interactions among school leaders' and teachers' schoolwork practice. In drawing attention to how the five-week assessment not only served as a mediational means in Adams but embodied particular representations of instruction and achievement, I am underscoring that locally designed mediational means have to be analyzed as part of a wider system that extends beyond the school to the educational sector made up of other schools, district offices, state and federal education agencies, as well as an array of extra system agencies including publishers, testing agencies, and universities (Cole and Engeström 1993). The very design of the five-week assessment cannot be fully appreciated without attention to this broader institutional environment. The construct of mediational means underscores the role of institutional, cultural, and historical artifacts in organizing practice. As school staff coperformed their locally designed five-week assessment and related organizational routines, state assessments and the ideas they embodied about learning and teaching became an integral part of everyday practice inside the school. The five-week assessment embodied logics and ideas from the broader institutional environment into the formal organizational structure of the school, which in turn structured interactions among school staff.

Of course, the extent to which the ostensive aspect of organizational routines structures interactions depends on whether they become institutionalized and are maintained over time. At the time of our study, Ms. Koh was implementing new organizational routines at Kosten that many veteran teachers openly contested. In contrast, at Adams School, things were more settled, as the organizational routines had been in place for several years and were more or less taken for granted by staff.

At the same time, organizational routines designed with one set of purposes in mind can, over time, take on other purposes. Moreover, school staff can continue to use organizational routines even though the circumstances that initially prompted their design and implementation have changed fundamentally.

In summary, framing data use in practice in terms of the ostensive aspect of organizational routines focuses our attention on school leaders' efforts to design and redesign organizational routines in an effort to transform administrative and instructional practice in schools. At the same time, it draws our attention to existing and sometimes taken-for-granted organizational routines that preserve extant practice even in the face of pressure to transform it. Focusing on the ostensive aspect of organizational routines, we get a sense of how the formal organizational structure is arranged so as to enable and constrain the use and production of various sorts of data. Further, by attending to how schools are positioned in the institutional sector, we can examine how local organizational routines with unique local forms are often designed to serve identical functions, due in part at least to the similar raw materials from the institutional environment with which school leaders design. We turn our attention next to the performative aspect of organizational routines.

The Performative Aspect of Organizational Routines

Framing research on data use by the performative aspect has several affordances. First, the performative aspect insists that practice is a central concern in investigations of data production and use. Talk *about* practice and/or formal accounts of the ostensive aspect of routines are insufficient in studying the performative aspect of organizational routines. We have to understand practice as it unfolds over time. Second, the performative aspect frames practice not simply in terms of individual actions but in terms of interactions, because organizational routines by definition involve two or more actors coperforming routines (Feldman and Pentland 2003). Hence, we need to attend to the interactions among those individuals who coperform organizational routines.

Third, as should be clear from our discussion of mediational means in the last section, aspects of the situation are framed not as a backdrop but as the medium for interactions among people and thus an essential defining aspect of practice. Organizational members depend on aspects of their situation, from language to organizational routines, for their interactions. In turn, aspects of the situation are produced, reproduced, and transformed in practice. Thus, studying practice as coordinated, patterned, and meaningful interactions of people at work, using an organizational-routines framework, necessitates attention to both the performative and ostensive aspects; you can't have one without the other. Here again I draw on conceptual and analytical tools from various disciplinary traditions to extend the performative framing and enrich my conceptualization of relations between the performative and the ostensive aspects. Specifically, these conceptual tools enable a richer conceptualization of the interactional nature of the performative aspect by acknowledging that

Ms. Koh began, "Kosten is a good school. The former administration did a good job, but we can't take it for granted. Society is changing." She continued, "We are putting those preventative resources in place. Why should we wait for a disaster?"
W: "I wouldn't disagree, but I think there has to be a balance with the fluidity required for creativity."
….
Koh: "Put the foot down and demand the children learn, demand the parents are responsible, and you know how much harder it is to do that in high school. That's why someone has to do this job," and "Children know, when we lower our expectations" and "I'm not superwoman," it's not something amazing about her that turns things around, but "You've got to have that expectation, because they are going to be serving you someday (students)."
…
W: "But our [students'] scores are going up."
Koh: "But our students are changing, and we want to insure that everyone is going up. If you don't think I'm compassionate," and she give the 3rd time 3rd grader story again.
But then another teacher responded with a different interpretation: "We're getting more and more kids now with problems at home. There's no discipline in the household, and I can model things here, but if they don't get it at home."

FIG. 2.—Field notes, faculty meeting, Kosten School, October 29, 1999

these interactions are enabled and constrained by virtual and concrete aspects of the situation, and in doing so underscoring the essential relationship between these interactions and their institutional, historical, and cultural situation. But let's turn first to some instances of the performance of organizational routines in actual schools.

Consider an excerpt from a single faculty meeting, a core organizational routine at Kosten, in autumn 1999 (see fig. 2). In this excerpt, we get a glimpse of the performative aspect of a faculty meeting at Kosten as it unfolds in a few minutes in a particular faculty meeting. The account is not based on participants' retelling of what happened in the faculty meeting or on their telling of their particular roles or actions in faculty meetings in general. We could use participants' accounts of what they do and how they do it to augment this excerpt, but such accounts on their own would be insufficient for understanding the performative aspect of the faculty meeting routine.

In this excerpt, practice, the performative aspect of the faculty meeting organizational routine, unfolds in the interactions between Principal Koh and

several veteran teachers. To analyze practice in this situation, we have to move beyond behavior and the actions of the individuals because the key action is the interaction between Ms. Koh and two teachers. Specifically with respect to data use, it is in these interactions that participants pull in various sorts of data and information in an effort to negotiate whether there is a problem with Kosten's instructional program and how best to define that problem. While Ms. Koh (earlier in this faculty meeting) draws teachers' attention to student achievement data to suggest that there is a problem, a teacher uses the same state test data to contest Ms. Koh's interpretation and her diagnosis of the problem based on that interpretation (fig. 2, line 14). Ms. Koh persists, drawing on information about a changing student population at Kosten to suggest that while some students are doing fine, others are not (fig. 2, lines 15–16). Another teacher, reacting to Ms. Koh's diagnosis in which she frames the problem in terms of teachers' expectations for students, uses information about changing student demographics to offer another diagnosis (fig. 2, lines 17–19). In this teacher's view, the problem is defined as students who undermine classroom instruction because they come from homes where there is no discipline. So although analyzing Ms. Koh's or the teachers' actions in this excerpt is necessary, it is insufficient because the reaction of others is essential to understanding practice as it unfolds in the coperformance of the faculty meeting routine. Most important, considering our focus on data use, is that what data are noticed, and what they are noticed for, are negotiated in the interactions among people.

Conceptualizing practice as interactions is not new (Emirbayer and Mische 1998; Sewell 1992). It is not what people "do" that matters, but how they do so "together" (Everett Hughes, cited in Becker 1986, 187). Hence, what information and data are noticed, whether this information is understood as evidence pertaining to some diagnosis or prognosis, and how it is used in practice has to be understood at the interaction level, not just the individual action level. What individuals notice as well as how they frame and interpret what they notice is not just a function of their prior knowledge and beliefs but also a function of their interactions with others in which they negotiate what information is worth noticing and how it should be framed. While individuals author their environment (Weick 1995), their authoring is negotiated in their interactions with others as enabled and constrained by aspects of their situation.

Scholars in various disciplinary traditions such as symbolic interactionism, sociocultural activity theory, distributed cognition, and new institutionalism recognize the interactional nature of human practice and the essential relationship between practice and its institutional, historical, and cultural situations. To enrich the conceptualization of practice as coperformed in interactions among school staff as mediated by aspects of their situation, I draw

selectively on constructs from these traditions. My intent here is to be suggestive of disciplinary fields that readers might mine for conceptual and analytical tools. Further, my goal is not to anoint any one theoretical tradition as the chosen way, but rather instead to identify some tools from different traditions as options for studying data use in practice. In selecting these constructs, my goal is to illustrate how conceptual tools from various theoretical traditions in the study of practice might be used to frame research on data in practice.

A subtext here is an argument for conversations that cross disciplinary boundaries and focus on recognizing similarities in conceptual and analytical tools that often are different mostly in name (Barley 2008; DiMaggio 1997; Star 1998). Such work might help sharpen the analytical tools at our disposal for studying data in practice. While there is overlap, often unacknowledged and/or unrecognized, in the conceptual and analytical tools across these diverse disciplinary traditions, there are also disagreements that I mostly ignore, allowing for future work.

To frame practice in terms of interactions, we can use several conceptual and analytical tools. To begin with, these interactions are cognitive in that they are about people perceiving, processing, and negotiating information. In figure 2, Ms. Koh and two teachers negotiate the meaning of pieces of information for their school's instructional program. These interactions are also about noticing and invoking particular pieces of information (and not others) to advance particular diagnoses. A teacher reacts to Ms. Koh's framing of a problem in terms of teachers' expectations for student, by drawing attention to rising test scores at Kosten (fig. 2, lines 8–12). Similarly, another teacher draws attention to information about changing student demographics. Hence, the cognitive aspects of these interactions are not just about interpreting particular pieces of data or information but also about selecting information, framing it in particular ways, and negotiating the relevance of some bits of information and not other bits. In figure 2, school leaders are engaged in sense making, of which interpretation is one component. Specifically, sense making "begins with the basic question, is it still possible to take things for granted? And if the answer is no . . . then the question becomes, why is this so? And, what next?" (Weick 1995, 14). Ms. Koh argues (in fig. 2) that it is no longer possible to take things for granted with respect to Kosten's instructional program by drawing attention to student achievement and student demographic data, framed as evidence for a particular diagnosis. Some veteran teachers are skeptical, and one openly challenges Ms. Koh's processing of the test data (fig. 2, line 14). Indeed, this teacher seems to argue that we can continue to take things for granted with respect to Kosten's instructional program. Another participant acknowledges that Ms. Koh may be right that is it no longer possible to take things for granted but invokes different data to frame the problem in an entirely different way to Koh (fig. 2, lines 17–19).

In summary, in this exchange, participants negotiated about whether there is a problem, what data merit attention, and the meanings of these data for the nature of the problem. (I intentionally focus here on the interactions among people, though my account would not be possible without reference to materials such as test data, which I will analyze later in this section.)

Recognizing the cognitive and interactional nature of practice only gets us so far with respect to framing data use in schools. Is it still sufficient to use constructs such as individual mental scripts and schemas to understand data use in these excerpts? Or do we need other conceptual and analytical tools that take into account the interactive nature of sense making in the performance of organizational routines?

Scholars working in several traditions including distributed and situated cognition and activity theory argue from the individual to activity systems that take into account individuals interacting with one another and their environment. Hutchins (1995), for example, argues that the task of landing a plane can be best understood if we take the cockpit rather than the pilot's or copilot's mind as the unit of analysis. The cockpit, what Hutchins terms a "sociotechnical system," includes not only the pilot and copilot but also the various instrumentation and tools that are involved in landing the plane. These features of the situation are not merely "aides" to the pilot's cognition; instead, cognitive activity is "stretched over" actors and aspects of the situation because what the pilots notice and how they interpret what they notice is not simply a function of their individual mental scripts but also their interactions and the tools with which they work. The notion of a sociotechnical system suggests that in studying data use in schoolwork practice, we must attend not simply to intramental models but also to intermental models—models or representations of learning, teaching, and achievement contained in the material and abstract tools that school staff use in their interactions with one another. Applying Hutchins's sociotechnical system to everyday work activities in schools, such as a teacher evaluation or curriculum alignment negotiations in a grade-level meeting, presses us to attend to the intermental models in the rules or schemas and resources that school staff interact with, such as standardized tests and test data, evaluation protocols, rules for calculating AYP (Adequate Yearly Progress), and so on. Over the past couple of decades, for example, the institutional environment of America's schools has increasingly demanded that schools use standardized tests and test data to measure both organization and individual performance. As school leaders and teachers increasingly use these resources and rules to interact with one another in the performance of their everyday work, the intermental models embodied in these resources and rules—of fundamentals such as what it means to be a successful third-grade mathematics student—shape practice, often in taken-for-granted ways. I will return to this matter below.

Scholars working in various traditions use different constructs to shift the unit of analysis from individual cognition and action to people interacting with one another in a system including (but not limited to) communities of practice (Lave and Wenger 1991; Rogoff 2003), activity systems (Cole and Engeström 1993; Wertsch 1991), and social worlds and social forms (Hughes 1958; Simmel 1955). While differences exist across these disciplinary traditions, there are also several similarities, chief among them the recognition that cognitive development and change are fundamentally about socialization into a community and the internalization of the knowledge and values of that community (Nasir 2005). Focusing on the activity system, scholars working in these traditions examine participation in everyday activity or practice over time (Erickson 1986; Goffman 1981; Greeno 1998). Work in these traditions also underscores that interactions among individuals are enabled and constrained by aspects of their situation such as language, notational systems, and tools (Gagliardi 1990), and therefore the situation is a constituting element of practice (Latour 1987; Pea 1994; Resnick 1991). These structures can have a virtual or an abstract existence (e.g., ostensive aspect of organizational routines, norm of classroom privacy) or an actual or material existence (e.g., test data, codified rules for firing a teacher) and, as instantiated in practice, are the medium for interactions serving as rules and resources that make everyday practice in schools possible. Thus, in studying data use in everyday practice in schools, we need to attend to these virtual and material aspects of the situation, working to understand their intermental representations of the technical core of schooling. Conceptual and analytical tools from work in these traditions enable us to extend the performative aspect of organizational routines and data use in practice. Consider figure 2 again and also consider figure 3. Figure 3 captures a brief exchange in one grade-level meeting at Kosten school in which Principal Koh is again invoking the state test data in her negotiations with teachers about a problem with their school's instructional program. Understanding the performative aspect of the faculty meeting and grade-level routines in figures 2 and 3 necessitates attention to the situation as more than a stage on which Ms. Koh and her staff interact. As argued above, the ostensive aspect structured interactions by enabling and constraining who interacted with whom and about what they interacted; as discussed earlier, the ostensive script can be thought about as a mediational means.

But other aspects of the situation were also constitutive of practice, providing the means with which school leaders and teachers interacted with one another. School leaders and teachers negotiated problem diagnosis and prognosis with government standards, state student assessments, and assessment data. At times, school leaders used physical representations of these policies (e.g., item analysis of the state test, student achievement data) whereas at other times these tools were referenced without any material artifact present. In the Kosten

1 Ms. Koh [principal] also shared a concern that throughout the school the Spanish bilingual
2 students have not been doing well in reading [on the IOWA's] (She did not name grade
3 levels, but this could have been taken as an affront to Sandy). Sandy replies calmly "I think
4 a lot of it has to do with how they learn reading" and "research shows that they need to learn
5 to read in Spanish first, and then English," which is not what happens at Kosten, so the kids
6 are "language confused." Koh nods and says, "that may be it." At any rate, Koh tells them
7 the school needs to do something to improve reading, because their scores are down "1.3"
8 on the IOWA tests [this change is not statistically significant]. In contrast, Baxter's
9 [neighboring school] reading scores are at 70, "I have to go over there."
10 Margery- "I'll go with you … they must be teaching to the test" because the two schools
11 are "servicing the same population."

FIG. 3.—Field notes, second-grade team meeting, Kosten School, May 17, 2000

faculty meeting, we observe a teacher challenging Principal Koh's diagnosis using student achievement data (fig. 2, line 14). At a grade team meeting, Ms. Koh persists in drawing comparisons, enabled by the state standardized test data (i.e., the Iowa), to another high-performing, neighboring school where test scores have improved (fig. 3, lines 7–9). Ms. Koh's interactions with her second-grade teachers are defined in part by the test data with which they negotiate the existence and nature of a problem with Kosten's instructional program. Indeed, absent the common performance metric afforded by the test data, Ms. Koh's comparison to a neighboring school would be much more difficult. (At the same time, it is worth noting that the comparisons afforded by the state test are also constraining in that they focus entirely on two school subjects and fail to take into account other factors that may account for differences in achievement between the two schools.) Further, while a teacher disputes Ms. Koh's diagnosis based on the test data, she does so not by questioning the legitimacy of the test data but by suggesting that the other school's performance must be due to teaching to the test (fig. 3, lines 10–11). Rather than take aspects of the situation for granted as a stage or backdrop in our analysis of practice, we must attend to how material and abstract aspects of the situation are constitutive of practice by structuring interactions among participants—what they notice and what they negotiate meaning around. We must attend not simply to intramental models but to intermental models, that is, the representations of learning, teaching, achievement contained in the material and abstract artifacts with which school staff interact with one another. By doing so, we can also develop a better and more nuanced understanding of how the macro (e.g., broader institutional sector of policy and testing agencies) comes to influence the micro—work practice inside schools.

A common state test generating public data by grade and by school enables school staff to make school-to-school comparisons by virtue of a common metric. The test score data that school staff negotiated with, though invoked by them, are produced and promoted by actors in the broader institutional environment—policy makers, test makers, and so on. The data that schools receive from government agencies come prepackaged and preconstructed in particular ways, focusing on some subjects and not others. It focuses on some aspects of the tested subjects and not others. It represents learning in some ways and not other ways. The materials that schools receive from state and district government preframe learning and, by extension, teaching. These tools from the broader institutional sector influence practice inside schools because, as school staff negotiate meanings with these mediational means in the co-performance of organizational routines, their interactions are constrained and enabled in particular ways; the tools more or less frame and focus their interactions.

More broadly, over the past several decades, through various government policy initiatives, standardized test data have become a more central feature of work in schools. These data embody particular representations of learning, teaching, and student success, enabling users to see some aspects of instruction and constraining our attention to not see other aspects. Material and abstract aspects of our situation discipline or train us to see in new ways (or one way rather than other ways; Stevens and Hall 1998). Our perception—what we notice—becomes disciplined to see in particular ways. Over time, reporting requirements for the data have evolved: No Child Left Behind requires data to be reported in particular ways for particular groups of students. These data embody particular representations of student learning, drawing our attention to some aspects of learning and not others, simplifying at the individual student, classroom, and school level the complex terrain of student learning and classroom teaching by assigning numerical values to what students have learned and by extension to what (and perhaps how) teachers have taught (Sauder and Espeland 2009). These shifts in the policy environment are not just new pressures on schools to use data and improve; they also involve a shift in how learning and by extension teaching is represented in practice in schools. To the extent that school staff notice and negotiate meaning with these particular representations of learning in the form of test score data, they come to see teaching and learning in some ways and not others. In this way, tools such as standardized test data that embody particular representations of what it means to learn and teach are not simply aids to practice; they are an integral and defining component of work practice.

Institutionalized roles and formal positions are also constitutive of and constituted in practice. Thus, in analyzing the performance of organizational routines, we have to take into account another aspect of the situation: the

positions occupied by the various participants. Further, while institutionalized positions influence whose meanings carry more or less weight in the coperformance of organizational routines, negotiations about the meanings of policy and other reform initiatives can also transform power relations in organizations (Barley 1986). In figures 2 and 3, although Principal Koh faces opposition to her sense of the instructional program at Kosten from veteran teachers, she persists, and her persistence is enabled in great part by the authority vested in her position as school principal. Indeed, in interviews, Principal Koh makes clear that she is working within the authority of her position as principal. School staff members occupy different positions, and these institutionalized positions both enable and constrain their coperformance of organizational routines. Indeed, research on data use suggests that the negotiation of different meanings is influenced by power relations within an organization (Schmidt and Datnow 2005; Zembylas 2002, 2005) and modified or contested by authority in a given interaction (Coburn 2001, 2006). In the negotiation of meaning, individuals interact with unequal resources and with rules that privilege the position of some over others through either authority or power (Coburn 2006; Schmidt and Datnow 2005; Zembylas 2002, 2005). While Principal Koh has the positional authority of the principalship, her interactions are evidence that she has to work to convince teachers of her power.

Specifically, the power and professional identity associated with authority positions (e.g., principal, teachers) are produced, reproduced, and sometimes renegotiated in the performance of organizational routines. Ms. Koh continually works at asserting her power as an instructional leader in the performance of organizational routines such as faculty meetings and grade-level meetings (see figs. 2 and 3). Here too we observe school staff negotiating what it means to be a principal and a teacher at Kosten. Ms. Koh sees her role as an instructional leader, a professional identity that represents a departure compared with past principals at Kosten who saw their role as preserving teachers' professional autonomy. Veteran teachers perceive Ms. Koh's notions about the principalship as undermining their identities as teachers, as autonomous professionals in the classroom. In the faculty meeting, for example, a teacher argues that there needs to be fluidity in order to ensure creativity in the classroom (fig. 2, lines 4–5). This teacher references a concern among several veteran Kosten teachers who believe that Ms. Koh, in renegotiating the power of the principal position, is working to undermine their identity as teachers.

A similar theme emerges in the performance of organizational routines at Adams School. In the performance of a breakfast club routine, for example, we observe participants negotiating what it means to be a professional (see fig. 4, lines 1–2, 5–6, 8–14). Throughout this exchange, we see staff negotiating what it means to be a teacher in a changing institutional environment where

Miss James: … the teachers should be the ones deciding. And that is my beginning opening statement. (Chuckles) And I think we can discuss it.
(Miss Hanes raises her hand)
Miss James: Yes?
Miss Hanes: I like the fact that they do give us credit as being professionals and us having the decisions that are made for our children instead of being handed down.
…
Miss James: And the new booklets, well not booklets but notebooks that we got, the white notebooks, I think are a good example of how we should make sure that we are defining ourselves as skilled beginning reading teachers as professionals. Because if we don't define ourselves as professionals who know how to assess our children and who know, who adjust the balance and methods and our children are taught to, somebody will think we are not professionals and will not uh…I mean they will say that white book is what we should be following which is not uh…I'm not criticizing it. I'm just saying that I think there's more…

FIG. 4.—Field notes, breakfast club meeting, Adams School, November 3, 1999

policy makers press teachers to make use of student achievement data to make decisions and measure progress. School leaders' and teachers' efforts to negotiate meanings with data and information about their instructional programs are integrally tied to their professional identities (Gioia and Thomas 1996; Weick 1995). Hence, to understand staff interaction in the two figures above, we have to situate them in the history of work arrangements at the two schools but also in ongoing negotiations about principals' and teachers' professional identities.

Looking beyond a purely instrumental view of policies that promote data use and hold schools accountable for performance on student achievement data, we see that what is negotiated is not simply technical matters—what to teach and how to teach it (Spillane and Anderson, forthcoming). Specifically, interactions among school staff using data to make decisions about their schools' instructional programs also involve renegotiating professional identities and power in schools. As standardized test data and value-added models become one of the dominant means for measuring student, teacher, and school performance, those individuals with expertise in testing and psychometrics in the education system (e.g., district offices) are likely to wield more authority in coperforming organizational routines. Moreover, to the extent that standardized test data are used as the metric to measure student, teacher, and school performance, teachers are very likely to see such endeavors as transforming their identities as autonomous professionals. In sum, the press for

data-based decision making also has entailments for the professional identities of teachers and school leaders.

Some readers will find reference to both cognitive and situated/distributed perspectives in my account problematic, based on the assumption that one precludes the other. Is individual cognition irrelevant when taking a distributed/situated perspective? The short answer is that it depends on who one reads. Indeed, we may learn a lot about human sense making by examining relations between participation in activity systems and individual cognition (Cobb et al. 1997; Nasir 2005). There is evidence, for example, to suggest that teachers and administrators may disregard data they perceive as invalid and lacking quality (Ingram et al. 2004; Kerr et al. 2006), although under pressure they may use such data (Marsh et al. 2006). But, we do not have a rich understanding of relations between individual cognition and their participation in the performance of organizational routines. How do teachers' and administrators' sense making shape, and are shaped by, their participation in the performance of organizational routines?

Framing data use in practice in terms of the performative aspect of organizational routines, extended by work in what we might broadly refer to as situated and distributed perspectives on human cognition, focuses our attention on social interactions among participants. It also draws our attention to the affordances and constraints of not only material aspects of the situation (e.g., tools) but also more abstract normative aspects. It not only focuses our attention on the immediate present situation of an interaction such as a particular performance of a grade-level meeting but also on the broader institutional sector that supplies the raw materials (e.g., institutional logics) for these interactions.

Discussion and Conclusion

Over the past decade, researchers and policy makers have fretted about (and tried to improve) the quality of data use in education, especially test data and social science research findings employing a broad array of policy instruments in an effort to get more and better data-based decision making in schools. This special issue was undertaken to sketch research agendas on data use, and, to that end, my account offers the following.

To begin, I have argued that research on data use and data-based decision making should be about the study of practice so that we can understand whether and how data are used as well as produced, for better and worse, in the everyday workings of schools. I argued that a real-time understanding of data in practice should be a core element of any research agenda on data use. A key challenge in this work involved getting beyond spinning atheoretical

tales about data use and beginning to marshal conceptual tools to guide the research so that as a field we can accumulate a knowledge base about practice data in practice. Absent empirical work that is theoretically and conceptually framed, it is difficult to compare across research studies and thereby accumulate an empirical knowledge base. By way of example, I offered a framing for studying data use in practice, anchored in organizational routines. Conceptualizing routines as having ostensive and performative aspects, I considered the analytical leverage of this particular framing for research on data use in practice.

My framing foregrounds interactions, rather than individual actions or behavior, and is cognitive in that it is fundamentally about noticing, processing, and negotiating meanings in these interactions. In addition, in the framework advanced here, aspects of the situation are constitutive of and constituted in practice, serving as the medium for interactions among school staff. The ostensive aspect of organizational routines, for example, more or less defines practice while, at the same time, the ostensive is produced, reproduced, and sometimes transformed in particular performances. Thus, in framing the practice of data use in terms of the interactions among school staff as mediated by aspects of their situation, I cast social structure and formal organizational structure as both the medium for, and an outcome of, practice (Archer 2000; Bourdieu 1990; Giddens 1984; Sewell 1992). School staff interact with one another with structure (e.g., norms, ostensive aspect of organizational routines, student achievement data) that provides the rules and resources for coperforming organizational routines. At the same time, structure is produced, reproduced, and potentially transformed in practice, in the interactions among people (Sewell 1992): school leaders at Adams and Kosten designed, implemented, and worked to maintain organizational routines that transformed the social/formal structure in their schools. The ostensive aspects of these organizational routines, in turn, more or less enabled and constrained interactions among school staff. At the same time, it is in these interactions—practice—that these routines and their accompanying artifacts and norms are reproduced and potentially transformed over time.

Thus, studies of data use can gain considerable analytical leverage from focusing on ongoing relations between structure, agency, and practice. Further, research on the microprocesses of data use in schools will benefit from careful attention to the broader institutional environment that supplies school staff with the rules and raw material for their local design efforts. Examining how school-level design and redesign efforts draw on rules and resources from the broader institutional environment will enable us to generate richer understandings of how schoolhouse practice is constrained and enabled by the broader institutional field.

My framing of data use in practice argues for a developmental approach

in which we take into account the developmental trajectory of a data-based decision-making initiative, a school, school leadership team, or an organizational routine. To understand, for example, how a new organizational routine transforms (or not) work practice in schools, we will have to study the routine's design, implementation, and institutionalization. It is by observing multiple performances of an organizational routine, from the design stage through institutionalization (and failure to institutionalize) that we can better understand how practice is transformed and maintained over time in the ongoing interaction between formal structure and everyday practice. A developmental focus necessitates research on work practice over time, and a core component of this work will have to be observational. Accounts of practice or talk about practice gleaned from interviews, though necessary, will be insufficient on their own for this work.

Taking a developmental perspective also presses us to attend not just to efforts to transform or change extant practice but also to maintenance efforts. With respect to data use, leading change gets much of the attention from researchers often studied over short time spans or based on retrospective accounts. In studying data in practice, we need to attend not just to efforts to lead change in what and how data are used but also to how these efforts are maintained over time and how these maintenance efforts lead, or fail to lead, to institutionalization.

One implication for practice here has to do with policies and interventions that are designed to transform what data are used and how data are used in schools. We cannot design practice—the performative aspect of organizational routines—as practice is emergent. Instead, policy makers, school leaders, and school reformers design *for* practice. They do so by working to design and redesign the formal structure—the medium for practice—in the form of organizational routines, formally designated positions, tools of various sorts, and so on. These aspects of the formal structure are designed so as to enable and constrain practice by virtue of how, in their performance, they focus and frame interactions among school staff. But they do so imperfectly because human interactions necessitate improvisation in all walks of life but especially in occupations of human improvement, such as education (Cohen 1988). The ostensive aspect of organizational routines, tools of various sorts, institutionalized roles, and so on embody representations of aspects of the core work of schooling, such as learning and teaching, and who is a legitimate decision maker on such matters. To the extent that school staff interact with one another using these mediational means, cajoled and prodded by school leaders and policy makers, formal structure, in more or less taken-for-granted ways, enables and constrains everyday practice inside schools.

My framing, like all conceptual frameworks, has limitations, as it backgrounds some aspects of the phenomenon under study. For example, using

routines to frame studies of practice, we can easily ignore those informal interactions that are often critical to understanding how work gets done in organizations. These informal interactions can be especially critical when it comes to the implementation of new approaches, as coalitions of staff supporting a particular change may mobilize informally out of view from those opposing it (Kellogg 2009). Similarly, these informal interactions may be one means by which new organizational routines emerge, offering valuable insight into data use in practice. Similarly, the examples I have used to illustrate my argument in this essay focus exclusively on school leaders' efforts to design and implement organizational routines. However, groups of teachers or other participants inside and outside schools may appropriate existing organizational routines or elements of existing organizational routines to design and redesign the formal structure to serve new ends, much the same as how the labor movement and the women's suffrage movement blended existing organizational models to create new organizational forms (Clemens 1993, 1997).

While I have framed practice in schools in a particular way, I have been intentionally catholic in my theoretical taste in the hope that by sketching a conceptual framework that attempts to draw from different theoretical traditions, I might encourage researchers to reach beyond their theoretical tradition of choice and capitalize on theoretical and empirical work in other traditions. Similar conceptual apparatuses across different traditions, though labeled differently, often go unacknowledged and indeed sometimes unrecognized (Barley 2008; DiMaggio 1997; Star 1998). Some disciplinary boundary crossing could contribute to a dialogue about framing research on practice that in turn would advance our understanding of data in practice.

Notes

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1. Policy discourses are systems of practice, beliefs, and values defining what is acceptable, "obvious, common sense, and 'true'" (Ball 2008, 5). By the 1990s, prevalent ideas in these policy discourses included articulating student learning and performance standards, aligning these standards with student assessments so as to create a common

metric to measure student and school performance, and using sanctions and rewards to hold schools accountable.

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