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Author(s): Cynthia E. Coburn and Erica O. Turner

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The Practice of Data Use: An Introduction

CYNTHIA E. COBURN

University of California, Berkeley

ERICA O. TURNER

University of Wisconsin–Madison

Data use, or drawing on and interacting with information in the course of decision making, has emerged as a key strategy intended to foster improvement in public schools and universities alike. A range of federal and state policies promotes it, most notably No Child Left Behind (Honig and Coburn 2008) and, more recently, the America Reinvestment and Recovery Act (US Department of Education 2009) and the Statewide Longitudinal Data System Grant Program (see <http://nces.ed.gov/program/slds/index.asp>). There are many foundation-funded initiatives to encourage it, including the national work of the Stupski Foundation and the Gates Foundation, which recently pledged over 12 million dollars to support investment in data systems and their implementation. In higher education, data use is increasingly required as part of accreditation processes (Council for Higher Education Accreditation 2006; Ewell 2008; Western Association for Schools and Colleges 2009). School districts across the country are investing in data systems to create enhanced access to data. They are also embarking on training to encourage teachers, principals, and district leaders to integrate attention to data in their ongoing practice (Datnow et al. 2007; Kerr et al. 2006; Marsh et al. 2006). There is a great deal of optimism on the part of those who promote data use, as well as on the part of many practitioners.

Yet, in spite of all of the policy and reform activity focused on data use in education, empirical research on data use continues to be weak. In particular, we still have shockingly little research on what happens when individuals interact with data in their workplace settings.

In this special issue, we present a series of articles that focus on uncovering and investigating the practice of data use: what actually happens when people in schools, school districts, and higher education interact with data in the

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The Practice of Data Use

course of their ongoing work in the situated context of their workplaces. The articles review and reframe the small body of research that examines what we know about how individuals interpret and make meaning of data of various sorts and what happens when new data interventions, processes, and protocols enter into the complex ecology of the classroom, school, and administrative offices. The articles take a broad view of data; they not only focus on how people engage with standardized test scores and other measures of student outcomes (i.e., graduation and dropout rates, progress tests, classroom assessment, and student work) but also attend to how people use measures of social and organizational conditions and information that they gather through their experience. The articles in this special issue take stock of studies that investigate how individuals' engagement with data is influenced by the social and organizational context of schools and universities. Crucially, they pave the way forward by providing theoretical frameworks and methodological tools for studying these issues.

Investigating the practice of data use directly is important if we are to understand what is happening at the ground level of one of the most prominent strategies for educational improvement in the country. Understanding the practice of data use not only can help us explain the outcomes of data use but also provides insight into when and under what conditions data use acts as a productive pathway to educational improvement and when it does not. Finally, it has the potential to provide insight into one of the most central questions in social theory: the interrelationship between macro-social structure and micro-level action.

CYNTHIA E. COBURN is associate professor in the Graduate School of Education at University of California, Berkeley. She studies the relationship between policy and practice in urban public schools. ANDREA C. BUESCHEL is program director for the Spencer Foundation. She oversees the foundation's Initiative of Data Use and Educational Improvement, among other duties. Her research is on the high school to college transition, with a focus on community colleges and students who hope to be the first in their families to graduate from college. ERICA O. TURNER is Anna Julia Cooper Postdoctoral Fellow in 2011–12 and will be assistant professor at the University of Wisconsin–Madison in 2012–13. Her research examines educational policy making, politics, and urban school districts. Coburn and Bueschel are the editors of this special issue, while Coburn and Turner are the authors of this introduction to the issue.

Conventional Approaches for Studying Data Use

Conventional approaches to research on data use tend to take one of three approaches, all of which fail to address issues of practice. First, there is a small body of research that focuses on the relationship between initiatives to promote data use and aggregate outcomes, such as student performance on standardized tests (see, e.g., Fuchs et al. 1999; Schmoker and Wilson 1995; Snipes et al. 2002; Symonds 2004). While this research is useful in providing information about the outcomes of data use, it provides little insight into the process by which these outcomes are produced. That is, we know little about how people in schools are interacting with the data—interpreting it, responding to it, ignoring it—and how these responses contribute to various outcomes of interest. This is unfortunate because understanding outcomes without understanding the mechanisms that produced them means that we have little insight into how to redesign data use interventions so as to increase their impact in practice.

A second stream of research focuses on describing the activities that are involved with data use initiatives. This body of research is extensive and includes descriptions of data warehouse systems to promote data use in schools (Wayman et al. 2004, 2008; Wayman and Stringfield 2006), the components of a district data system (Supovitz 2006), and the activities and approaches that schools and districts use to promote data use in schools (Datnow et al. 2007; Halverson et al. 2007; Kerr et al. 2006; Marsh et al. 2006; Nichols and Singer 2000; Supovitz and Klein 2003). For example, Datnow and colleagues (2007) highlight strategies they found in four school systems identified as data-driven decision-making systems. They describe how system leaders encouraged data use in schools by establishing norms and expectations for data use, investing in data management systems, empowering school leaders to use data, and creating tools and processes for using data to make decisions. Research in this genre tends to focus on the nature of the interventions themselves, paying less attention to how people in schools and districts engage with the interventions or how the various activities interact with and influence the preexisting work practices in a site. Absent this information, we have little insight into why the same activities appear to foster positive outcomes in some settings and not others.

Finally, there is a large body of writing about data use that is normative rather than analytic. This work focuses on trumpeting the cause of data use or providing how-to guides for accomplishing it (see, e.g., Bernhardt 1998; Boudett et al. 2005; Love et al. 2008) rather than analyzing what actually happens when people at different levels of the system use data in their practice. The research of this type is characterized by great optimism about the trans-

formative power of data use but with little evidence of when and under what conditions this optimism is warranted.

An Alternative Approach: Focus on Practice

Recently, a new line of research has emerged that addresses these limitations. This research turns its attention instead to the practice of data use. “Practice” can be understood as “the coordinated activities of individuals and groups in doing their ‘real work’ as it is informed by particular organizational or group context” (Cook and Brown 1999, 386–87). Researchers who investigate the practice of data use seek to understand what actually happens when people engage with data in the course of their ongoing everyday work and how that relates to instructional change and organizational learning.

There are three distinguishing features of studies that focus on practice. First, scholars in this tradition tend to conceptualize data use as a fundamentally interactive endeavor. Even teachers, who typically work alone in their classrooms, interact with children, their colleagues, and coaches and school leaders around data in ongoing ways. A focus on the practice of data use involves investigating how data enters into streams of ongoing action and interaction as they unfold at the classroom, school, or district level. For example, existing studies have investigated how social interaction influences how people interpret the meaning and implications of data (Coburn et al. 2009); how conversational routines—the “patterned and recurrent ways that conversations unfold within social groups”—create or close down opportunities for learning as teachers talk with one another about evidence of learning (Horn and Little 2010, 184); and how a group of teachers’ collective examination of student work and reasoning changes the ways the group worked together and the focus of that work (Kazemi and Franke 2004). These studies typically use close-in analysis of how teachers and others interact with one another to interpret data, learn about their own practice, and make decisions about next steps.

Second, scholars who study the practice of data use seek to understand the role of environmental, organizational, and group context in how the practice of data use unfolds. Cook and Brown (1999) argue that practice is given its meaning by the local and occupational culture within which it unfolds (see Barley [1986] and Wenger [1998] for similar arguments). Shared language and common frames of reference that have been developed through interaction over time, along with powerful occupational norms, shape action and interaction and the meaning that individuals attribute to them (Coburn 2001; Coburn et al. 2009; Horn and Little 2010).

Others point to the way that practice is both enabled and constrained by

such factors as the nature of teachers' workplace context (Lampert 1985); the tools, artifacts, and routines that people use when they interact with data (Sherer 2007; Sherer and Spillane 2011; Spillane, this issue), and the way that levels of the school system are interdependent with one another (Honig and Venkateswaran, this issue). For example, Spillane and his colleagues (2011) investigate how school leaders design and redesign organizational routines in an effort to bring state and district standards and student assessments into closer contact with instructional practice, thus tighter coupling between the upper levels of the system and the technical core. Espeland and Sauder (2007) document the way that ranking systems (like *US News and World Report*) influence work practices in law schools, including organizational scripts and procedures, how resources are allocated, and the development of strategies for gaming the rankings.

Still others point to the way that the broader institutional environment, including categories, classification systems, and broader systems of meaning, shape and become embodied in everyday practice (Colyvas, this issue; Little, this issue; Sauder and Espeland 2009). For example, categories such as below basic, basic, proficient, and advanced and the key subgroups were promoted as part of the requirements in *No Child Left Behind*. But these categories have not only shaped the way that teachers, school leaders, and district personnel look at, analyze, and make meaning of data, they also have influenced how people at multiple levels of the system organize instructional responses and, at times, how they think about children, learning, and the nature of schooling itself. Thus, studies of the practice of data use have not only attended to what people do in social interaction in the course of their daily work but have also attempted to understand how what they do is influenced by the proximal organizational context and "more broadly institutionalized (and evolving) system[s] of meanings, identities, relationships, and structural arrangements" (Little, this issue, 163).

Third, scholars in this tradition investigate data use as a situated phenomenon. These studies are interested in how data use unfolds in what Hutchins (1995) calls the "natural habitat" of the workplace in all its complexity—data use in the wild. To capture this complexity, these scholars tend to study data use as it unfolds in real time (Little, this issue; Spillane, this issue). Thus, they eschew methodologies that rely predominantly on self-report of data use practices from interviews or surveys. They also tend to stay away from retrospective accounts that are so popular with conventional approaches to data use (e.g., Armstrong and Anthes 2001; Datnow et al. 2007; Petrides and Nodine 2005; Snipes et al. 2002) as retrospective accounts tend to mask the complexity and smooth out the fits and starts and uneven progress of change.

As this brief discussion should make clear, studying the practice of data use extends beyond studying teachers. To date, most research on the practice of

data use has focused on teachers' practice, both inside and outside of the classroom. However, we are beginning to see studies that investigate the practice of data use of school leaders, including coaches (Sherer and Spillane 2011; Spillane et al. 2011; Stoelinga 2008), school district personnel (Coburn et al. 2008, 2009; Honig 2008; Honig et al. 2010), and higher education deans and administrators (Espeland and Sauder 2007; Sauder and Espeland 2009). Data use is a multilevel phenomenon in education. In order to understand how data use unfolds, it is important to study the practice of individuals at multiple levels of the system—and the relationships between them—as they interact with data in their ongoing work (Honig and Venkateswaran, this issue).

Contributions of Studies of Practice

Focusing research on the practice of data use enhances our overall understanding of the intersection between data use and educational improvement, and indeed of larger questions about the nature of organizational learning and change, in at least three ways. First, it helps us understand the mechanisms by which various outcomes come about. If, in fact, data use fosters such outcomes as student learning and achievement, instructional change, or organizational learning, understanding the practice of data use can help us understand how and why. If data use fails to foster these outcomes or triggers unintended or negative consequences, insight into the practice of data use can help us understand this as well. Espeland and Sauder (2007, 10) describe the benefits of uncovering social mechanisms in the following way: “Instead of simply identifying relationships between variables, conditions, or events, a mechanism describes causal patterns that generate and sustain these relationships. A mechanism is like a causal switch that, if turned on, directs action in one way rather than another. Analyses of mechanisms produce deeper causal knowledge of social relationships and their dynamism.” In this case, research on the practice of data use has the potential to provide insight into how engagement with data fosters stasis, change, or a range of unintended outcomes.

To date, research on the practice of data use has provided insight into such mechanisms as the process by which people interpret and make decisions with data (Coburn et al. 2009; Spillane and Miele 2007), how teachers learn when they talk with one another about student work and other forms of data (Gearhart et al. 2006; Gearhart and Osmundson 2009; Horn and Little 2010; Kazemi and Franke 2004), the process of central office transformation (Honig et al. 2010), and the mechanism by which ranking systems in the K–12 and higher education system lead to negative outcomes such as gaming the system or rationing instruction (Booher-Jennings 2005; Espeland and Sauder 2007).

Understanding these mechanisms is essential for it provides insight necessary for redesigning existing interventions and improving data use design efforts overall.

Second, while much of the conventional research on data use focuses on the activities that are put into place to foster it, research on the practice of data use gets underneath these activities to investigate how people in schools and districts interact with one another while engaged in a given activity. That is, it helps us understand how a particular data use activity gets adopted and adapted in practice in districts, schools, and classrooms. This understanding, in turn, helps us understand when and under what conditions activities, structures, and organizations foster learning and improvement and when they do not. For example, Horn and Little (2010) investigate the nature of teacher talk in collaborative groups focused on teachers' accounts of their classroom experiences. By looking at the dynamics of interaction in two groups of subject matter teachers (mathematics and English) in a single high school, they are able to show that, even though both groups have the overt characteristics of collaborative groups, the patterns of interaction within that activity differ in consequential ways. Specifically, these authors document how conversational routines created opportunities for deeper engagement and learning in one group but closed down opportunities to discuss deeper issues of teaching and learning in the other. Thus, while prior research has pointed to the role of collaborative groups in data use, by focusing on actual work practices, research like Horn and Little's helps us understand what actually happens when teachers engage in these collaborative work groups and when and under what conditions collaborative groups foster opportunities for teacher learning and when they do not. This insight is crucial. We know from studies of reform implementation that it is relatively easy to adopt activities and change structures and organization. But, unless people actually change what they do within those structures, while using those activities, and in the new organizational arrangements, substantive improvement is rarely forthcoming (Cohen 1990; Cuban 1993; Elmore et al. 1996; Tyack and Cuban 1995). Studying the practice of data use, therefore, provides insight into how new activities and interventions alter patterns of work (or not), influencing how data use interventions play out on the ground.

Third, attention to the practice of data use can help us understand the relationship between micro and macro levels of the social system. As sociologists remind us, macro-level social structures are often the product of micro-level changes over time (Barley 1986; Barley and Kunda 2001; Giddens 1984; Powell and Colyvas 2008). Data use may be a particularly potent micro-level avenue for influence. As individuals and groups respond to data, they often do so by making shifts in practices and policies. Over time and under the right conditions, small shifts can add up to fairly major structural and organizational changes. For example, many

schools and school districts have responded to data that identify students at the margins of proficiency by reallocating resources toward tutoring, pull-out, and supplemental services for these students. Over time, this has created new roles, new ways that time and resources are organized, new organizational structures at the school and district level to manage this process, and a new conception of teaching that challenges the notion, previously quite common at the elementary level, that an individual teacher is solely responsible for the education of the 30 or so students in her class. At times, approaches in one school or district are emulated by others, creating new standards for doing business that become taken for granted and, as such, redefine practice and govern action in the field. By studying the practice of data use, we have the potential to gain insight into what Powell and Colyvas (2008) call the “microfoundations” of social structure, which may be central to understanding how organizations learn (Feldman 2000) and how large-scale social structures persist and change over time (Barley 1986).

However, at the same time that micro-level action can accrete into macro-level structures, existing macro-social structures, rules, and roles also enable and constrain micro-level action. Indeed, studies of data use provide evidence that macro-level structures influence the practice of data use as individuals and groups internalize the categories, classification schemes, and values that are embodied in data use routines (see Colyvas, this issue; Little, this issue). For example, Spillane and colleagues’ (2011) study, described above in greater detail, points to the ways teachers come to normalize values from new government regulation over time through the new data use routines that they adopt into their practice. Similarly, Booher-Jennings’s (2005) study of teachers’ educational triage reveals that teachers’ response to test score data came about, in part, through macro-level changes in the state testing and accountability system, the widespread notion of data-based decision making as scientific, and the equation of good teaching with raising student test scores. Investigations of the practice of data use can provide insight into how macro-level forces matter for the day-to-day work and decisions of people in schools. Because studies of the practice of data use have the potential to shed light on how and why macro-level structure and micro-level action implicate one another, this approach to studying data use has the potential to contribute theoretically and methodologically to one of the central questions in social science research.

The Articles

The articles in this special issue seek to bring issues of practice more centrally into the research on data use. These articles review the research on the practice of data use at the classroom, school, district, and university level, paying attention to the dynamics of social interaction and the role of organizational

and institutional context. They provide new theoretical frameworks and discuss the affordances of different methodological approaches for studying practice. Most crucially, they chart the path forward, proposing research agendas to guide future research in this area.

James Spillane starts us off with an article that puts forth innovative conceptual tools for studying the practice of data use. Spillane argues that conventional accounts of data use often fail to draw on rich understandings of the nature of practice. Anchoring his account in organizational routines, he draws on conceptual tools from different theoretical traditions—distributed cognition, organizational theory, and sociocultural activity theory—to offer new ways of conceptualizing the practice of data use that attend to its interactional and situational dimensions. He illustrates the affordances of these conceptual tools with reference to and extended examples from his own research.

Judith Warren Little takes on the methodological challenges of studying the practice of data use. To do so, she reviews and critiques existing research that investigates the practices employed by teachers as they analyze and interpret student data in a range of professional development and workplace contexts. She discusses methodological concerns with existing research and puts forth a vision for studying the practice of data use that can both get at the micro-processes of interaction, interpretation, and learning and shed light on the ways these local practices both instantiate and construct broader institutional and organizational structures, processes, and logics.

An article by Jeannette Colyvas takes us to the higher education arena. Colyvas puts forth a conceptual framework for understanding how performance metrics—quantifiable classification systems like the *US News and World Report* or Adequate Yearly Progress rankings—shape the practice of data use among higher education administrators. Colyvas draws on the work of organizational theorists Arthur Stinchcombe and Wendy Espeland to craft a new way of understanding how performance metrics work and their impact. She illustrates this approach by reviewing existing empirical studies at the intersection of performance metrics, accountability, and higher education. This work helps us understand how classification systems and categories have both intended and unintended effects on work practices and organizational structures.

Next, Meredith Honig and Nitya Venkateswaran turn their attention to the role of context in the practice of data use. More specifically, they investigate how levels of the school system interact during the practice of data use. While most studies of data use in K–12 education focus on a single level of the system (classroom, school, or district), Honig and Venkateswaran argue that doing so fails to acknowledge the way that these different levels of the system are fundamentally dependent upon one another. They review existing liter-

The Practice of Data Use

ature at both the school and the district levels and argue that we should understand the practice of data use as a “systems problem” that implicates school and central office-level actions, and relationships among the two.

Finally, the journal issue closes with commentaries from Pamela Moss and Paul Goren. These commentaries bring outside eyes to the articles, surface key themes that go across them, and discuss the implications of this analysis of the practice of data use for research and practice.

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The Practice of Data Use

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