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Preparing Educators to Effectively Use Student Data Systems

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Introduction

The use of educational data to make decisions and foster improvement is increasing dramatically. Federal and state accountability mandates have created a strong market for formal achievement testing, both in terms of state achievement tests and benchmarking assessments that help predict performance on these tests. Many schools and districts are looking beyond accountability to find ways of using these and other student data to assess learning and improve educational practice.

As a result, a growing research base has provided knowledge about the effective use of student learning data for educational improvement. Data use has been shown to increase the conversations that educators have with each other, with students, and with parents about education (Brunner et al., 2005; Halverson, Grigg, Prichett, & Thomas, 2005; Massell, 2001; Wayman & Stringfield, 2006). Collaboration, long a difficult task for educators, has been shown to work well when centered around data use (Chen, Heritage, & Lee, 2005; Wayman, Midgley, & Stringfield, 2006; Wayman & Stringfield, 2006; Young, 2006). Teachers report data uses that improve practice, such as adjusting instruction, grouping students, and better understanding learning needs (Brunner et al., 2005; Chen et al., 2005; Datnow, Park, & Wohlstetter, 2007; Lachat & Smith, 2005; Wayman & Stringfield, 2006; Young, 2006).

While much research touts the benefits of data use, such use has historically been a difficult undertaking. Educational data were often stored in ways that rendered them inaccessible to most educators, so using educational data usually involved an unrealistic amount of time and effort (Stringfield, Reynolds, & Schaffer, 2001). This situation has eased recently, with the advent of user-friendly computer systems that deliver data to educators in rapid fashion (Wayman, 2007; Wayman, Stringfield, & Yakimowski, 2004). Wayman (2007) suggested that it is impossible for a school or district to realize full efficiency from a data initiative without the support of such technology.

Data systems are a necessary component of effective data use but they are not sufficient—there are many considerations in preparing educators to use such a system. In this chapter, we provide a discussion of important issues facing districts that are implementing data systems and preparing educators to use them.

Tenets of an Effective Data Initiative

Effective educational data use is about integration. District-wide, data users at every level must be using data toward a common purpose; therefore, an effective data initiative should be considered a systemic initiative. To this end, an effective initiative must be directly related to teaching and learning. This precept is the lens through which every data activity must be seen (Wayman, Cho, & Johnston, 2007).

Guided by this principle, it is important that data use be aligned throughout the district and that a systemic vision or outline for data use exists (Datnow et al., 2007; Halverson et al., 2005; Wayman et al., 2007). Wayman et al. (2007) outlined a data initiative that was cast in terms of a "data informed district," where data are used to support education at every level. In a data informed district, clear understandings exist regarding how education will be conducted, what is meant by learning, and how data will be used to understand and support these. Individuals and entities throughout the district understand the different ways they connect and align to this vision, how their work affects and supports the district and each other, and how various forms of data support their work. Educators at every level are engaged in data use to improve their practice, including district administrators, central office workers, counselors, principals, teachers, and many more.

Building-level educators are particularly critical to the health of a data initiative. Data use lives and dies in the principal's office, and nearly every piece of research on school data use has discussed the role of the principal in some form (e.g., Chen et al., 2005; Datnow et al., 2007; Lachat & Smith, 2005; Wayman, 2005; Wayman & Stringfield, 2006; Wayman et al., 2007; Young, 2006). These studies have shown principals serving as instructional leaders, as administrators who provide time and structure for faculty data use, and as effective data users themselves. Unfortunately, research also suggests that this picture of principals may be optimistic because principals are often unprepared to use data, lead faculty in using data, or sometimes lack support from their districts (Wayman et al., 2007).

At the building level, teachers are also an important set of data users. While research has suggested that teachers may be initially resistant to data use (Ingram, Louis, & Schroeder, 2004), they will engage in data use when properly supported and when they recognize value in the data (Chen et al., 2005; Lachat & Smith, 2005; Wayman & Stringfield, 2006; Young, 2006). In discussing the importance of involving teachers, Wayman (2005) suggested that one of the most important supports is the presence of user-friendly data systems that provide rapid, efficient access to student data.

A Brief Overview of Computer Data Systems

An increasing number of computer systems are being marketed for the purpose of delivering student data to educators (Mieles & Foley, 2005; Wayman, 2007; Wayman et al., 2004). While, these systems provide many different functions, no data system performs every function a district may want. Instead, data systems typically perform specific functions and districts join various individual systems to form one overall system. Increasingly, commercial vendors are looking to provide solutions that

combine features from varied areas, but district personnel are still well served to understand the various functions and limitations of each type of system.

Wayman (2005) described three common types of data systems that deliver student data to educators:

(a) student information systems (SIS) that provide real-time accounting of daily school function (e.g., attendance, schedules);

(b) assessment systems that rapidly organize and analyze frequent benchmark assessments; and

(c) data warehousing systems that provide access to historical data of all types and link disparate databases.

Wayman (2007) additionally described "instructional management systems" as a different type of system that offers connections between student data and supports such as curriculum resources, learning standards, intra-staff communication, and home–school linkages.

Empirical research has demonstrated the value that educators are finding in such systems. For example, hands-on work with data systems can help educators see benefits of data use that they may not grasp in the abstract (Chen et al., 2005). By offering access to a breadth of student data, these systems help educators see data uses beyond simply examining state achievement test data (Chen et al., 2005; Lachat & Smith, 2005; Wayman & Stringfield, 2006). Data systems can also bring issues of at-risk students closer to educators because of the individual student detail offered by these systems (Chen et al., 2005; Lachat & Smith, 2005; Wayman, Conoly, Gasko, & Stringfield, in press; Wayman & Stringfield, 2006). Further, data systems offer unprecedented scope and detail regarding student learning histories; research has shown the utility of student learning histories for teachers (Brunner et al., 2005; Chen et al., 2005; Lachat & Smith, 2005; Wayman & Stringfield, 2006), even in the presence of more recent data sources (Wayman & Stringfield, 2006).

Two other benefits of data systems seem evident, although they are not yet empirically supported. First, data and evidence are often used for political purposes (Coburn, Honig, & Stein, in press) and this often fosters mistrust of data among teachers (Ingram et al., 2004). Data systems should help improve this situation by allowing all district educators to independently use a breadth of data to inform their own decisions. Second, while calls are being made for the use of multiple measures in assessing student learning (Herman & Gribbons, 2001; Wassermann, 2001; Wayman & Stringfield, 2006), others have worried that an overabundance of student data would make it impossible for educators to realize maximum benefit (Massell, 2001). Data systems offer a solution to these concerns by managing multiple measures in a usable fashion.

Preparing Educators to Use Data Systems

Data systems are a necessary component of effective data use but they are not sufficient. Although data systems are powerful, indispensable tools for using data,

they are like any tool: without proper training, knowledge, and support, they serve a less effective function. Therefore, it is important that individuals planning for data system use endeavor to prepare, teach, and support users at every turn. This is true not just initially, but ongoing—as with the data systems themselves, users will evolve in their capacities and abilities. More globally, the data system should be a critical component of a focus on making a district-wide data initiative useful and sustainable.

There are many considerations in preparing educators to use such a system, and we will use this chapter to discuss many of these issues. In doing so, we offer sections on necessary groundwork for system use, aims of system use, professional development, collaboration, and institutional structures that support system use. We will finish with a brief discussion of issues to consider beyond preparation and initial use.

Groundwork for System Use

Before using the data system, there are a few foundational prerequisites that districts and schools must consider. In this section, we discuss preparations from three areas: (1) "calibration" conversations that establish an aligned vision for data use, (2) system preparation, and (3) system rollout.

Calibration

Prior to selecting and implementing a student data system, it is critical for educators throughout the district to have conversations that establish an aligned, common vision for education and how data use will support this vision. Termed *calibration* (Wayman et al., 2007; Wayman et al., 2006), this process engages educators in important dialogue about the educational process, using questions such as: What do we mean by teaching and learning? How will teaching be conducted under these definitions? How will we assess student learning so we know it when we see it? How will we react to the results? A more detailed description of calibration and recommendations for establishing a formal calibration process can be found in Wayman et al. (2007).

Components of calibration conversations that involve data use will be much richer if they are preceded by a detailed district evaluation of data use—without such an evaluation, it is difficult to decide how student learning should be assessed and to articulate processes for adjusting practice. Consequently, we strongly recommend that any district looking to implement a data initiative and system should first conduct a thorough, district-wide evaluation of available data, data practices, and support capacities. Wayman et al. (2007) provide findings and recommendations resulting from one such evaluation.

System Preparation

The process of selecting and preparing a system for use is a complicated one. Districts that place high importance on this process are usually rewarded with smoother implementation and more effective use.

Correctly choosing the type of system that fits the district context is an important process. Research has described many issues that should be considered in choosing a system, such as the types of modules or functions to be included, whether to build or buy a system, data storage and cleaning, and many more (Mieles & Foley, 2005; Wayman, 2007; Wayman et al., 2004). The calibration process provides a helpful base from which to choose a system because a calibration-based district has clearly identified data uses and goals and is thus able to tailor a system to district needs. Unfortunately, our anecdotal observation is to the contrary: most districts choose a system, then base their data uses on system capacities.

Data preparation and identification is an important task. District, school, and classroom data are typically stored using a variety of systems and methods, so it is important that district personnel conduct a thorough audit to identify every type of data used in the district and take measures to eliminate overlap and redundancy. Once a data system is acquired, data must be loaded and cleaned (examined for accuracy and quality). District personnel should budget plenty of time and resources for data cleaning; a considerable amount of work is required to prepare data and educators may be surprised by how incomplete and inaccurate their data actually are (Chen et al., 2005; Lachat & Smith, 2005; Wayman et al., 2004).

System Rollout

We believe the initial implementation of a data system is critical to the long-term success of the data initiative because users who are immediately able to make practical use of the system are more likely to advance in their later use of the system. Consequently, we do not recommend that all functions of the system be rolled out at the same time. Rather, we advocate that the system is introduced in small, immediately useful pieces, offering the easiest and most useful functions first. Besides easing users into the often unfamiliar process of using a data system, this approach reduces the time from acquisition to initial rollout because it does not demand the entire system be immediately functional. Wayman and Conoly (2006) and Wayman et al. (2004) have provided more detailed discussion of rollout issues.

Prior to rolling out the system, it is advantageous to prepare users for system use so they encounter as shallow a learning curve as possible. Besides training on the system itself, this preparation should also help users understand effective use of the data elements included in the initial rollout. An example of this process was given in Wayman et al. (2007); their district-wide evaluation of data use identified two sets of formal assessments that were most popularly used. The resulting recommendations suggested the district not just focus initial system implementation on these two assessments, but prior to rollout, provide thorough professional development on the proper use of these assessments. Such a strategy should enable district educators to

efficiently access the data systems and apply the results to their everyday practice right from the start.

Aims of System Use

District personnel should clearly articulate how the system should be used to best fit district needs. Clearly, all system use should be connected to student learning and educational improvement, and it is important that this vision is clearly described relevant to the various roles represented in the district. Consequently, the details and shape of this vision are very context-dependent and should be refined during the calibration and system identification process. Although details will be determined by the local context, two important generalities will apply to all contexts: (1) system use will be more efficient if uses focus on small-scale, workable problems, and (2) system use should fit directly with educator work.

Identify Workable Problems

Educators at different district levels will have different uses for the data system. For example, teachers will use the system differently than principals, who will use the system differently than central office administrators, and so on. From the boardroom to the classroom, we recommend focusing on problems that are small in scope, short in term, and immediately useful and relevant to the educator. These recommendations are not unlike those that researchers advocate in effecting more general organizational change (e.g., Fullan, 1999).

Results from the calibration process will help identify workable problems at every level; in addition, research has highlighted a number of different kinds of workable problems that could be applicable to many district contexts. For instance, teachers and principals often review prior year test scores and other historic information on their incoming students at the beginning of a school year (Brunner et al., 2005; Chen et al., 2005; Lachat & Smith, 2005; Wayman & Stringfield, 2006). In an effort to rapidly inform practice, teachers may also use a data system to process frequent, formative assessments (Chen et al., 2005; Wayman & Stringfield, 2006). Administrators at both the school and district level may use a data system to determine instructional program priorities (Brunner et al., 2005; Wayman & Stringfield, 2006), but it is important to keep these decisions aligned with the priorities articulated in the calibration process.

Fit System Use to Educator Work

Educators are often skeptical of data use and data systems because such initiatives often add to their already full workdays (Ingram et al., 2004; Valli & Buese, 2007; Wayman et al., 2004). Consequently, we believe that system use will become widespread if the uses fit directly into the fabric of educator work. More specifically, we

recommend that system uses should be initially focused on components that either reduce work or improve efficiency.

Research provides some examples of such use. Collaboration is often forwarded as sound educational practice, but has typically entailed an undue amount of work (Wayman et al., 2006). Wayman and Stringfield (2006) described one school that used its data system to post and share instructional strategies for individual students as a result of data examination; prior to system implementation, educators had found this collaborative task to be difficult. Lachat and Smith (2005) found that collaborative teacher inquiry with a data system was more effective when school leaders modeled inquiry. Chen et al. (2005) reported educators using a data system to efficiently examine state test results.

Data systems can help make administrative work more efficient while improving individual student outcomes. Wayman et al. (in press) outlined how district administrators used a data system to examine weekly the progress of each student in special education. The same study highlighted how a principal, concerned that test scores for one particular ethnic group would result in a lower school rating, used the data system to track and provide special help to each individual student in that group for an entire year. In both cases, administrators in the Wayman et al. (in press) study agreed that the work required to address these problems would have been unmanageable without a data system.

Wayman et al. (2007) provided an example where system use was less widespread because of poor system integration with educational work. In their study, a teacher described the incredible amount of work placed upon him by a new data system. Because of poor system alignment, this teacher was maintaining parallel grading processes: he kept his gradebook as he had done for many years, but was also maintaining the system-specific gradebook required by the district. Teachers in this school reported that they used the system as little as possible because it represented extra work.

Professional Development

In this section, we describe some approaches to professional development that can help educators become proficient in using data systems in everyday practice. The data use research base contains little rigorous study of which professional development practices are best suited for various types of data use. However, we are able to provide guidelines that will help districts in implementing a data initiative and system.

Ultimately, professional development, like data systems themselves, should improve and shorten an educator's day (Wayman et al., 2007; Wayman & Stringfield, 2006). Professional development for data use should encompass all educators and be fundamentally tied to educational practice (Massell, 2001). District personnel should also endeavor to provide professional development that is immediately, specifically, and practically relevant to each educator, regardless of his or her district role. In the following sections, we use these guidelines to discuss professional development for introducing a data system and ongoing professional development.

Introducing the System

Professional development should be offered *prior to* data system implementation. Such pre-emptive professional development helps build awareness throughout the district for the initiative's goals, direction, and expectations (Wayman et al., 2007). It can also provide a foundation for data literacy and clear understandings regarding the purposes, distinctions between, and uses of assessments (Knapp, Swinnerton, Copland, & Monpas-Huber, 2006; Perie, Marion, & Gong, 2007; Supovitz & Klein, 2003).

The possible focuses of pre-emptive professional development are numerous and will depend on the local context. Generally, district personnel should look to make these trainings specific and relevant, concentrating on components that provide the most value and immediate impact when the system is introduced (Wayman et al., 2007). The calibration process will help define which topics best suit each context; hopefully, this process will have been thorough enough to identify the initial aims of data and system use.

As the system is introduced, it is critical that ample professional development be provided regarding the system itself—the data system should be central to the data initiative and user incompetence would be crippling to the initiative (Wayman et al., 2004, 2007). Most commercial vendors offer some training as part of their agreement, but districts should plan to provide deeper and ongoing training on the use of the system. Wayman and Conoly (2006) provided one example of system training, describing a district's train-the-trainer approach that resulted in preparation for each district educator.

Ongoing Professional Development

A comprehensive professional development plan should support elements from the entire cycle of educator decision making, from access, to interpretation, to taking action and using feedback. This lens, coupled with knowledge that the backgrounds and needs of district educators are as varied as the educators themselves, suggests that preparation offerings should be widely varied and offered at regular, frequent intervals. Educators should be provided whatever they need to continue to develop proficiency as data and data system users.

District personnel have many options in crafting how professional development is offered and organized, and we recommend that an appropriate variety be integrated into the plan. For instance, training can be offered at the district level, with one example being uniform, district-wide training in data system use (Wayman & Conoly, 2006). Development may also be offered at the building level, such as a faculty-wide session offered by a principal, district personnel, or outside experts (Darilek, & Barney, Kerr, Marsh, Ikemoto, 2006; Wayman & Stringfield, 2006). Specific training may be offered for groups of educators with similar needs, such as central office groups or grade-level teacher teams; such training is often effective when coupled with collaboration initiatives (Lachat & Smith, 2005; Wayman et al., 2006). Although one-on-one arrangements or data coaching can be challenging to

implement successfully, some districts may choose to implement this strategy (Symonds, 2003; Wayman et al., 2007). Third-party help has also been used, with varying results (Kerr et al., 2006; Supovitz & Klein, 2003).

Space limitations preclude us from detailed discussion of the various topics that may be addressed in professional development sessions, but district personnel should generally ensure that professional development be relevant to educators' roles. For instance, professional development topics for teachers might focus on accessing data, making meaning of data, and using them to adjust classroom practice (Wayman et al., 2007; Young, 2006). Principals and other instructional leaders will not only need to know how to use data themselves, but how to prepare others and implement effective leadership structures that promote system use (Datnow et al., 2007; Wayman et al., 2007; Wayman & Stringfield, 2006; Young, 2006). In addition, as practices advance, educators may find that they are faced with unexpected or conflicting data (Coburn et al., in press; Knapp et al., 2006; Massell, 2001; Supovitz & Klein, 2003); this presents the opportunity to teach educators how to manage, or even embrace, the tension between these data as grounds for fruitful investigation.

Finally, we note the importance of tailoring ongoing professional development to the data system. Some aspects of training may depend on a data system's manner of presentation, flexibility, strengths, and content. Knapp et al. (2006) noted that data system capacities and offerings usually affect what educators come to define as problems, or select as areas of focus. This underlines the importance of choosing a system that is tailored to specific district needs and adaptable to new developments in how educators think about and use student data. Tailoring professional development in this way should result in a better integrated data system, data initiative, and improved professional development.

Collaboration

Although researchers often tout the benefits of collaboration, propagating collaboration among faculty in schools can sometimes prove to be a difficult and challenging task. Collaborating around data can help remedy this situation, bringing focus, a sense of purpose and a common language to collaborative efforts (Wayman et al., 2006). Further, the data–collaboration relationship is reciprocal: data initiatives are more likely to be successful if educators are allowed to work collaboratively, and data use itself can foster that collaboration (Chen et al., 2005; Lachat & Smith, 2005; Wayman, 2005; Wayman et al., 2006; Wayman & Stringfield, 2006).

Data systems can be great facilitators of collaboration, providing data in an accurate, timely, and user-friendly way (Wayman et al., 2004). In this way, data systems can reduce the frequent roadblocks shown to slow collaboration around data, thus allowing educators to work together in developing initiatives and resolving clearly articulated problems (Chen et al., 2005; Lachat & Smith, 2005; Wayman, 2005; Wayman et al., 2006; Young, 2006). In many ways, an investment in a quality data system is an investment in a school's overall capacity to combine efforts toward school improvement.

In this section, we discuss how to leverage collaboration and the use of student

data systems. We first describe the centering of collaboration around a student data system, then offer some examples of collaborative arrangements and how they may be used to support data use.

Center Collaboration on the Data System

Since data provide a foundation for sustaining collaboration, it is useful to establish collaboration around the use of a student data system. Addressing collaboration in this manner provides a scaffold for educator learning—educators are not only learning how to use a data system, they are learning new ways of thinking about their craft and developing new professional relationships.

As with the data system and data initiative, we recommend implementing collaboration around the system in small, organic doses (Wayman et al., 2006, 2007). Doing so allows the nature of collaboration to build around the culture of data use relative to the specific context. Further, since data systems offer more clear and timely points for discussion than may have been previously available, the systems become part of a larger overall process of change and reform.

Varied Forms of Collaboration

Collaboration among school members can come in many forms; we supply a few examples for ways in which their work together may be centered on a data system and data use. Accordingly, these examples are a springboard for thinking about how existing and emerging collaborative relationships may be developed, strengthened, or formalized.

Teachers are likely to find it meaningful to work together by grade, by subject, or by other groupings. Halverson et al. (2005) discussed "data retreats" and methods for offering time to reflect upon data as a group. Supovitz and Klein (2003) described the benefits and challenges faculties can face as they use data to set long-term and intermediary goals. Symonds (2003) described how teachers can work together in attending to unique student needs, especially those of low-performing students. Structured meetings also afforded teachers the opportunity to share instructional strategies, develop long-term school-wide plans, and address issues of race and equity. Many of these issues have been ignored without the support of data systems (Lachat & Smith, 2005; Wayman et al., in press).

School administrators' roles can vary greatly, serving to underline the importance of their collaboration with teachers, other administrators, and central office personnel. Administrators are in a unique position to shape how and the extent to which teachers use data collaboratively (Young, 2006), and teachers respond positively when administrators personally make an effort to collaborate with teachers regarding data use (Supovitz & Klein, 2003; Wayman & Stringfield, 2006). Further, administrators can work with others to make informed decisions regarding curriculum and assessment, student services, budgeting, personnel, and community outreach (Halverson et al., 2005). Data systems can help facilitate these relationships; a counterexample

was shown by Wayman et al. (2007), who described the isolation that occurred at various administrative levels eager to collaborate about data, but unable to leverage the technology to do it.

District administrators may find it useful, if sometimes challenging, to collaborate between departments or by connecting to individuals at the building level. Coburn et al. (in press) described the organizational and political challenges central offices face in using data collaboratively. Wayman et al. (2007) found the absence of a quality data system can also suppress the capacity of central office to operate in a well-integrated manner. Such fragmentation can shape central office members' patterns of interaction, further influencing how and with whom they share understandings, and in turn influence how data are used (Coburn et al., in press). In contrast, Wayman et al. (2006) described how a data system made possible central office collaboration about special education issues and Wayman et al. (2007) described how a data system would support extant—but difficult—collaborations between central office departments and other district areas.

Institutional Structures

While the issues discussed to this point are critical for successful use of a data system, none will efficiently support system use unless the district implements various structures to ensure that system use goes smoothly. In this section we will discuss four structures that will enhance the use of data and a data system: (1) system access, (2) time to engage in data use, (3) principal leadership, and (4) "go-to" individuals to support others.

System Access

One important function of data systems is to provide easy access to data (Chen et al., 2005; Wayman, 2007; Wayman et al., 2004). Full access has been shown to enhance and broaden teacher data use (Chen et al., 2005; Wayman & Stringfield, 2006) and lack of technological access has been cited as a hindrance to effective data use (Halverson et al., 2005; Supovitz & Klein, 2003).

Even in the presence of fully efficient data systems, some educators do not access data directly, but instead rely on other individuals (Lachat & Smith, 2005). Further, some leaders are wary of providing access to data for all educators (Young, 2006). We believe these situations can stifle effective use of a data system. We argue that data systems are most effective when each educator has full access to their permitted data, and we advocate that structures be built to ensure such access.

With full system access, users (e.g., teachers, support staff, principals, central office administrators) are given personal login information that allows them 24-hour access to data and system functions they are legally allowed to access. Merely structuring opportunity for access, however, is not enough to ensure full access. Structures must also be put in place that encourage and permit users to take advantage of this access. These structures are discussed in the following sections.

Time

Allowing educators time to examine data is cited throughout the literature as a critical support for effective data use and to efficiently use data systems (e.g., Ingram et al., 2004; Lachat & Smith, 2005; Wayman, 2005; Wayman & Stringfield, 2006). Young (2006), Massell (2001), and others have observed schools providing large portions of time in periodic intervals, and while the educators in these schools found this time to be an effective support, other researchers (Chen et al., 2005; Wayman & Stringfield, 2006) have described the utility of time set aside at more frequent intervals. It is our position that educators must use the data system on a daily basis in order to fully integrate it into the fabric of their workdays.

Consequently, we suggest that school and district leaders should endeavor to set aside multiple opportunities per week for the examination of educational data. This may involve daily set-aside time such as planning periods; less formal time per week may be structured if educators are properly encouraged and supported to use data daily on their own. Structuring time to use data and data systems, rather than specifying use as an extra mandate, sends a clear message that data use is valued, expected, and supported.

Many examples are available in research to describe how schools or districts have structured time for using data. These include the use of common planning time (Massell, 2001; Wayman et al., 2006), specifically dedicating time for collaboration (Lachat & Smith, 2005; Wayman & Stringfield, 2006), and creating teacher groupings such as subject- or grade-level teams (Chen et al., 2005; Wayman & Stringfield, 2006).

Principal Leadership

The literature is clear that principals play an integral role in the health of any data initiative (Copland, 2003; Lachat & Smith, 2005; Wayman & Stringfield, 2006; Young, 2006); research also describes ineffective data initiatives that are characterized by poor principal leadership (Wayman et al., 2007; Young, 2006). Recognizing the importance of principal leadership, we suggest that district leaders work with principals and other building leaders to establish clear structures describing how principals should lead faculties in using data and data systems, along with supports for carrying this out.

In some cases, these specifications may demand a restructuring of the principal's role or job description. In doing so, district leaders will have to carefully consider the drains of these new responsibilities on principals' time, along with strategies to support principals who are unprepared to use data or to lead faculties in using data. District personnel may additionally find it necessary to shift some responsibilities to other building support staff, as seen in the recommendations offered by Wayman et al. (2007).

Another principal leadership structure shown to be facilitative of data use is shared leadership (Copland, 2003; Lachat & Smith, 2005). In sharing leadership, principals designate and help develop faculty members (e.g., teachers or coaches) to guide other faculty members in effectively using data, through such activities as leading teams or

providing expertise. Certain aspects of shared leadership may be formally structured for faculty leaders, such as creating specific positions, providing stipends, or supplying further training. Copland (2003) describes how other aspects of shared leadership may be intentionally less formal, allowing faculty leaders to develop as the data initiative develops.

Go-to Individuals

Related to the concept of shared leadership is the development of "go-to" individuals who regularly provide advice and support in the effective use of data and data systems. Research suggests these individuals may play numerous formal and informal roles, such as support for data cleaning (Chen et al., 2005), support for system use (Lachat & Smith, 2005; Wayman et al., 2004), and support for data interpretation (Lachat & Smith, 2005; Massell, 2001; Wayman et al., 2007; Young, 2006).

It is likely that these individuals will surface on an informal basis in every school. Additionally, many schools or districts formally establish such a position (Lachat & Smith, 2005; Massell, 2001) or formally shift the responsibilities of existing coach or facilitator positions (Wayman et al., 2007; Young, 2006). If districts choose to formally establish such positions or responsibilities, we believe it is critical that their duties be very clearly outlined and formal provisions be established for building and maintaining the data skills of the individuals filling these roles.

Although the data use literature is generally supportive of a formally structured role for supporting effective data use (e.g., coach, facilitator), we believe the literature is not robust regarding the positive effects of these positions on data use. Wayman et al. (2007) and Young (2006) described coaches present in both weak and strong data-using schools, and most research does not go into adequate detail regarding the tasks, actions, and training of these individuals. Further, the presence of "go-to" individuals has been shown to create bottlenecks that stifle independent data use (Lachat & Smith, 2005; Wayman et al., 2004). Consequently, we caution against heavy reliance on these formal positions. We are optimistic about the shared leadership that "go-to" individuals can provide and we believe that coaches or facilitators can be good support for using data systems. However, we also recognize that recruiting, training, and maintaining these positions may be a very difficult task.

Beyond Preparation

We have described some critical issues about preparing educators to effectively use data systems. Throughout this discussion, there has been an undercurrent that preparation is only the start: in fact, the use of data systems for school improvement is an ongoing, transformative process. Beyond initial preparation, district educators should look for ways to grow the data initiative and data system in ways that improve education in the local context. In this section, we discuss three issues that should be addressed: linking data to instruction, increasing capacity for using data, and expanding the data system.

Linking Data to Instruction

Wayman et al. (2007) described how many teachers in one district were avidly and frequently examining student data, but these same teachers were unable to thoroughly describe how they used these data to adjust their practice. This highlights an unfortunate paradox: increasingly, the literature describes how educator data use and data system use is growing, but this literature devotes far less detail to describing how practice is increasing. We believe this inconsistency suggests that accessing and examining data is one thing, but reflecting and deciding on how this information should inform practice is another, more difficult task.

Beyond preparation for system use, we suggest that educators closely monitor the status of practice in their district and provide support to this end. When data are used to help inform decisions and improve practice, a data system is a cost-effective, efficient investment. Absent the improvement of educational practice, however, a data system is an expensive waste of school resources.

Increasing Data Use Capacity

The implementation and growing of a data initiative never stops. In fact, the only constant will be change. As educators, schools, and districts learn how to best use data in their context, new needs will arise. Consequently, district personnel should have in place a long-range plan to build each user's capacity for effective data use. Many ways for building future capacity have been described above, such as implementing structures and support, fostering collaboration, and offering relevant professional development.

Knowing exactly how to engage these practices to increase capacity can be a difficult task. To ease this process, we recommend planned, ongoing evaluation of district data use. Each school year, evaluation should be conducted about the types of data being used by district educators, frequency of use, unmet needs, and how the system hinders or facilitates these. The calibration process should also be revisited each year, allowing the learning provided by data use to shape district goals and vision. It is also important that district personnel maintain contact with new developments in data use, through examination of research, monitoring other districts, and relationships with experts.

Expanding the Data System

In addition to increasing user capacity, the district must consistently look to increase data system capacity. New technologies and user abilities are being developed daily, so the intelligent expansion of a data system is a critical component to growing a district data initiative.

Such expansion may take the shape of additional modules that are needed to respond to increased user ability. System expansion may also include the implementation of new technology that was not available when the original system was built. If

a district has been diligent in choosing the right system for its needs, the system should allow for these types of expansion.

Conclusion

Data systems provide critical and effective support that help educators examine student data for the purpose of educational improvement. Without the proper technology, though, even the most capable and interested educators will find it difficult to examine data in an efficient, fruitful manner.

The mere presence of these data systems does not ensure effective data use. Besides the obvious financial investment, data systems also require a substantial district investment in terms of vision, support, and structure. In this chapter, we have discussed several issues that are particularly important in preparing educators to use these systems effectively. We view these issues as integrated and inextricable: attending to one but ignoring others will result in less effective implementation. We believe district officials who attend to all of these issues will realize a great return on their investment.

Still, there is much to be learned about the effective application of data systems. While knowledge in this area has increased exponentially in just the last few years, we consider the greatest lesson to be the need for more learning. Consequently, we view the recommendations set forth in this chapter as a starting point. As research becomes fuller, deeper, and more detailed, new research will be conducted that strengthens these recommendations, resulting in a sound set of scalable practices that foster educational improvement.

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