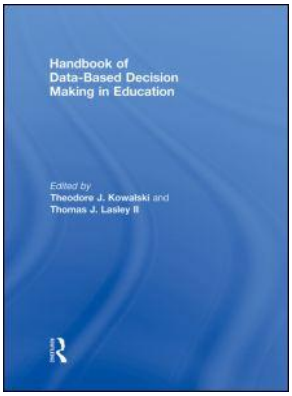

Handbook of Data-Based Decision Making in Education

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Principal Leadership, Data, and School Improvement

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Principal Leadership, Data, and School Improvement

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Educational leaders operate in an increasingly data-rich environment, where they are expected to make decisions that require sophisticated knowledge, skills, and practices with the use of data. Routinely, today's educational leaders grapple with what it means to draw data into decision-making processes in ways that are more systematic, relevant, and sufficiently nuanced to carry the weight of important decisions. This chapter puts forward conceptual and practical definitions of what we will call "data-informed educational leadership," illustrating ways in which data collection and use play out in intentional efforts to improve teaching and learning.[1] We focus particularly on how these ideas play out in the work of school and district leadership, where data practices are embedded most directly in ongoing efforts to improve teaching and learning in schools.

As we write, the data dialogue has entered a new era in which educational leaders' engagement in data-based problem solving is benefiting from new tools and trends not previously known. Building on a robust evaluation movement in the 1960s and 1970s, a variety of techniques and strategies are now available for systematically evaluating the implementation, effects, and effectiveness of educational programs, policies, or initiatives. Underlying standards-based reform has been growing attention to outcomes and results, with a corresponding lessening of interest in inputs. Moreover, the associated accountability movement has become a fact of educators' lives, steadily ratcheting up the demand for an evidence base concerning educational programs' effectiveness since the late 1980s. Finally, the rapid sophistication of technologies for handling digital information makes the prospects for educational decisions rooted in relevant evidence more realistic, yet simultaneously more costly and complex.

In this context, deep data analysis focused on student learning is becoming increasingly a routine means for informing teachers' and administrators' daily work. The growing attention to questions of what counts as data, sophistication in understanding data, and technologies for manipulating data open up important possibilities for educational leaders.

This chapter pursues three integrated agendas. First, we synthesize and interpret research that informs the field's understanding of data-informed leadership in schools and school districts. We rely largely on published accounts in the research literature and also descriptive material concerning current or emerging practices.

The ideas concern the availability, quality, and use of data in the work of school and school district leaders related to the improvement of teaching and learning.

Second, we offer an inquiry-focused framework that provides a set of lenses for understanding change work, and in particular, how data enter into change processes. In this effort, we establish processes or cycles of inquiry as the foundation for data-informed decision making in schools and school districts. We endeavor to ground these ideas operationally through an illustration of how they might play out in a school engaged in data-informed change work.

Finally, we use the ideas from the first two sections to focus on intentional efforts at data-informed leadership, in one linked school-district case vignette. In particular, we highlight the theory of action at work within this context, and examine the role that data play in school (and district) improvement efforts. We find this particular case compelling because of the context of the district's specific and intentional data-informed efforts to link technology, curriculum, assessment, and professional development in powerful ways to support the work of school leaders in improving teaching and learning. Our case discussion daylights a number of the current issues facing school and district leaders across the country as they wrestle with how to understand and use data productively in service of improving learning.

Data-Informed Educational Leadership

To explain the central construct in our argument we must first lay out what we are treating as "data" and identify what kinds of data might be regularly available to school leaders in the course of their work. We also need to distinguish data-informed educational leadership from the more common conceptions of "data-driven leadership" and "data-based decision making" and locate it in the decision-making infrastructure that districts and schools create.

What Counts as Data?

To explore what the concept of data-informed leadership might entail, we need first to clarify what we mean by "data," and for what purpose leaders might be using them. Here, we limit our attention to data implicated in what is arguably the central function of educational leaders—to guide, direct, assess, and support teaching and learning. Accordingly, for purposes of this chapter, we concentrate on data as information that:

(1) Represents the content or conduct of instruction or its effects on student learning and the student experience, as well as the factors and conditions that most immediately affect these matters.
(2) Is, or could be, used in leadership actions aimed directly at the improvement of instruction, learning, and the student experience, or the organizational conditions that support instructional improvement.

A wide range of data, both quantitative and qualitative, falls within this boundary. While leaders and their audiences may often use data that can be quantified or averaged, such as grades, graduation rates, teachers' experience levels or qualifications, and scores on state assessments there is clear evidence that many forms of qualitative evidence (e.g., capturing the qualities of student work, teachers' perceptions, or various features of classroom-based assessment) have as important a role in improving teaching and learning as their quantitative counterparts. As the boundary definition makes clear, we are particularly interested in data that pertain most directly to the improvement of teaching and learning.

Given a focus on learning, leaders' ability to bring data to bear on it is shaped in large measure by the actual data they can find or generate with a reasonable investment of time and resources. Some of these data reside in information systems created through state policies and investments—such as those that have created "data warehouses," management information systems, or reporting systems. Other sources are more likely to be "homegrown," derived from the school or district leaders' own efforts to put together data that have meaning and usefulness in the local situation, or from research, media accounts, or other efforts to represent what is going on in schools (Weiss, 1995).

Table 10.1, adapted from Bernhardt's (1998) work, provides an overview of the kinds of data (demographic, perceptions, student learning, school processes) educators may use as they engage in data-informed decision making, especially in "information-rich" environments.

From these raw materials, leaders may conduct various kinds of inquiries, including simple indicator systems that offer "warnings and hints" about performance (e.g., trends in the achievement gap, student attendance, teacher retention, and funding equity (Celio & Harvey, 2005)).

Moreover, we also acknowledge that data are not the same as evidence. Put another way, data by themselves are not evidence of anything, until users of the data bring concepts, criteria, theories of action, and interpretive frames of reference to the task

Table 10.1 Types of data available to educational leaders in information-rich environments.

Data category	*Sample data points*
Student demographic	Enrollment, attendance, dropout rate, ethnicity, gender, grade level (by school, or district)
Perceptions	Perceptions of learning environment, values and beliefs, attitudes, observations . . . (e.g., held by a school's teachers, district-wide educators, or the local community)
Student learning	Standardized tests, norm/criterion-referenced tests, teacher observations, authentic assessments
School processes	Descriptions of programs, instructional strategies, classroom practices
Teacher characteristics, behavior, and professional learning	Teacher assignment (grade, subject area, students served), qualifications, retention, participation in professional development

(Adapted from Bernhardt, 1998)

of making sense of the data. In this regard, flooding leadership practice with data is unlikely to bring about much improvement, and could even get in the way, absent time and attention to the central issue of sense making.

Data-Informed Educational Leadership Defined

In the current context of accountability and school reform, data-driven decision making is increasingly seen as an essential part of the educational leader's repertoire, yet more is at stake—and more is possible—than this term, or even the term data-based decision making may imply. Leaders' productive work with data implies more than laying out test scores, noting areas of weakness, and mounting remedies that address patterns in the data. We suggest the scope of such work is better described as *data-informed educational leadership*—a term that broadens the scope of thinking and action in two productive ways.

First, a shift to data-informed leadership escapes the sometime deterministic implication of data "driving" action. Tempting though it may be to imagine educational leaders' actions single-mindedly "driven" by "bottom-line numbers," complex educational problems require greater depth of understanding. While they can be fully knowledgeable of available data when taking action, wise leaders also bring to their work core values and insights into those aspects of practice for which there is not yet good data, and may never be. Weiss (1995) reminds us that no matter how systematic and comprehensive the data gathering, several other factors are always likely to influence decision making, including interests, ideologies, and institutional context.

Second, the concept presumes that data are useful for more in the practice of leadership than the making of decisions, per se. Given the inherent ambiguity and multiple meanings of much data in educational settings, data may prompt questions and deliberation more than they point to specific decision options (Coburn & Talbert, 2006; Honig & Coburn, 2005). For example, certain data points (e.g., disaggregated state math test scores) may provide an awareness of a given situation (e.g., performance gap between seventh-grade boys and girls), but the data do not necessarily indicate how educators should address the issue at hand. In this example, assessment data certainly *inform* conversation about possible actions, but they do not necessarily "drive" decisions or provide information about how best to address the issue of low performance.

Finally, we suggest leaders' expertise with data—what may be referred to as their "data literacy" (Earl & Katz, 2002)—defines how much and what they are able to do with data. The challenge is more than a technical one limited to the assembling and manipulation of information, but rather extends to what Fullan (2001) calls "knowledge building," the capacity to extract and share useful meaning from organizational experience. Data literacy presumes more than trial-and-error experience with data, but rather an accumulating facility with the interpretation of data, not to mention familiarity with data sources and creativity in assembling relevant data quickly and efficiently. As implied by work on cultures of inquiry (Copland, 2003), members of a school, district, or other educational organization can become more

"literate" in the use of data and committed to this feature of their collective practice. For purposes of this chapter, we focus in on leadership practices of those in schools and classrooms (e.g., principals, department heads, teacher leaders, teachers, and others who take part in instructionally related inquiry), and in district central offices (school board members, superintendents, directors, and other staff who are involved in decision making focused on instructional improvement). Leaders at each of these levels are potentially engaged in data-informed leadership, broadly construed; hence, our discussion concerns the ways that data are or are not part of their daily practice.

Data can serve a range of purposes in the leaders' toolkit, as Table 10.2 suggests (e.g., Bernhardt, 1998; Holcomb, 1999). Each implies different ways of representing what the data say and communicating them to the intended audiences.

As the Table 10.2 entries suggest, not all of these leadership actions imply specific decisions, but rather imply a range of actions (including the investigation of new questions). Such public availability of data has multiple implications for leaders as they interact with those both internal and external to their schools and districts, among them the continuing questions about the effectiveness of their ongoing efforts to improve teaching and learning.

Table 10.2 A range of ways that educational leaders use data.

Type of leadership activity (with and for internal or external audiences)	*How data are used and what kinds of data are implied*
Diagnosing or clarifying teaching and learning problems (primarily internal to the decision-making group).	Seeking to know whether, or to what extent, student learning matches those overarching expectations (standards) established at the top of the system, leaders seek out information that reflects one measure of student learning in particular content areas.
Weighing alternative courses of action (primarily internal).	Leaders use data to evaluate existing programs or curriculum approaches, and (where they have relevant data) judge their potential in comparison with alternative programs.
Justifying chosen courses of action (primarily external).	Data (e.g., concerning learner characteristics, learning outcomes, comparative program benefits, school closure decisions) are used selectively to "make a compelling case" for programs or courses of action that may or may not have been chosen on the basis of the data.
Complying with external requests for information (external).	Leaders are careful to generate information requested by external agencies, authorities, or groups providing funding—for example, descriptions of how different learner groups are served, evaluations of services to these groups.
Informing daily practice (internal).	Data of various kinds are used by administrators and teachers to guide daily practice. The data are often informal, gathered in mid-stream, and in a form that can be immediately interpreted and used by the practitioner for refining teaching and learning.
Managing meaning, culture, and motivation (internal).	Data help leaders understand and guide the cultural aspects of the professional workplace, by representing to staff what the organization is accomplishing, how people feel about their work, what matters in the work, and what professional learning needs exist.

Finally, data-informed leadership for school improvement assumes an infrastructure that supports and cultivates this kind of activity. A number of larger system dimensions bear on questions of infrastructure, but given our focus on school and district leaders, the role of the school district is particularly important. District considerations of infrastructure that support data-informed leadership include:

- *Offering sources of data or help with assembling or interpreting data* (which may involve responding to school needs for particular kinds of information, etc.).
- *Embedding new technologies that assist with data collection and interpretation* (such as computer-based attendance, discipline records, or grading systems that enable access and make analysis more efficient).
- *Creating occasions for inquiry* (as when an influx of new immigrant children raises questions about appropriate educational programs or school assignment).
- *Setting expectations for reliance on data in school planning and decision making* (as in mandates for the inclusion of certain kinds of evidence in the School Improvement Plan).
- *Creating accountability structures for data-informed leadership linked to overarching district initiatives* (such as expectations for principals to engage in learning walks in classrooms to observe in particular content areas that are the focus of district curriculum work, etc.).

Conceptual Framework

The capacity for data-informed leadership—embodied in leaders' values, expertise, theories of action, and availability of data—sets the stage for particular leadership activities that bring systematic information into consideration by leaders and others. Specifically, educational leaders who are so inclined engage, along with others, in cycles of data-informed inquiry and action. This may mean being open to going beyond the initial boundaries of a given question or problem, and reframing the issues in ways to help the organization and its inhabitants to "see" different possibilities.

Building Organizational Cultures that Enable and Motivate Data-Informed Leadership

Data are only useful to the extent that leaders and those who work with them ask questions that can be answered with the data. Schools, districts, and other educational settings vary in the degree to which they make data a prominent feature of deliberation about the myriad issues that confront these organizations on a daily basis. The literature is beginning to offer a number of examples of educational organizations in which participants accept—even hunger for—data, as they plan and implement their respective programs. Such instances appear in descriptions of "reforming districts" (McLaughlin & Talbert, 2002); schools engaged in "cycles

of inquiry" (Copland, 2003); schools in the midst of school improvement planning or "self-reflective renewal" (Portin, Beck, Knapp, & Murphy, 2003; Streifer, 2002); and schools enacting, or responding to, accountability systems (Lemons, Luschei, & Siskin, 2003; Spillane et al., 2002).

In these cases, leaders have taken deliberate steps to *build a culture that supports inquiry* into the pressing problems facing the organization. Such a culture is supported by the stance leaders take as learners themselves, not having all the "answers," which sets an example for others that engenders trust and reduces the perceived risk from asking and answering questions about practice and performance (Copland, 2003), and ultimately can support collective learning (Scribner, Cockrell, Cockrell, & Valentine, 1999).

A central part of the culture of inquiry is that it characterizes the organization, not just a few key players; many players are participants in it, often implying that data-informed leadership is *distributed*, as are other aspects of the exercise of leadership. In line with recent formulations of the idea of distributed leadership (e.g., Elmore, 2000; Spillane, 2006), leaders who find ways to stimulate and sustain inquiry into problems of practice confronting a school, district, or state system invite others to share in the framing, conduct, and interpretation of the inquiry, and the subsequent actions based on it. The participants often become co-leaders and over time they develop shared norms and expertise in data-informed problem solving.

Such activities emphasize expert over hierarchical authority, an essential attribute of distributed leadership arrangements (Bennett, Wise, Woods, & Harvey, 2003). Such arrangements also recognize that the knowledge and skills necessary to shape or exercise data-informed leadership may be located within a professional community of practice more than in a particular individual (Wenger, 1998). That said, leadership informed by data may not be shared equally among participants, as research on committee deliberations about math performance in a school indicates. When committee members held different beliefs about what the data "Said," it was the leader with positional power whose framing of the problem predominated (e.g., are we facing a curriculum problem or a professional development problem?) and whose beliefs largely informed the final decisions for action (Coburn, 2006).

Engaging in Cycles of Data-Informed Inquiry and Action

Cultures of inquiry support—and, in turn, develop from—repeated attempts to use data to support work on key problems facing the school or school district. At least five discrete phases of activity, schematically represented in Figure 10.1, define this kind of "inquiry in action," work that connects data to learning improvement.

- *Focusing and reframing problems for inquiry*. Leaders focus attention on problems of practice and frame them in terms that invite inquiry. Work that highlights problem-framing ability (Cuban, 1990) and capacity to *reframe* problems from multiple vantage points or perspectives (Bolman & Deal, 1997; Copland, 2003) captures what leaders do, or can do, to set inquiry in motion, thereby giving context for the use of data. This emphasis on framing and

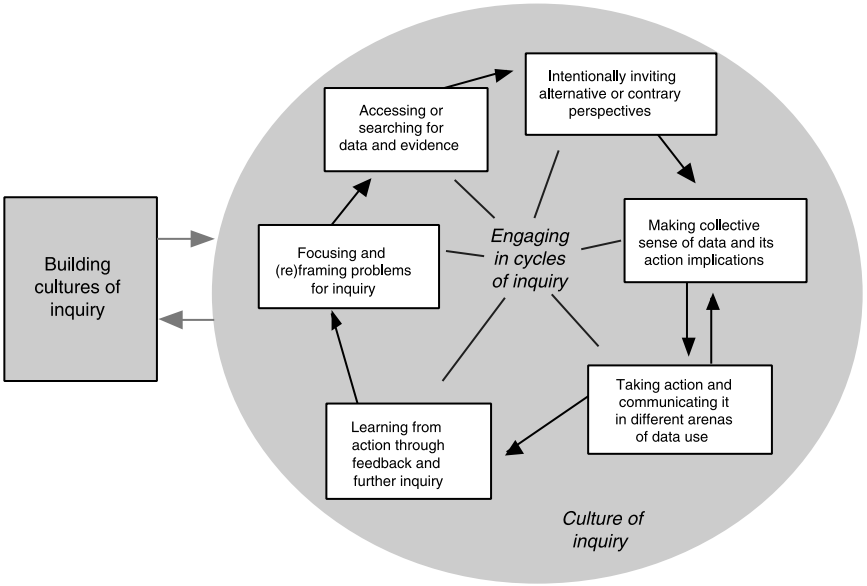

Figure 10.1 Culture and cycles of inquiry.

reframing means that leaders pay careful attention to, and continuously engage in grappling with how to identify and understand what count as problems of practice that should ground their work and the work of others in the collective. They hold on to the present framing of problems to anchor their present work but also remain prepared to let go of current frames as conditions (people, tools, time trajectories) change. Most importantly, for framing purposes here, they engage in an ongoing search for relevant data to guide this work.

- *Accessing or searching for data and evidence.* Leaders and their collaborators generate or search for data using available inquiry tools, sources, and strategies, as delineated in various works on "organizational learning" (e.g., Honig, in press; Huber, 1991), or simply access data that are already available.
- *Intentional invitation of alternative (or contrary) perspectives.* Inquiry-based leadership is open to critical feedback from others, and understands that the reframing of problems and/or change strategies is enhanced by the intentional invitation of alternative perspectives, including those which are contrary to, or in direct conflict with, the current overriding decision direction. This notion emphasizes the importance of leaders taking time to deliberately open their doors (and minds) to alternative ways of framing problems and of creating formal and informal structures to facilitate this engagement around problem framing.
- *Making sense of data and implications for action.* With data in hand, leaders create occasions for *making collective sense of the data* and probing the data for possible action implications. Here, drawing on underlying frameworks concerning sense making in organizations (Coburn & Talbert, 2006; Weick, 1995), recent work has begun to outline how leaders approach the sense-making task

(Spillane, Reiser, & Reimer, 2002). The leap from data to action is not simple, however. Scholarship that captures patterns of actual data use in school districts, for example, notes how ambiguous the data often are, a fact that can curtail their perceived usefulness, but can also stimulate deliberation about ways to serve student needs better (Honig & Coburn, 2005). In addition, individuals' conceptions of what counts as evidence, how evidence should be used, and how research informs practice varies across systems, is often informed by where an individual sits within an organization (Coburn & Talbert, 2006). Thus, the same data may likely be interpreted differently and suggest different courses of action depending on who is engaged in decision making.

- *Taking action and communicating it in different arenas of data use.* Informed by the sense they make of the data, and by other matters not intrinsic to the data (e.g., the politics of the situation, basic values, reporting demands), leaders take action and communicate what the data say to relevant audiences. Some actions take place out of the public eye, but others are intimately connected to the relation between leaders and relevant audiences (Witherspoon, 1997). A central part of the leaders' work is "making it public" in ways that are respectful and politically astute (Holcomb, 1999).
- *Learning from action through feedback and further inquiry.* Scholarship by cognitive scientists on short-term "quasi-repetitive feedback cycles" supports the notion that regular feedback can be a powerful influence on learning, and by implication, the learning of leaders' who receive such input (Schwartz, Bransford, & Sears, 2005). Not surprisingly, syntheses of work on effective educational leadership draw attention to the role feedback can play as an influence on leaders' and others' learning (e.g., Hattie, as cited in Marzano, Waters, & McNulty, 2005).

Presented this way, leaders' attempts to make use of data within cycles of inquiry may appear logical, rational, and orderly. In actual practice, these cycles are likely to be "messier," and they are likely to differ considerably depending on the participants' experience and comfort with inquiry, as in research that has identified schools exhibiting "novice," "intermediate," and "advanced" cultures of inquiry (Copland, 2003) as well as where data users reside in relation to the organization (Coburn & Talbert, 2006). But the underlying impulse is the same, regardless of the sophistication with data use: to raise questions about practice and to develop insights into these problems by considering what can be learned from data about practice.

Operationalizing Data-Informed, Inquiry-Based Leadership in a School

A hypothetical example illustrates how these ideas play out in more concrete, operational terms. Imagine a school engaged in efforts to overcome inequitable patterns in student achievement data that persist over time; year after year the school's achievement data reveal that, with regard to particular assessments, second language learners were underperforming the rest of the school's population. A school

community that took seriously the process of working through cycles of inquiry would recognize that defining the problem was an all-important first step; they would understand that the data did not constitute the "problem" but rather were reflective of something underneath the numbers that needed to be explored in greater depth. In particular, they would avoid assigning blame to kids, or families, or teachers, or prevailing community norms, and turn instead to ask openly—what is the cause of this persistent inequity? What might the problem be?

Deeper consideration of the problem would ensue. The school operating in the mode of inquiry would avoid adopting quick solutions based on limited or superficial understanding of the problem(s) represented by the disparities in data. Rather, they would devote time and energy to deep consideration of the underlying problem dimensions, attempting to discern the root causes of the disparities, and why the trends persisted over time. They would consider a variety of alternative sources of information that might help deepen their understanding of the problem to be addressed; they might, for example, consider what second language students were saying about their experience at the school, or how families of second language learners perceive their connection with the school. Teachers might engage in dialogue about learning among themselves, working to make assumptions held by members of the school community about students, about teaching, about families they served more explicit. In these efforts they might unearth conflicts and reframe more fundamental problems to resolve regarding school members' perceptions or beliefs about which students can achieve, gaps or concerns in particular aspects of their collective instructional practice, or varying perspectives about whose interests were being served by the school. Importantly, they would take critical account of what efforts (programs, practices, etc.) the school had already instituted that were intended to help solve the situation, and try to learn from what resulted in those earlier efforts in ways that could guide their deeper understanding of the problem(s) to be solved. Efforts at problem framing and reframing like these run counter to prevailing norms that encourage schools to "jump on the bandwagon" of new reforms, without first understanding the problem for which new reforms may be solutions.

Armed with a deeper, clearer understanding of the problem(s) to be addressed, the school community could become much more intentional and specific about the choice of particular strategies or solutions. If, for example, it became clear that the fundamental challenge had something to do with lower achievement expectations for second language learners held by some teachers, a new curriculum or new set of pedagogical strategies would be unlikely to help close the disparities in achievement. Rather the school would necessarily need to tackle the deeper work on changing teachers' beliefs and attitudes, and devise strategies that would work on helping teachers to hold all students to high expectations. Importantly, a theory of action hailing from this kind of critical inquiry would provide a rationale for why the particular choice of strategies and solutions would be likely to address the underlying problem(s) that was uncovered.

Finally, school personnel would engage in continual efforts to learn from outcomes, to assess progress in at least two dimensions. First, they would pay attention to whether or not the problem they started to work on was the "right" problem, or if efforts at change helped to develop an even deeper understanding and a new problem

frame. A new problem frame would call for a reconsideration of their theory of action, and possibly different strategies specific to the new understanding of the problem. Second, they would pay attention to whether the solutions they put in place, supported by the theory of action, actually worked the way they had anticipated. If progress of the kind they anticipated was not evident, they would seek to understand why, and make concerted efforts to learn from the efforts they had made initially, that could guide new rounds of decision making.

A school working this way would recognize that problems underneath inequitable achievement for second language learners are complex and unlikely to respond without ongoing and persistent learning and reinvention. Educators engaged in critical inquiry are always attending to new challenges on the horizon, and looking honestly at the progress in their practice, learning from efforts to make productive change.

Given this conceptual and operational backdrop, we turn now to a brief case vignette of a school and its school district to consider how these ideas play out in one example of what might be termed data-informed leadership.

Data-Informed Leadership in Context: The Bodewell (WA) School District

The Bodewell (WA) School District (pseudonym) is recognized regionally and nationally as a "high performing" system, pursuing a rigorous, college preparatory education for every student. For nearly a decade, the district has realized strong and steady growth in various measures of student achievement. Under Superintendent Mike Rodgers' (pseudonym) leadership, state test scores have risen steadily across all grades tested, and, in recent years, Bodewell high schools are consistently ranked among those with the greatest student participation in Advanced Placement courses in the country. However, data analysis now reveals a "plateauing effect" in key indicators. Over the past three years, for example, the district has stalled at about 80% of students taking at least one Advanced Placement course, and last year saw a slight decline in student performance on state assessments in mathematics across grade levels.

In what follows, we focus on the case of this specific school district's efforts at data-informed leadership. We begin with a brief illustration of the current work playing out on the ground, in one elementary school in the district—Alexander Elementary—in which the building principal and teachers are working to improve teaching and learning in connection to the district's goals and strategies. From here, we move out to the system, to highlight the district goals for students, and the theory of action at work within this context, and explicate ways data play in the learning-focused efforts that the superintendent, central office administrators, and building leaders have made to move the district toward identified goals, and in considerations of next steps.

Alexander Elementary

Of the 16 elementary schools in the Bodewell district, five receive Title One funding from the federal government to support disadvantaged students. We turn attention

first to one of those elementary schools, Alexander, to explore ways in which the efforts of the district to embed data collection, analysis, and use in increasingly powerful ways in service of student learning are playing out in schools.

Alexander principal Kathleen Washington does not soft pedal the learning issues the school faces. "There is an achievement gap at Alexander Elementary School, particularly for students of poverty and color," she notes, before detailing efforts the Alexander faculty have pursued intensively to close the identified learning gaps among students at the school. Alexander's approach involves a variety of strategies and interventions revolving around a restructuring of the school's Title One program, which was the subject of data collection and scrutiny in 2002–2003. The work, in many ways, embodies the district's stated directions, focused on increasing student achievement, by grade level, toward specified district literacy benchmarks, with an eye on all students ready for high levels of curriculum at the secondary level.

Through an analysis of data on outcomes for students receiving Title One services, conducted by the school's leadership team, personnel realized that students were entering Title One programs at Alexander and staying there—some never exiting to mainstream classes despite two, three or even four years of special intervention. Based on the data dialogue, Alexander staff determined the model was not working and, with Washington's leadership, changed the delivery of remedial services from "pull out" to in-class support using teacher facilitators. Since the change, Alexander's professional development, including that of principal Washington, has centered around learning how to improve literacy learning for both students and teachers.

Identifying a Clear Problem for Focus During 2002–2003, Washington's focus on data analysis and conversation with faculty began to shift collective attention on the achievement gap between poor students and students of color, and their more advantaged counterparts. The district's infrastructure designed for supporting school-level data analysis and use was rapidly developing, and Alexander's leadership took advantage of the opportunity to go deeper with their understanding of which students were achieving. While only 55–60% of Alexander students were achieving at expected levels on standardized assessments overall, the vast majority of the 40–45% that were not achieving were students of color, students living in poverty, or in some cases students whose profile included both characteristics. As a result of dialogues resulting from this data analysis, the school embarked on the journey of realizing all students achieving at high standards.

A School-Level Theory of Action Washington led her teachers, drawing on research and their own experiences, in an effort rooted in the fundamental belief that students are successful when they have outstanding teachers, who are well versed in instructional strategies and can meet a variety of needs within one classroom. Washington and the Alexander staff also worked from an understanding that more students are successful when the cognitive demand in a classroom is high, and when the climate of the school supports high academic achievement. Washington's working theory of action was that improving the quality of the classroom experience, through intentional professional development, and numerous opportunities for

observation, interaction, and conversation with and among teachers, would ensure that by any measure, students at Alexander will be more successful.

In addition to a focused set of professional development activities, the Alexander staff has begun to develop an organizational culture of teaming in which analysis of classroom-level data plays a central role. Teachers work with each other in grade-level groupings, cross-grade groupings, and in other intensive work with district technology/curriculum specialists, and developers who provide ongoing, job-embedded support for improvements in literacy instruction, employing frequent, common assessments of student learning as the means for dialogue and learning. Principal Washington notes:

> The entire (school) team is focused on meeting the specific reading goals for our kids. Grade-level teams meet every week with a facilitator, discussing student progress and strategies. Teachers routinely observe each other teaching, giving feedback and ideas. . . . Our (district) technology/curriculum specialist is in the building one day per week, in classrooms, focusing on those teachers that struggle with implementation. She teaches, models, and provides support. . . . We have moved from what I would describe as a closed culture (i.e., "I'll teach my students, and you teach yours"), to a much more open one. The rooms are open, our practice is open, our results are open, and we routinely share and receive feedback on our progress. Teachers, in contrast to the old model, are doing a significant amount of discussing, examining, speculating, both about students' progress and their own practice.

Evidence suggests that the processes around deep and ongoing data gathering and analysis are influencing at least some of the Alexander teachers to challenge their beliefs and expectations about students, and the role they play in promoting learning. By way of example, the Alexander staff recently tested out an assumption that was prevalent in the school—that transient students, those who drifted into the school over the course of their elementary experience, were performing far below those who had been in residence at the school for their entire elementary experience, and, in the process, contributing to lower state test scores. Data analysis revealed, in fact, that the opposite was true. Students present at the school since kindergarten were underperforming their more transient counterparts. The finding caused this teacher to deeply question her assumptions about students, and her personal role in helping all students learn, stating:

> When we looked at the data, we were blown away. What we had assumed for so long as being a primary problem for our kids—their transience—was, in fact, not their problem at all. It challenged me to revisit how I think and act in the classroom, and made me realize that I'm implicated in ways I'd failed to consider before.

Assessing Progress Thus Far While it is arguably difficult to link specific professional development efforts at the school to quantifiable improvements in learning for students, some indicators appear promising. Evidence suggests, for example, that, consistent with district direction, teachers are using assessments linked to the curriculum to track progress in greater detail than ever, and that this process is informing teacher dialogue and instructional strategies for individual students. This detail further illustrates how the data dialogue is changing the work at Alexander. Washington illustrates:

> As an example, a first-grade teacher reported that 84% of ALL her students are testing at or above a Level 16 (the target). She has two more students who are at a Level 14 and may be at 16 by June 21. The one other child is on an extensive IEP and will not test past a Level 8. Comparatively, last year's first-grade class had only 61% of the students at or above a Level 16 (interview, 2004).

Bodewell District Goals and the Theory of Action

Working productively with data to inform leadership actions requires ongoing efforts to clarify the intended outcomes, as well as the means or strategies rooted in an explicit rationale, that aim to move the organization in a productive direction. In Bodewell's case, as illustrated by the snapshot provided above of Alexander School, the desired outcomes are both lofty and clear.

In achieving such outcomes, the district's support is of utmost importance, and in Bodewell a coherent theory of action for improving student learning has evolved under Superintendent Rodgers' leadership that centers around three key elements: curriculum, professional learning, and student support.

Curriculum at the Center Initially, Rodgers worked from an intuitive sense that specification of curriculum, across content areas, and spanning the K-12 spectrum, was essential to move the district toward the goal of graduating all college-ready students. He notes:

> Because learning targets are ambiguous and inconsistent, American kids typically march from kindergarten through 12th grade repeating content and skills more times than necessary and, at the same time, skipping large chunks of important things they should be learning. No wonder it is so unusual for all students to end their K-12 education at advanced levels. It is indeed impossible under (typical) conditions.

Early district efforts in curriculum began with the purchase of existing curricular solutions in science, and later evolved to have district teachers engaged in developing curriculum and associated classroom-level assessments that are now common across schools and grade levels.

Most recently, a sophisticated technology infrastructure has enabled the district to digitize curricular materials and assessments and make them accessible online, an effort which will eventually encompass the entire curriculum in core content areas. The technology initiative, in addition to making curriculum readily available down to the level of individual unit and lesson plans, is also structured to invite ongoing, interactive teacher development of exemplar lessons that can be made available to every teacher in the system through the district's curriculum "share point" website, accessible to all. In this sense, the Bodewell curriculum effort is not static, but continuing to evolve based on teachers' use and experimentation with it over time.

Leadership challenges remain as to how to encourage and promote interaction around the curriculum. Clearly, as the Alexander Elementary discussion highlights, data collection, analysis, and use will continue to play an ever more important role in leading the work. During annual leadership institutes for all district administrators and coaches, Rodgers challenges principals, assistant principals, coaches, and district

administrators to connect the curriculum efforts to the goals they created for students, and to rely on data skills to determine what comes next.

Connected Data-Informed District Professional Learning Opportunities Alongside curriculum specification, development, and leadership, the district has pursued an ongoing robust professional development agenda for teachers, integrally linked to the curriculum, in an effort to deepen and extend pedagogical content knowledge and skills. Professional development efforts have both been informed by ongoing analysis of student data, and designed to build teachers' and administrators' "data skills."

For example, recent professional development focused on connections between technology and curriculum is a high priority in Bodewell, including efforts to help teachers learn to use the district's developing "data warehouse." Efforts focus on helping teachers learn data analysis operations, and to develop ways to conduct meaningful research connected to particular curricular efforts in content areas. Strategies involve layers of different activity, providing choices for teachers, including curriculum workshops, lesson study, individual coaching and/or assistance from technology/curriculum coaches, peer observation and peer coaching (including incentives to support this activity), and high numbers of classroom observations by administrators.

Data-Informed Supports for Students Finally, in addition to curriculum and linked professional development for district teachers and leaders, Bodewell has pursued a third component focused on providing additional support for struggling students to enable them to learn the specified curriculum. Rodgers and other leaders in the system recognized that raising expectations for what would be taught and learned in the curriculum across the district would challenge students in new ways, and require thoughtful efforts to add supports for struggling students to be able to learn the material.

Toward this end, the district has developed classes at key junctures that offer support in key content areas, in many cases allowing teachers to "pre-teach" material to struggling students, and set them up with greater opportunity for success in their other "regular" courses. Rodgers places a high priority on providing what he calls "successful academic support," noting:

> Bodewell's academic support system is effective only to the extent that it enables students to master the curriculum. . . . Students typically predicted not to become college graduates—the ones most likely to need extra support—are the very ones who will benefit the most from being free from pre-college classes on their entry to college.

The district is working to provide interventions for students who need extra support in the earliest grades, as well as "catching up" those who are already in the system, but may have fallen behind. The efforts include systemic assessments administered as early as kindergarten to identify students who need help, and provision of more time before, during, and after school in support classes, as well as summer experiences designed to provide an academic boost. With the student support initiatives, Rodgers brings the conversation back to data and evidence, asking questions that are aimed at determining program effectiveness in the area of student support. He notes:

> We may have the right elements in place, but are we using them to their full advantage? Are assessments effective diagnostic tools? Are they given frequently enough to identify problems early? Are programs that provide extra time targeted enough in their goals for content and skill development? Are these programs used by the right students? How closely aligned are Title One, ESL and Special Education to the mainstream curriculum? How well trained are teachers in these areas in the delivery of our district curriculum?

Despite this systemic approach to curriculum, professional development, and student support that extends to the earliest grade levels, the superintendent expresses the realization that the district has progressed as far as it can given the current level of knowledge and skills of its educators. He notes, "What Ron Edmonds said years ago simply isn't true—we don't have all the knowledge and skills we need to ensure every student's success. I'm saying, I've been at this work for a long time, and I don't know how to teach all kids in a way that will guarantee their success." The district sits poised on the edge of moving to the next level of accomplishment, but the way from here is not clear. Rodgers asks, "How can the district promote experimentation, and harness new forms of data and data use to break through the ceiling?"

Case Discussion

The case example sheds light on how Bodewell leaders, and, in particular, Superintendent Rodgers and Principal Washington, are deepening data-informed efforts to enable the district to achieve better results for students, developing new data sources, analyses and uses in service of realizing greater progress toward their specific goals for students. The case highlights the district's specific and intentional efforts to link technology, curriculum and assessment, professional development, and student support in powerful ways, and the role data of various kinds play in those efforts at the school level. The following discussion of the Bodewell case applies key framework ideas introduced earlier to bring to light promising aspects of the work underway there, and to raise questions about the road ahead.

Stepping back from the specifics of the Bodewell case, three lenses on data-informed leadership related to key ideas introduced earlier seem particularly relevant in considering the case. These include:

(1) efforts to define elements of data-informed leadership in context;
(2) cultures and cycles of inquiry at the district and the school; and
(3) considerations of district infrastructure that inform and support school-level activity.

Defining Data-Informed Leadership in Context

At both school and district level, leaders have established a clear focus for data use by staff; they have developed a theory of action emphasizing curricular coherence across grades and schools that offers a reference point for data-informed leadership; and

they are developing a basic level of data literacy, while recognizing that there is more they can learn.

Focus for Data-Informed Leadership Leaders are in a position to define the focus for the data they might generate and use, reflecting their own leadership priorities and their response to events such as that call for data and evidence. The district has developed efforts to increase accountability for principals to use data in developing plans and tracking progress. State assessments play a minor, but supporting role in this; more important are data from common classroom assessments that shape teaching decisions more immediately.

Coherence Through a Curricular Theory of Action To the extent that the perspectives of those at the top of the organization in Bodewell reflect understandings that permeate the rest of the district, there is relative clarity about what the district is being designed to accomplish (all students rigorously prepared for college), and about the means for how that will be accomplished (a curricular theory of action). The theory outlines how the presence of a shared curriculum enables teachers at the same grade level, regardless of their school affiliation to engage in dialogue about their work, and build shared assessments that can provide more systemic understanding of progress in key content areas coherently across the entire system. Coherence is created through linkages to robust professional development opportunities tied to curricular efforts, and student support structures and programs targeting key student learning needs.

Leaders' Development of Data Literacy As noted earlier, numerous scholars (e.g., Dembosky, Pane, Barney, & Christina, 2006; Earl & Fullan, 2003; Wayman & Stringfield, 2006) cite the importance of building educators' expertise in using data to inform action. The case suggests some evidence that Bodewell educators' ability to interpret and apply data is growing, and that they are on the road to becoming "data-literate" (Earl & Katz, 2002, p. 1013). Yet, as comments from both Rodgers and Washington suggest, becoming data-literate in Bodewell likely means developing new capacities for using data effectively that are not yet imagined.

Cultures and Cycles of Inquiry

The cases illustrate what it might look like when district and school leaders have encouraged a culture of inquiry and how a system of collective learning by teachers might ensue, as participants across the district share what they are doing in their practice.

Efforts to Develop and Sustain Cultures of Inquiry Across the System Some evidence suggests that Bodewell is developing an organizational culture that encourages inquiry into problems of practice. Such cultures develop over time through repeated activity by many individuals, but data-oriented leadership, such as that displayed by Superintendent Rodgers, is often a "driving force" behind data use

(Supovitz & Klein, 2003). Clear from the case description is that some Bodewell leaders, and in particular Superintendent Rodgers, have embraced the idea that the only way to continued improvements is to turn the district into a learning community, where experimentation with new ideas and forms, and ongoing analysis of results of those experiments, becomes the norm for teachers' work, rather than the heroic exception. Whether or not this will come to pass ultimately is part of the question of how to promote continuous progress and break through the ceiling that appears to have capped learning outcomes at around the 80% mark.

Unleashing the Power in Collective Teacher Learning The picture Rodgers paints of a teacher community is compelling—intimately linked, one to another, over the Internet, working to continually develop the range and depth of the district's curriculum, and using those same web-based structures to enable the sharing of knowledge about what works, both inside and outside the district.

Considerations of Infrastructure

The case clarifies the role data infrastructure can play in enabling data-informed leadership to take place. Furthermore, access to data through technology and associated assistance makes it possible for teachers to connect to the tools and means for addressing the problems of practice they face.

Deep Data Infrastructure and Access for Schools and Classrooms Bodewell has taken steps to rapidly improve data infrastructures (i.e., merging silo systems), and leadership is mandating the analysis and use of data to inform instructional improvement. The district has also engaged in strategic partnerships to enhance support for the analysis and use of data, in service of building a stronger instructional program. Rodgers, probably correctly, sees the need for ever deeper data structures that enable teachers to gain even more clarity about the specific needs students bring, and learn from their ongoing efforts to improve learning.

Access to Resources for Improving Teaching Bodewell's technology initiatives include both "people" expertise and hardware/software. Human resources include district technology/curriculum coaches—a new role in the system designed to help teachers work from data on issues that are present in student learning. Smart boards are in the multi-year plan to remodel all the district's schools, and are included as part of a package of best available technology infrastructure in those schools, to enable teachers to archive and access data related to the curriculum for teaching and assessment purposes.

Conclusion

The concept of data-informed leadership embraces a realm of practice central to the improvement of learning in schools and the educational prospects for the full range

of students served by these schools. For those who have just begun to see data as a resource to practice, the framework offered here suggests a vocabulary for thinking about and experimenting with the possibilities, For other leaders, like those in Bodewell, who have already become comfortable practicing data-informed leadership, the framework points to areas that need further exploration and hints at new dimensions of practice that are only just beginning to be imagined. For researchers who wish to understand the roles data can play in leadership and school improvement, the framework highlights activities, assumptions, and dimensions of practice that deserve careful scrutiny.

Together, practitioners and scholars who engage in data-informed practice or who study it will help the field to evolve richer, grounded conceptions of *data literacy* in the leadership of schools and districts. Specifically, they will help the field get beyond the notion that data literacy consists only of the ability to read data tables and interpret simple statistics—rather, it includes facility in collective inquiry into practice while in the midst of the urgencies of practice.

While they do so, practitioners and scholars engaged in data-informed leadership will help us all resist current calls, intensified by the current accountability context, to use student performance data single-mindedly to *drive* decisions. Rather, our hope is to reframe the conversation to emphasize inquiry about student performance *informing* decisions through collective examination of practice *with* data, in iterative cycles. The ultimate questions—and answers—do not sit inside student performance data themselves but rather in the search for new ways of framing seemingly intractable problems. This search will produce new understandings of what is possible and desirable for students' education.

Note

1. Earlier versions of this chapter's argument appear in Knapp, Copland, & Swinnerton (2007), and in a report commissioned by The Wallace Foundation (Knapp, Swinnerton, Copland, & Monpas-Huber, 2006).

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