LEADERSHIP FOR DATA-BASED DECISION MAKING: COLLABORATIVE EDUCATOR TEAMS

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Principals and other school leaders have been given a difficult charge: Take an abundance of student data, mostly in the form of assessments, and turn this data into information to be used in improving educational practice. To read policy and news accounts, one might surmise that the mere act of providing student data is sufficient to create a school or district driven by this data. On the contrary, although many educators embrace the notion of becoming more reflective practitioners, few educators have the preparatory background to engage in such analysis and reflection.

Despite these potential difficulties, the use of student data to inform reflection on educational practice offers a concrete foundation from which to engage in learner-centered leadership as advocated in this volume: Though data use places clear focus on student learning, data use also provides important focus on educators' learning about

their craft. In examining student data, teachers, principals, and other educators are afforded opportunities for reflection on practice, monitoring effectiveness, and participation in community learning. Further, by couching reflection in issues from day-to-day school life, educators are able to engage in action learning by applying new learning and practice to already-developed professional routines. These and other tenets of learner-centered leadership are well-supported in an efficient data initiative.

Although the research literature provides numerous case studies on individual schools or educators that have successfully used data to improve achievement, Stringfield, Reynolds, and Schaffer (2001) found the use of data at the school level to be an incredibly difficult task because school personnel often lack proper systemic supports for data use. Instead they often rely on the "hero model," so dependent on the heroic work of one or more individuals that the initiative is unsustainable after the hero leaves. Our observation is that data initiatives are replicable and scalable when they are built with proper supports at all levels to help educators in this learning endeavor. One such support is the establishment of collaborative data teams.

The goal of collaborative data teams is to form groups of educators that can work and learn together as they engage in the process of using student data to examine and improve their craft. These teams are typically established at the building level and can exist in a variety of forms: They can be made up entirely of teachers, or may also contain administrators, counselors, or other building personnel. These teams may be formed within or across subjects and grade levels. Regardless of their makeup, these teams all serve the same purpose: to support educators in conducting inquiry into practice, and make this inquiry efficient and fruitful.

Educator collaboration is supported by many researchers as an efficient way to improve education (Schmoker, 2004) and should be an effective method in placing a learner-centered focus on school data. The difficulties of educator collaboration have also been described (e.g., Gunn & King, 2003), so it is necessary to establish a firm research base on the implementation of collaborative educator data teams.

In this chapter, the experiences of four districts partnering with the Stupski Foundation to encourage data use within a larger reform context will serve as a backdrop to our discussion of collaborative data teams. This discussion will identify important elements and considerations that will help school leaders in the establishment of productive collaborative data teams, and will highlight practical difficulties in pursuing this endeavor.

RESEARCH BACKGROUND

Data Use

The use of data to inform school practice may seem new because of the increased attention brought about by NCLB, but this concept has received varied attention in school research literature for over 30 years. Many studies of positive outlier, "effective" schools demonstrating unusual academic gains have shown that the thoughtful use of student data positively correlates with a range of measures of student achievement (e.g., Edmonds, 1979; Stringfield, 1994; Teddlie & Reynolds, 2000; Weber, 1971).

Research on school improvement and school effectiveness has suggested that data use is central to the school improvement process (Chrispeels, 1992; Earl & Katz, 2002), and there are an increasing number of recently available case studies available describing ways in which data has supported educational decisions (e.g., Petrides, Nodine, Nguyen, Karaglani, & Gluck, 2005; Supovitz & Klein, 2003; Symonds, 2003; Wayman & Stringfield, 2006).

Inquiry into student data has been shown to be useful in improving overall school practice. Chrispeels, Brown, and Castillo (2000) demonstrated that data use can be a strong predictor of the efficacy of school improvement teams: Data use not only directly increased the efficacy of these teams, but served as a mediator for the positive effect of other factors. Lachat and Smith (2005) found data to be a useful and convenient vehicle for promoting faculty interaction with in-school coaches. Streifer and Schumann (2005) reported precise predictions of student achievement using complex data mining models. Chrispeels et al. (2000) noted the reciprocal nature of data use—the more their team learned about and used data, the more data informed important decisions.

Case studies and interviews suggest that data use may have a positive effect on the people involved in the educational process. Formal and informal research has suggested that schools involved in data use often evolve toward a more professional, collaborative culture (Chen, Heritage, & Lee, 2005; Feldman & Tung, 2001; Nichols & Singer, 2000; Symonds, 2003). Earl and Katz (2002) noted that school leaders involved in data use often consider themselves in charge of their own destiny, increasingly able to find and use information to inform their school's improvement. Data use can be helpful in changing educator views and attitudes toward educational practice and students: Administrators in Massell's (2001) study viewed data use as stimulating a search for new ideas, with data opportunities encouraging many to seek more professional development. Massell (2001) also found that increased communication and knowledge provided by data appeared to be positively altering educator attitudes toward the school capabilities of some underperforming groups. Armstrong and Anthes (2001) found the introduction of data use resulted in heightened teacher expectations of at-risk students, noting positive changes in teacher attitudes regarding the potential success of previously low-performing students.

Though accountability policies do not stress teacher involvement in data-based decision making, teacher involvement is a key element of a fully successful data initiative, particularly in a learner-centered environment. Researchers such as Black and Wiliam (1998) have argued for a classroom-focused policy for assessment because of the access teachers have to students and their performance. Preliminary evidence suggests that, though teachers are often critical of accountability initiatives, they will embrace such policy when it is soundly implemented, responds to the learning needs of their students, and helps them improve as teachers. Ingram, Louis, and Schroeder (2004) and Massell (2001) showed that, though teachers expressed concerns about the appropriateness of and importance assigned to assessments, they also recognized the new information afforded by assessments, along with the stimulus for new ideas brought about by inquiry. Other research has shown a variety of ways that teachers can realize improvement through involvement in a data initiative (Chen, Heritage, & Lee, 2005; Lachat & Smith, 2005; Murnane, Sharkey, & Boudett, 2005; Wayman & Stringfield, 2006).

Though not yet definitive, there is a growing research base to indicate that school data use can lead to a variety of educational improvements. However, this pleasant picture must be moderated by findings from Stringfield, Reynolds, and Schaffer (2001) that many schools have found the use of data for school improvement to entail a great deal of labor. Data are often stored in ways that frustrate flexible analyses, and lack of preparation places undue pressure and burden on a select few individuals. Still, as Earl and Katz (2002) noted, data use is suddenly not a choice for school leaders, but a must. Twenty-first century school leadership models will undoubtedly be heavy on the use of data to inform decisions. Consequently, it is incumbent on school leaders to identify structures and methods that support the use of student data and involve teachers and other staff. Collaborative teams that examine data and explore ways to improve practice are a promising support.

Collaboration for Data Use

In a learner-centered environment, leaders foster collaborative opportunities that offer shared learning, dialogue, and reflection from all members in the organization (Danzig, Blankson, & Kiltz, this volume). Not coincidentally, it has also been suggested that a data initiative will be most useful when it is characterized by widespread involvement among teachers and other faculty members (Wayman, 2005a; Wayman & Stringfield, 2006). Still, most accountability policies do not provide mechanisms for broad, effective involvement among educators and such policy omissions are often considered by researchers to be a hindrance to an effective data initiative (Massell, 2001; Porter, Chester, & Schlesinger, 2004; Stiggins, 1999). It is thus important to identify methods that can help leaders promote widespread collaboration among faculty involved in the inquiry into student data.

Collaboration is touted by many researchers as an effective general educational practice (Schmoker, 2004) and should be a particularly effective structure in promoting school data use. Copland (2003) described collaborative inquiry as one form of distributed leadership, a reculturation of schools and their organizations such that educators throughout the school take on formal and informal leadership roles. Mason (2003) described professional learning communities as the ideal organizational structure for data use.

In describing the administrator as a community builder, Murphy (2002) noted the importance of stretching leadership across different organizational roles to involve various players. Data use is an important component of promoting such leadership and the principal has been shown to be a key element in supporting and spreading data use among a faculty (Copland, 2003; Supovitz & Klein, 2003; Wayman & Stringfield, 2006). Still, there are barriers that make leadership of faculties problematic in a data initiative. Besides the aforementioned lack of preparation, principals often face faculty resistance because data initiatives often involve changes in school culture (Ingram et al., 2004). Also, although effective data use has been shown to be too burdensome for one individual (Stringfield et al., 2001), principals may be hesitant to pass off data exploration to others for fear of mistakes (Supovitz & Klein, 2003).

Solutions to these problems often lie in forms of collaboration that can help educators work together in exploring student data and crafting instructional solutions (Copland,

2003; Huffman & Kalnin, 2003; Mason, 2003). Though effective faculty collaboration can be difficult to achieve because of preexisting educator autonomy and implicit power relationships (Gunn & King, 2003), early evidence suggests that teachers are enthusiastic toward collaboration around data use. For instance, Mason (2003) described a school where teachers strongly expressed their desire for inquiry to be a collaborative process where learning and ideas were exchanged. Wayman and Stringfield (2006) described group meetings around analyses and data software to be a common component of successful data initiatives. Copland (2003) noted that engaging teachers in thoughtful, collaborative inquiry into practice is an empowering act that enables teachers to become equal partners in instructional improvement. Collaboration and data analysis help provide teachers input into important decisions, as illustrated by Schmoker (2004): "Effective teachers must see themselves not as passive, dependent implementers of someone else's script but as active members of research teams."

Even in a supportive, learner-centered environment, efficient data use is difficult to undertake without proper technology, so data systems that assist inquiry into student data are important supports in the creation of collaborative data teams. These systems promise fast, efficient delivery of student data in a user-friendly fashion (Wayman, Stringfield, & Yakimowski, 2004), and have been suggested to be a key element in eliciting and supporting teacher involvement in data use (Wayman, 2005a). These systems are just recently becoming more common in schools, and not coincidentally, much recent empirical evidence on data use comes from districts whose data initiatives include such systems (Brunner et al., 2005; Chen et al., 2005; Lachat & Smith, 2005; Murnane et al., 2005; Streifer & Schumann, 2005; Wayman & Stringfield, 2006).

A strong illustration of the attention required to foster effective data teams is given by Chen et al. (2005), who noted that collaboration for inquiry was a positive byproduct of a student data initiative supported by these systems, but also presented results that showed these collaborations were not ubiquitous and were sometimes unfocused. This contrast shows that, even in supportive environments, effective data teams are complex and difficult to foster. School leaders need information and research on practices that can help them cultivate effective data teams within a learner-centered environment, so in this chapter, we seek to discuss facilitators and challenges to the implementation and function of collaborative data teams. As an illustrative backdrop to this discussion, we draw on stories from four school districts currently partnering with the Stupski Foundation for school improvement. Through this discussion, we aim to offer practical information that school leaders and other educational professionals may use in establishing these teams to improve educational practice and student achievement.

THE STUPSKI FOUNDATION AND THE DISTRICT ALLIANCE PROJECT

Our points and suggestions are cast in terms of the experiences of four districts partnering with the Stupski Foundation in the District Alliance Project, a set of school reform partnerships focused on systemic improvements that develop high-performing schools and high student achievement. These four districts range

in size from approximately 10,000 to 35,000 students and cover a range of ethnic makeups and economic classes.

The Stupski Foundation was founded in 1996 as a nonprofit operating foundation to help ensure that all children in America, regardless of race or income, have access to a high-quality public education. The Foundation believes that its most effective contribution to education reform will be through support at the district level, providing expert resources and financial investment in district partnerships. Resource teams working with school districts include former superintendents, educational leaders, and consultants who have led successful district reform initiatives, as well as organizational development, data analysis, and systems experts. The Foundation's District Alliance school reform partnerships began in 2001 with six small- to medium-sized urban, suburban, and rural districts on the West Coast (9,000–50,000 students). In subsequent years, larger and more geographically diverse districts were also added. All districts have been included on the basis of their demonstrated need regarding low student achievement in an environment including high poverty, high minority population, and often with English language acquisition problems.

District Alliance partnerships are expected to last from 2 to 5 years of active work, after which time the districts are expected to serve as a model of reform for other districts beginning the program. Partnerships are primarily with urban school districts and are focused on a systemic approach to school reform, with a goal of developing high-performing schools that provide high-quality educations for all students while closing the achievement gap between ethnical, racial, and socioeconomic populations.

The Stupski Foundation helps districts attain increased student achievement by supporting the use of research-based best practices in a strategic way, mindful of the unique needs of the district and its community. One of the key factors in this reform is a commitment to making equitable decisions and to consistently allocating its resources in ways that ensure all students achieve at high levels. The Foundation envisions equity not in the sense of treating all students equally, but in taking the necessary steps to guarantee that all students are successful.

Such a charge requires that school cultures be addressed. In the District Alliance project, cultural transformation is addressed through high expectations for focus on student achievement by all stakeholders of the district. This commitment is demonstrated by what people say and do, and their shared sense of responsibility for results. Transforming a district culture in this way requires relentless focus and strong, consistent leadership.

The Stupski Foundation has identified seven interrelated components it believes are essential to attaining cultural transformation and to accomplishing the goals of improved student achievement, equity, and social justice. All seven components must be present to bring about meaningful, long-term, systemic school reform. The seven core components of the Stupski Foundation's work are as follows:

- Strong, visionary results-oriented leadership.
- Alignment of action, resources, and results.
- Standards-based curriculum and powerful teaching.
- Effective and efficient processes.
- Active engagement of internal and external stakeholders.

- Employee and student accountability for results.
- Stellar teachers, board members, leaders, and support staff who are continuously learning and growing.

The four districts chosen as illustration for our discussion are ones where the use of student data is a focus within this larger reform context. Although collaborative data teams are not being implemented in these districts as a systemic initiative, collaboration is forwarded in each of these districts as a method for engaging in the thoughtful use of data to improve practice.

COLLABORATIVE DATA TEAMS

The benefits of educator collaboration are particularly valuable in involving faculties in data-driven inquiry into their teaching and practices. The use of data to improve educational practice is new to most educators, so the support and drive that results from group effort will serve faculties well. Wayman (2005a) noted that the relationship between data use and collaboration is reciprocal: Data initiatives are more likely to be successful if teachers are allowed to learn and work collaboratively and the use of data conversely helps foster constructive collaboration. Additionally, using data within a collaborative framework affords educators more opportunities to interact and share ideas across disciplines, and offers teachers opportunities to interact with and assume a variety of roles in the educational hierarchy.

In the following sections, we describe four important contexts regarding the establishment of collaborative data teams: (a) the exploration of standards and definitions for learning ("calibration"), (b) a focus on student data, (c) engagement of educators, and (d) technology to support data use. Following the discussion of each context will be an informal "Leadership Highlight" that offers practical information about the particular construct.

Calibration

Collaborative inquiry as described here demands a strong consensus regarding standards, definitions, and goals about schooling; without such consensus, this work can become fragmented and diffuse (Copland, 2003). This process is reciprocal because an inquiry-based approach builds a common vocabulary and focus (Copland, 2003; Murphy, 2002).

The establishment of common ground is not only important for leadership within collaborative teams, but at all levels of the system. From the top of the district down through the classroom, it is important to engage in the up-front work of defining what learning is, how instruction should be conducted for such learning, and how the assessment of such learning will take place. We refer to this process as "calibration" to remind ourselves that this work involves the dual duties of standardization and ongoing modification.

The calibration process allows stakeholders to explore personal positions on important questions such as, "what should students learn" and "how will we know learning

has happened," with the stated aim of arriving at a group (e.g., team, school, or district) set of common standards and definitions. Much as a mechanic would calibrate the settings of an engine for maximum performance, so should school personnel calibrate the foundations and goals of schooling to produce positive learning experiences. At the building level, leaders may engage faculties in calibration activities (e.g., multiple grading of the same student work products by a number of teachers using a common rubric) that can provide a concrete process for schools or teams to identify areas of success, deficiency, and inconsistency.

Three of our illustration districts have experimented with calibration strategies and have shown positive anecdotal results with a few teacher teams. In these districts, we are observing initial progress regarding changes in teacher and principal practice, and in educator understanding of reform issues. As the calibration process continues to unfold in these districts, we anticipate this up-front work will serve these districts well in sensitive interpersonal issues at the school level, where calibration can serve to defuse potential conflicts due to the traditionally autonomous nature of teaching. In a case study of teaming in one school, Gunn and King (2003) described how an absence of shared educational orientation exacerbated conflict; conversely, Huffman and Kalnin (2003) reported teacher comments that team focus on data and goals enabled them to work on improvement in a nonblaming fashion. These results underline the importance of discussing and defining a shared vision–concept of teaching and learning—otherwise, everyone goes their own way.

Calibration is particularly important for classroom practitioners because of the frequent disconnect between policy definitions of success and individual educator definitions of success. Although accountability policies mandate that schools, teachers, and students be judged by external assessment data, Ingram et al. (2004) showed that teachers judge schools, themselves, and students by broader, less definite, and often less quantifiable criteria (e.g., behavior, grades). The calibration process is thus an important link between policy, which often ignores this aspect of school culture, and classroom reality, where educators operate autonomously. Although educators may eschew formal assessments as too narrow to be of much good, it is possible through the calibration process to engage educators in the process of identifying what information they find useful in mandated assessment and define what information should be collected to augment assessments.

The promising implementations of calibration in these districts are cause for optimism, but it is important to remember that even the best efforts of building leaders to foster calibration among their faculty will be difficult to maintain unless there is similar calibration that has occurred at the district level, aligning goals into objectives at the classroom level. Even the districts where we have observed calibration success have realized this only with sporadic faculty groups throughout the district, probably because these districts have not yet structured calibration into a larger district system of accountability and instruction.

Two of these three districts are moving toward this more systemic approach to calibration, creating district-wide accountability systems that direct schools to set local goals based on the success of their students. Although this in itself is a common practice (Reeves, 2004), these districts have additionally made substantial investments to ensure that the school goals are connected to regular collaborative meetings of

teachers, and vice-versa. These meetings focus on student work, standards-based instruction and regular assessment. We hope to report on the progress of these measures in future work.

Leadership Highlight. There are a variety of activities leaders may engage their faculties in for calibration purposes. Examples of calibration activities include common grading, where multiple scorers independently evaluate a common set of student work, then come together to discuss similarities and resolve discrepancies, and professional observation and coaching, which provides constructive and designed ways for educators to simultaneously explore areas of success and improvement. Another interesting calibration activity for data use comes from the work of Doug Reeves, founder of the Center for Performance Assessment: The "Adult Science Fair."

In the Adult Science Fair, schools or instructional teams within a school build specific plans for improving teaching and learning. These plans include analysis of existing data to determine areas of strength and improvement, and strategies and measurement goals for targeted areas of improvement. Using these plans, the teams conduct their work (analysis, exploration, and goal setting) over some predetermined time interval (often 1 year). At the end of this year, every team prepares a simple, three-part "Science Fair Presentation." This presentation includes three main components: (a) analysis of existing data, as described in the plan; (b) evaluation of strategies and measurement (e.g., were strategies in plan implemented, what learning was measured based on these strategies); and (c) narrative and description of work to date. As in student science fairs, a common event hall is used to bring together all the teams and display their presentations. In addition to presenting their own work, teams examine the other presentations in the room, looking for accomplishments or successes that would assist in their work and planning. Opportunities for constructive critique may also be offered.

This activity has many positive implications. One is accountability: Peer review and public display creates motivation for high-quality analysis and proper execution of the research plan. Another is group learning and development: Professional learning is a shared experience among a large group of teams; educators are afforded the opportunity to learn from like-minded individuals working in a similar situation. Teams also have the opportunity to connect with other educators working on similar or identical problems.

Focus on Student Data

In building collaborative teams for school improvement, it is important that teams put student learning data at the center of their work and not waver from this focus. Over the years, all four of our districts have attempted a variety of collaborative techniques in an effort to build more effective practice throughout their systems. These prior efforts were marked by the same frustration: school personnel wanted to "go deeper," but had neither the tools nor the guidance to do so. It was not until these districts fully engaged in the thorough examination of student data, studying how well their students were meeting specific, time-bound learning objectives, that these districts began to feel their collaborations were yielding the deep information they had hoped.

The message that student data facilitates collaborative work is perhaps best described in a counterexample from one of our districts. In this district, faculties are meeting regularly about improving educational practice, but are not examining student work and assessments in a consistent and focused manner. Instructional progress in this district is impeded because the conversations in these meetings center on student learning only in the context of sharing techniques and materials, not on specific student learning progress. One current reform focus in this district is thus to help school leaders infuse data into these collaborations—to turn collaborative teams into collaborative *data* teams. If successful, these teams will still exchange materials and ideas as part of the teamwork, but will be supported by data examination. Collaborative conversations that center on topics such as "What did my students learn recently and how do I know this?" and "In what practices have I engaged that affect student learning?" make conversations around "I have these materials that might help you," or "have you considered this activity" much more meaningful.

There is a broad spectrum of student data that faculties will find useful, so leaders need not feel that they need to identify the perfect type of data. Common examples of available data include (a) summative assessments, such as state-mandated tests, that are used to document student achievement at the end of a quarter, semester or school year; (b) formative assessments that are given more frequently and are intended to guide planning, instruction, and daily practice; and (c) student data profiles, which provide information contained in a student's permanent record such as demographic information, test histories, and relevant family information (Wayman, Stringfield, & Yakimowski, 2004, provide a more thorough overview of various data forms). No single form of student data provides all learning information, so teams will find it useful to triangulate student information, using multiple forms of data to assess student learning.

In the four districts highlighted here, summative assessments have been in more frequent use than formative assessments. Summative assessments are frequently criticized because they do not provide up-to-the-minute information as do many formative assessments, yet summative data have served many uses in our districts. For instance, summative data have been used to define an agenda for upper level district administration and help build political support for a long-term strategic information plan. Summative data have been used to help teachers and principals identify specific groups of students for remediation and to provide a positive base for identifying areas of strength and improvement in educator practice. Summative data have also been used for capacity-building; one district in particular has successfully employed summative data to shift their analysis paradigm from a prevention focus to one of capacity-building. The success related to such a paradigm shift is common in other studies of capacity building (e.g., Brown, D'Emidio-Caston, & Benard, 2001) and particularly underscores the importance of a positive focus in using student data for school improvement.

Student data profiles are very popular with teachers because of the breadth of information provided (Wayman & Stringfield, 2006). These profiles lend themselves well to teaming because they provide an overall picture of the student's situation to educators from varied areas. When such profiles have been made available electronically, student data profiles have been used consistently in our districts. Still, lack of availability has rendered these profiles less popular in our districts than they potentially

could be. Electronic versions of student profiles are sometimes difficult to produce, particularly with a homegrown student data system. Many commercial data systems offer student data profiles, and this feature is one where commercial vendors are placing increased emphasis and development (Wayman, 2005b).

Leadership Highlight. In building collaborative data teams, keeping the focus on student data serves a hardly surprising, but important, role: It gives team members something to talk about. Leaders should take care to ensure the work and conversations of the team are focused on data to provide a common, nonthreatening topic around which to establish collegiality and teamwork.

Focusing on data creates equality among a team because everyone works from a common starting point. By focusing on data, questions begin around topics such as "what do the data say," rather than, "who do we need to change." Once data are examined and the team moves to setting goals and directions, continued focus on data keeps improvement discussions centered around the numbers rather than centered around the successes or failures of specific people. These points are important toward keeping data examination a positive, nonthreatening experience for the educator. Educators are rightly suspicious of data initiatives, because data have been used to punish educators for so long. Focusing on data toward educational improvement enables practitioners to collaboratively and powerfully explore ways to improve their craft: this focus enables them to *use* data, rather than *be used* by data.

In focusing on data, it is important to remember that one source of information is educator judgment. Focusing on data does not replace educator judgment, but enhances it, because educator judgment is a data point, as may be assessment scores or student histories. All such data points are synthesized in decisions for improvement. In previous work (Wayman & Stringfield, 2006), we have termed this "nonthreatening triangulation" of data, highlighting the example of one principal who demands that all decisions be informed by at least three pieces of data—one of which must be educator judgment.

One final note on data focus: Many researchers correctly note the importance of real-time, ongoing assessment data. But for a faculty or team that is just beginning a data initiative, it is possible that members have never seen any available data on students. Consequently, "historical" data such as student profiles, student test histories, and the like often lend surprising amounts of information and may be an excellent place to start. Data use is a knowledge-building enterprise, so leaders should help their faculties build a good knowledge base about students before working up.

Engagement

In promoting effective teaming around data use, it is important to note that many teachers are understandably mistrustful of data initiatives. Ingram et al. (2004) found that some of this mistrust can be solved by involving teachers in the construction and implementation of a data initiative. Schmoker (2004) noted that instead of merely following directions, effective teachers must see themselves active members of research teams, an assertion backed up by data from Huffman and Kalnin (2003), who highlighted teachers taking ownership of the inquiry process.

It is our position that data initiatives built entirely around mandates are hard to sustain and are unlikely to yield widespread change in instructional practice. In building effective collaborative data teams, it is not only important to engage educators at all levels but to take care that compliance is not the focus of collaborative inquiry. Too much structure and mandate hinders deep, reflective thought, because team members are more engaged in following rules than in reflection and inquiry around this data.

We observed negative instances of this point in two of our districts. In both situations, a rigorous curriculum was implemented that initially helped improve achievement. However, the districts did not build on this success by encouraging input from all levels, and inquiry within this curriculum eventually deteriorated into a compliance system. Educators in these districts blamed subsequent achievement setbacks on the system rather than engaging in practical inquiry to explore further. We believe district educators may have pursued these questions had they felt ownership in the inquiry. Leadership can solve these problems by providing structure, but allowing inquiry and reflection to develop relevant to the particular context. This is a delicate balance, but achievable (Copland, 2003).

Striking a balance between the healthy, supportive pressure infused by mandates and the rich, contextual growth fomented by free inquiry is difficult. Administrators in one of our districts have addressed this problem after recognizing the inhibitions caused by a too-rigorous curriculum. The superintendent in this district has become very proactive in releasing some freedom back to the school level and creating two-directional communication and cooperation across levels of the school hierarchy. In such an environment, collaborative data teams can be a powerful player because they can serve to focus the opinions of educators from a wide range of backgrounds and provide a forum for educator engagement.

Our observations of other aspects of school reform within these districts provide further supportive evidence of the importance of faculty engagement in the health of collaborative data teams. We have observed many forms of engagement in systems planning in these districts, involving formation of accountability systems, selection of computer data systems, and the selection of program materials and assessment instruments. Districts who involved principals and teachers in these processes were generally able to make more rapid and effective use of data for school improvement.

Leadership Highlight.   Creating and fostering ongoing engagement and input from faculties can be tricky because context determines much of how engagement and collaboration operate. Besides serving as a *support* for collaborative data teams, faculty engagement can also be *accomplished* through collaborative data teams. Especially in the early stages of team development, leaders should look to create frequent opportunities for teams and individuals to weigh in on issues such as the functions of data teams, the way data are used to support instruction, and district alignment of data and curriculum. Leaders may structure these opportunities into the work of the team by creating time for building leaders to interact with the teams. Also, it may be important to create formal meetings between building teams and district personnel responsible for decision making about learning matters. Finally, in promoting engagement, leaders should remain aware of implicit power relationships and personal relationships that may hinder communication or present opportunities for growth.

Technology

Limited access to data is often a barrier to widespread school data use (Thorn, 2002; Wayman et al., 2004). Historically, there has been no shortage of school data, but these data have typically been stored in ways that were inaccessible to most educators. This situation is changing with the recent advent of user-friendly computer systems that offer efficient access to student data (Wayman et al., 2004).

Because of this powerful and flexible access, technology is often seen as a panacea for school data use. On the contrary, these systems must be implemented with proper leadership and support if they are to have the envisioned impact on educational practice—although such technology is a *necessary* condition for a scalable data initiative, it is not *sufficient* (Stringfield, Wayman, & Yakimowski, 2005). Educator teaming has been forwarded as an excellent method to help educators get the most out of these powerful tools (Wayman 2005a).

Wayman and Stringfield (2006) described districts that were proactive in involving entire faculties in the use of computer systems to explore student data. One particular school in their study noted the advancements their teams were able to make because district technology personnel were very responsive to team requests for support and training. In asserting the utility of student data to form a nonthreatening base from which to begin professional conversations, Wayman (2005a) noted that efficient student data systems help provide this data in the rapid fashion needed to build on early team successes. Although technology is a good support for data teams, it is also true that collaboration is a good support to help educators learn and grow in their use of these powerful tools. For instance, Zhao and Frank (2003) argued that positive teacher interaction is crucial to the survival of any new technology, demonstrating their teacher interaction construct to be a prominent factor in teacher use of technology.

The necessity of proper technical support for data use and data teams is well illustrated through a counterexample from Huffman and Kalnin's (2003) data. Educators in these data teams reported some difficulty and slowness in executing analysis plans because they had to first collect data, then construct analysis and presentation methods in packages such as Excel. If these teams had access to efficient technology, there would have been plenty of data already collected, organized, and at their disposal. Additionally, the system would have offered a variety of ways to explore, analyze, and represent their data. These teams described momentum and eagerness for more exploration that was built through their process; this momentum would have been far greater and the push for more knowledge much more fruitful with efficient supportive data technology.

In our districts, we saw contrasting examples of implementation and subsequent support of student data systems, with contrasting results. On the positive side, one district provided regular training sessions for principals, offering opportunities to work with data from their schools in these sessions. The district provided an established senior leader to act as a coach and advisor to help principals build skills and leadership capacity around data use with the system. This district also promoted the system at every opportunity, touting the power and potential held by this technology. In contrast, another district had implemented a similar system, but was not as proactive in supporting the technology. Use of the system was not championed, nor were plentiful

opportunities provided. Consequently, the capacity of the first district to engage in data use was considerably higher than that of the second district and we anticipate a corresponding difference in the capacities of data teams in these districts.

Leadership Highlight. Technology is among the most important supports for collaborative data teams. In the absence of proper technological support, even the best-trained team will continually encounter ceilings and hindrances, dampening the rich potential these teams hold for impacting teaching and learning. Still, today's technology world is a double-edged sword for school leaders: Although technology offers unlimited potential and unprecedented efficiency, the amount of technical options available can be daunting for most school leaders. Fortunately, there are resources to help; we highlight two such resources:

In a technical report on student data software for school improvement, Wayman et al. (2004) reviewed issues regarding software for data use, including discussion about choosing appropriate software and what good software might look like, and they also provided reviews of software packages that offered user-friendly access to existing student data. The authors also suggested that most districts would be better off buying systems than building them—they asserted this was no knock on local technical staff, but reflects the experience vendors bring to the problem and associated efficiency that can result in a greatly reduced time to implementation.

In acquiring student data technology, school leaders sometimes find themselves armed with little experience in negotiating business, technical, and legal details that will ensure the system is of the greatest use to their district. Help is available for schools through Contract Commons Project of the New York Law School. In partnership with The Stupski Foundation, the first area of focus of the project will be to produce a set of tools to help school leaders in technology procurement. These tools will be publicly available and will include technology contracts and contract language, a clearinghouse of vendor information, an expert contract drafting "wizard" to walk procurement officials through the business and legal issues necessary to consider when negotiating for technology, and a community forum to encourage debate, discussion, and collaboration among procurement officials and vendors. More can be found on the Contract Commons Project at http://www.contractcommons.org.

IMPLICATIONS

The use of student data to inform school improvement is increasing in popularity and importance, but is unfamiliar territory to most educators. The formation of collaborative data teams offers a positive environment for faculties to learn together and build an initiative they can call their own. Principals and other school administrators serve an essential role in leading, guiding, and organizing the work of collaborative data teams.

In this chapter, we have discussed four contexts that are important for school leaders in the establishment of collaborative data teams: (a) "calibration," (b) focus on student data, (c) engagement of educators, and (d) technology to support data use. Four districts partnering in school reform with the Stupski Foundation served as a backdrop for this discussion, lending practical illustrations for the dis-

cussion. The discussion set forth in this chapter has highlighted the potential that lies in collaboration around student data for school improvement, but has also highlighted the fact that educator collaboration and student data investigation are difficult endeavors to perform efficiently.

We have posited that the work of these teams will be most fruitful if the teams are led in forging a common understanding of teaching, learning, and measurement of learning. Calling this process "calibration," we have suggested that engaging in up-front conversations about what student learning is, how it will be achieved, and how it will be measured serve to build consensus and key foundations for teamwork. Data use and collaboration sometimes conflict with established school culture, so we have suggested that efficient teams will realize success by always keeping student data at the focus of discussions. This focus provides a nonthreatening atmosphere to engage in ongoing calibration and other activities involved in practical inquiry. Creating data initiatives can be tricky because of long-standing mistrust of the purposes of student data, so school leaders are well-served to ensure that faculties are engaged in the creation and maintenance of the data initiative and collaborative teams. Giving teachers and other educators a voice in this process helps build support and offers valuable feedback and professional insight that inform a healthy initiative. Finally, no data initiative is efficient, sustainable, or scalable without proper technology. Today's systems offer previously unimagined support for the collaborative work described here, but they in turn must be supported with proper educational training. These findings carry implications for policy and practice.

First, it is important to note the importance of ensuring that data use is grounded in inquiry. Accountability policies such as No Child Left Behind are largely responsible for the increased attention currently given to student data, but the architecture of these policies deal with reporting, thus giving school systems freedom in developing how they will use these data for school improvement. We believe that student data will be most useful when the data are used as tools to support inquiry into educator practice and student learning—learner-centered inquiry. The task thus falls to leadership to discern the best methods to enable this learning, and we believe one way leaders can realize success is to establish efficient collaborative data teams.

Such methods are not easily accessed. We have provided information that will be helpful to leaders looking to establish such teams, but the knowledge base on which leaders may draw is still unfortunately sparse. Thus, a second implication of this work is that it highlights the importance of rapidly establishing a sound research base specific to collaborative data teams, one that informs inform theory, policy, and practice. This void exists despite a fairly large amount of literature on collaboration and increasing attention to data use. That neither practice is independently in widespread use, much less combined into widespread use of collaborative data teams, underscores the need for expanding this body of research.

Third, we have cited evidence that suggests that collaborative data teams and technology may be mutually supportive means for inquiry. However, it is still unknown exactly how powerful these computer tools may be in this endeavor. More importantly, there is a strong need for an information base that provides leaders a variety of sound practices in using technology to support collaborative data teams and vice versa.

These and other implications lead to some important questions for consideration:

1. What scalable practices can be established for collaborative data teaming that are applicable in any educational context? What practices must vary according to context?
2. How may "calibration" prove most effective in establishing such teams? What varied forms of calibration activities may prove most useful?
3. What role may school culture play in determining effective teaming practices? How may existing school culture be both overcome and leveraged in fostering collaborative data teams?
4. What types and methods of principal involvement will prove effective in establishing efficient collaborative data teams? What practices and structures must leaders establish to support principals and engage teachers in collaboratively learning about their craft and increasing student achievement?
5. What role may computer technologies play in enhancing the work of collaborative data teams (and vice versa)? What features and capacities will prove most useful in this endeavor?

Through these and other forms of questioning and research, we hope to witness and contribute to the development of a knowledge base that results in a variety of effective practices in collaborative use of data for educational improvement. Ultimately, we hope that these practices are useful in furthering knowledge about educational improvement and student learning.

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