Beyond Test Scores
Leading Indicators for Education

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Introduction

At its best, data should be more than a number. It should tell stories. Measure capacity. Create, in a sense, a living picture in order to see the school and the system in a different way. Present the everyday in a precise and meaningful way.

– A district administrator

The Importance of Leading Indicators in Education

Improving student outcomes and closing achievement gaps, both within a school and across a district, takes time – more time than is often allowed in typical large district and urban environments. Education leaders and community members need a way of examining their schools and school systems that allows them to understand when (and whether) progress is being made *before* the results show up in indicators like student test scores.

Leading indicators – indicators that provide early signals of progress toward academic achievement – enable education leaders, especially at the central office level in a school district, to make more strategic and less reactive decisions about services and supports to improve student learning. These indicators are a way of viewing and using data to inform systemwide decisions about education. This study builds on existing efforts by school districts to use *data-informed decision making* by developing further the concept of "leading indicators."

The study described in this report focused on four districts that are at the forefront of the field in using data to inform decisions and examined how these districts are developing and using leading indicators for education. The study aimed to:

- identify and describe the leading indicators used in four districts considered advanced in their use of data;
- more broadly examine the infrastructure, resources, and supports each district has developed to support its use of data for decision making;
- look beyond student measures (though these are critically important) to other measurable areas, especially the effectiveness of central office practice;
- bring representatives from these four districts together to review initial findings and help develop the work of the Annenberg Institute for School Reform at Brown University in the area of leading indicators and data-informed decision making.

By describing how these four districts – Hamilton County (Chattanooga, Tennessee), Montgomery County (Maryland), Naperville (Illinois), and Philadelphia (Pennsylvania) – have developed and used leading indicators within the context of a strong district "data culture," the Annenberg Institute hopes both to catalogue specific indicators that have been useful to these districts in increasing student achievement and to expand the notion of a leading indicator beyond easily identified testing data to more difficult-to-measure but important measures such as student engagement and central office practice.

Current Gaps in Research on Data-Informed Decision Making in Districts

Most of the research on data-informed decision making has focused on how school-based staff – teachers and principals – can use data in school-improvement processes. In a summary of the literature, published separately (Supovitz 2008), we focused, instead, on data-informed decision making at the district central office level, because

central offices are well positioned to make systemic changes and provide systemwide supports.

The literature summary cited many studies that contain important insights into how data are used by school districts to inform decision making. Such studies provide reinforcing and supporting qualitative case study evidence that data-informed decision making plays an important role in district improvement strategies. This body of evidence is also suggestive of many of the important ways in which data-informed decision making can be used to contribute to district improvement.

However, the literature summary also pointed to several gaps in the literature related to how districts use data to inform decision making.

- Most of the systems were heavily focused on analyzing student-performance data, and less so on other, process-oriented indicators of performance. While it certainly makes sense to focus on improving student performance, there are many indicators that contribute to student learning that are not direct measures of student performance itself. Bernhardt (1998), for example, identified four categories of data for districts and schools: demographic data, instructional process data, perception data, and student-achievement data. She argued that selectively representing these categories would produce a powerful system of indicators.

- One of the biggest challenges that district leaders face is turning their data analysis into action. This theme emerges in several research studies at both the administrative and classroom levels. Administrators were uncertain how to apply the lessons from the data back to their practice, and teachers often reported that they struggled to turn data about student learning into instructional action.

- Central office administrators are increasingly attending to providing feedback to educators about their school and classroom practices. But none of the research that we examined focused on the ways in which data were used by central office administrators to provide feedback about their own processes, systems, and performance.

- While some of the research discussed opportunities for districts to synthesize the vast amounts of information they collect and identify key indicators, there was little indication that much of this was going on in the field. Most of the data districts collect is focused on indicators of *current* student-performance levels. Little information is collected or analyzed on indicators that can serve as "signals of progress" – indicators that *precede* the eventual achievement gains but tell us that those gains are likely to occur in the future.

Our study was developed to get at these gaps by exploring the need for and use of *leading indicators* in education.

Applying the Concept of Leading Indicators to Education

The term *leading indicators* originated in economic theory (see sidebar). But it need not be exclusive to economics. In fact, leading indicators may be *more* useful in fields such as education or public health, in which growth is not necessarily cyclical, but where progress can be sustained over time. The challenge for such fields is to develop sets of indicators that not only reflect key investments, but also incorporate measures of important conditions that are known to be associated with improvement.

Currently, the most widely accepted and used indicators in education are standardized-test scores. However, the manner in which standardized tests typically are utilized – given at the end of the school year and constructed as summative assessments – make them *lagging* indicators, like unemployment statistics. Scores on standardized tests, along with the other lagging indicators typically collected and used in public school districts, usually arrive too late to help individual children or schools that are struggling.

Lagging indicators confirm trends but do not easily inform investments. Collecting information only on lagging indicators, as one of our study

informants told us, is like "playing the game with the scoreboard off. When the buzzer sounds at the end of the game, you flip the scoreboard on and say, 'Wait a minute. I thought we were ahead.'" These measures do not tell us whether the types of practices, people, strategies, materials, or technologies school districts are investing in are likely to lead to higher student academic performance.

Leading indicators, on the other hand, prioritize key areas that are particularly helpful in assessing progress toward goals. While educators do need to monitor lagging indicators, they also need leading indicators to help them see the direction their efforts are going in and to take corrective action as soon as possible. An indicator is a leading indicator when it is:

- Timely and actionable: It is reported with enough time to change a course of action.
- Benchmarked: Users understand what constitutes improvement on a leading indicator through construction of "metrics."
- Powerful: It offers targets for improvement and shows progress – or a lack of progress – toward a desired outcome before that outcome occurs.

Our study districts associated lagging indicators primarily with student achievement at the end of each grade (as measured by letter grades and standardized tests) and high school completion (or dropout). We would like to note, however, that an indicator that is considered leading in one context can also be considered lagging in a different context. It is common knowledge that education outcomes are connected to one another. For example, there is a well-established connection between early reading proficiency and later outcomes, from upper elementary school to secondary school, which is one of the reasons, as will be seen later in this report, that early reading proficiency rose to the top as a leading indicator in our four study districts. With a change in perspective, however, early reading proficiency can easily be seen as an outcome, or lagging indicator, of data collected at earlier points, such as letter identification and oral vocabulary in kindergarten. The leading indicators we identify could, for the most part, be seen as lagging indicators when used in a different context.

LEADING INDICATORS IN ECONOMICS

Economists do not wait for unemployment rates to be released to see if the economy is on the road toward full employment. To determine if employment rates are likely to rise in the future, they examine certain sets of data, such as factory orders, known as *leading indicators*.

The Conference Board, a nonprofit organization, uses three indexes, each composed of several indicators (monitored by various government agencies), to determine the economic and fiscal standing of the United States :

Leading index. A monthly index that predicts the direction of the economy's movements in the months to come. The index is made up of ten economic indicators whose changes tend to precede changes in the overall economy.

Coincident Index. An index composed of four cyclical economic data sets that provide broad-based measurements of *current* economic conditions, helping economists and investors to determine which phase of the business cycle the economy is currently experiencing.

Lagging Index. A monthly index that confirms the direction of the U.S. economy's movements in past months. The index is made of up seven economic components whose changes tend to come *after* changes in the overall economy.

These indexes are produced regularly and reported widely. Despite their imperfections, leading economic indicators play a critical and effective role in strategic planning in all sectors of the economy and its regulation.

Definitions adapted from Investopedia.com.

About the Study

To further explore how leading indicators might work in practice, we sought out four districts that were at the forefront of using data-informed decision making. We identified these districts by reviewing studies focusing on that topic and noting sites that were mentioned, speaking to colleagues who are knowledgeable about the topic, and drawing on our own experience.

We narrowed down an initial list of over fifty districts to twelve that were cited multiple times. We interviewed one district representative in each of those twelve districts and selected four districts – Hamilton County (Chattanooga, Tennessee), Montgomery County (Maryland), Naperville (Illinois), and Philadelphia (Pennsylvania) – to be part of a cross-case analysis focused on leading indicators. The research involved interviews with district and school leaders in the four communities. (See the Appendix for research protocols.)

The Leading Indicators

We learned of efforts to develop and use what we would call *leading indicators* in all four of our study districts. Figure 1 lists these indicators and describes the interventions our study districts undertook as a result of assessing these indicators and how broadly the intervention was applied. Each of the leading indicators in Figure 1 is described in more detail in this section.

The indicators fall into two groups:

- Indicators that the districts have *the most* information on. These indicators are commonly collected by most school districts; they have simply been prioritized in our study districts.

- Indicators that are not as commonly collected, about which our study districts have *some* information. Not coincidentally, these are apt to be harder-to-measure, less-quantifiable constructs such as "teacher quality."

Common Indicators

All of our districts had ways to monitor student learning, as described in the section of this report entitled The Role of the Central Office. But, in addition, they tracked other indicators they felt were critical to student achievement, such as early reading proficiency and enrollment in pre-algebra and algebra, among others. All of the indicators described here were examined at varying levels of aggregation: by individual student, by classroom, by school, by subgroups such as race/ethnicity, and for the whole system.

Early Reading Proficiency

Early reading proficiency was the most common leading indicator examined by our study districts. It was often the first thing district leaders and partners mentioned when asked if they could identify any high-leverage indicators. A central office administrator told us:

> If we start looking at where our children are in third-grade reading, which we've seen articles and documents written that if a child is on grade level . . . by grade three they're on a very good path for success. [The superintendent] has put millions of dollars into our early-childhood education program. . . . We have established benchmarks in kindergarten and in grade one and in grade two for on-grade level reading of text.

To one external partner, it was as simple as: "We know that third-grade reading scores are an important predictor of getting through high school." To address this leading indicator, our study districts invested in early childhood education to increase the numbers of students meeting this benchmark and provided interventions, such as tutoring and double doses of reading instruction to individual students not reaching the benchmark.

Enrollment in Pre-algebra and Algebra

A central office administrator told us:

> We use data K to 12. We have different leverage points – targets – we think will move the bar for our kids, increase performance. One leverage point is how many kids we have in sixth-grade math in fifth grade. We want everyone to complete algebra by grade 8. We want them to complete algebra by seventh grade if they're on the fast track.

The other three study districts also had some kind of systemwide initiative focused on helping students get ready for algebra and to increase enrollment in algebra. The ultimate goal was to help students master algebra sooner in their academic careers. They monitored enrollment and performance in math classes. As one partner told us in response to a question about important indicators:

> The level of math courses students take and their performance in math. Math is a huge stumbling block for kids' success in high school and beyond.

Over-Age/Under-Credited Students

Two of our study districts work to identify students who are "over age." In high school, that typically might mean students who have only accumulated enough credits to qualify as a sophomore but are actually old enough to be a junior or a senior. In elementary school, over-age students are those who are a year or more older than their peers in

Figure 1.
Leading indicators used in our study districts and their associated interventions in the same districts

Leading indicator	Associated intervention(s) by our study districts	Level applied to:
Early reading proficiency	Reading interventions (double dose, Reading First, tutoring, etc.)	Individual student
	Investment in early childhood education	System
Enrollment in pre-algebra and algebra	Provide math tutoring and other supports	Individual student
	Increase enrollment & course offerings	System
Overage/under-credited	Alert someone at the school about students meeting these criteria	Individual student
	Establish transition goals	School
	Create grades 6–12 academy to reduce transitions	System
College admission test scores	Change placement and provide support to succeed in more rigorous courses	Individual student
Attendance and suspensions	Intervene with student and parents	Individual student
	Adopt strategies to reduce violence and disruption	School
Special education enrollment	Reduce number of separate placements	System
	Inclusion	
Student engagement	Benchmark and look at data	Classroom or school
	Develop rubrics	
Teacher and principal quality	New teacher evaluation	School or system
	Coaching for teachers and principals	
	Conversations about data	

the same grade. Concern about a lagging indicator – dropout rates – was the impetus for this focus in one district.

> We started looking at dropout rates. What are some of the factors leading up to it? We did a little research and found that 64 percent of dropouts are over age [for the grade they are in]. So we put an indicator at every grade that alerts schools that kids are over age.

> We are trying to avoid having sixteen-year-old ninth-graders. [But] you can't just wait to high school to address it, so we brought it down to kindergarten, try to provide support to at-risk kids. . . . Is the child over age; has poor attendance; shows some at–risk factors? Then we intervene earlier. We are trying to be more proactive and preventive.

> *– Central office administrator*

One district, in particular, focused on data around student transitions, especially from fifth to sixth grades, eighth to ninth, and ninth to tenth. A district partner talked about the central office's "change leadership group," and about how in looking at district data, they found that:

> Lots of students were not successful in sixth grade. There's lots of retention, and a huge number of retentions in sixth grade, as compared to fifth grade. It's a transition problem.

The number of disciplinary and special education student referrals was also much higher in sixth grade than in fifth. Now, in addition to literacy and math goals, the central office has established a "transition goal" between elementary and middle school.

Transition goals have also been established between middle school and high school. As the district partner put it, the "overarching goal of the entire initiative is to prepare every single middle school student . . . for a rigorous high school curriculum." According to a district partner,

> In 2001, schools were reporting 100 percent promotion. But the more you poked at it, [you learned] every high school had a different way

to determine what made a ninth-grader a tenth-grader. In some schools, if you showed up the next year, you were marked as a tenth-grader. It took us forever to go back and change board policy. . . . You've got to get the data clean and clear. It took us two years before we could get precise numbers.

Now, "every academy [talks] about ninth-to-tenth-grade promotion." And not only are schools talking about middle school to high school transition, but they have also used data on over-age and under-credited eighth- and ninth-graders to create a 6–12 academy that focuses on this group of students. A central office administrator said that in this school, they started an eighth-grade transitional academy with a focus on math, literacy, and physical science.

> It's designed to help this [over-age and under-credited] group of students make a smoother transition [to high school]. It's easier there because of the 6–12 configuration. Have we developed all options for this group? No, but it's come up out of our data.

College Admission Test Scores to Clarify High School Placements

All of our study districts sought out ways to assure that high school students were appropriately placed, either by assessing students' credit accumulation compared with their age, as described in the section Over-Age/Under-Credited Students, or by examining college admission test scores. Two districts in our study have examined scores on college-entrance examinations (such as the SAT and the ACT) and their associated preparatory tests (e.g., the PSAT) and curricula (e.g., ACT Plan and Explore). They identify students who score high but are not enrolled in advanced courses or who are in danger of dropping out.

> For example, we had students who were dropping out of high school who were very smart. We didn't realize until we looked at the data. We found students who scored 19 or above on the ACT. These students need to be supported.

> *– Central office administrator*

The PSAT, to me, is the most powerful [indicator]. . . . We've defined cut scores . . . so there's now a tool that schools have access to through FileMaker Pro. With that, we pull up a kid's [record] and we can identify what kids have those scores that are not currently enrolled in honors or AP.

– Central office administrator

So we analyzed the PSAT to see if there was any correlation between courses and their score. Did it have an impact on the [student's] SAT [score by] just taking the PSAT? And we found out that if you take the PSAT you score better on the SAT. We also knew that if you get more than 42 or 43 on the math or English [PSAT], you could be in a highly rigorous course. Research from the College Board substantiated that. . . . We made it so that if you score a certain level, kids have to be in the [more rigorous] course. If they're not in there, you have to put them in. Have to put the kids scoring high in these courses. But they need to have the supports if they haven't been in higher-level courses in the past.

– Central office administrator

One district is piloting the ACT's eighth- and tenth-grade college- and career-planning tests. An external partner noted:

Right now, all eighth- and tenth-graders are taking Plan and Explore for ACT. How do you backwards-map what you need to know in sixth grade to get 22 on ACT for a college scholarship from the state? How do you structure curriculum and coursework to accomplish that?

This district is also utilizing a Web site that correlates state assessment scores to predict ACT scores and expected salary figures for future employment. Another district enrolls students, particularly students of color, in AP courses if they score high on standardized tests.

Student Attendance and Suspensions

Districts have made headway collecting and sharing school- and district-level attendance rates with greater frequency. In one district, previously, attendance-data reports were delivered to schools once a month and at the end of each semester. Now, attendance data are shared on a ten-day cycle, allowing for principals to make necessary changes. According to one principal, "I have the central office get me grade-level attendance data because my ninth and tenth grade have awful attendance. I'm missing 15 percent of my kids."

In the same district, a school leadership team asked the district's data team to present to the faculty on the relationship between attendance and student achievement. Important data in this effort are suspension and major incident rates. The key is to look not just at the overall percentages, but also at whether it tends to be the same students who are chronically suspended – and to build a subsequent understanding of how many instructional hours these students are missing and the academic costs of those absences. One district leader put it this way:

The serious incidents and suspension indicators were connected to the theory that we all believe in – that if you have a highly volatile school, you can't have really good instruction take place. [So we] help teachers and principals monitor and bring down the level of violence and disruption.

Harder-to-Quantify Indicators

All of the indicators described above are fairly easy to measure and have, for the most part, been collected by most districts for years. But there were also some indicators that our districts examined that were more difficult to quantify and are not collected widely by most school districts. These indicators include special education enrollment, student engagement, and teacher and principal quality, including teacher turnover.

Special Education Enrollment

Under No Child Left Behind, special education students receive a great deal of attention due to the need to make adequate yearly progress with all subgroups. As one central office administrator put it, "It's no longer compliance with 'dotting i's.' It's now achievement and outcomes for all students."

All of the districts in this study tracked data on special education students, though sometimes the data were not integrated. For example, interviewees in one district mentioned that information in special education students' IEPs existed only on paper, not in the district's data warehouse, and integrating this data was a priority.

A central office administrator in one district specifically mentioned using data to make changes in special education programs. This district had created a number of schools and centers for special education students. These students were removed from mainstream classes to attend these schools and centers. However, as the administrator put it,

> We have a lot of data now that shows that [these special schools and centers have] not been successful for many of these students. . . . So we're now trying to use that data to help us bring those kids back into the mainstream, the regular schools and regular classrooms through inclusion and other practices and taking those resources that we had out of those special centers and schools and putting them into the regular schools and regular centers to support those kids. So we've been using data to show that and try to drive that.

This decision has upset some parents, who wanted their children to remain in these schools and centers and believed the regular schools would not be as supportive for their children:

> But we've just been continually focusing on that data and as you look at that data . . . a lot of those kids that were in those special placements are African American. . . . Taking African American students and identifying African American students and putting them into separate places has just not been successful. So using data to help drive some of the strategies in our strategic planning, eliminating some of these special centers, eliminating an evening high school program where students haven't been successful – taking those kids and putting them back into the regular school.

When fifty or sixty upset parents picketed outside of a board meeting, the administrator again pointed to the data:

> They're issues that raise a lot of emotions in people. . . . The only reason we're able to make any of these changes is because of the data. And it's more than just telling a story. It's really having good hard data to show that kids haven't been successful in the other placements, in these other settings. And having the data when they are included to show that it's making a difference for the kids is helping us at the district level to be able to support strategic planning to implement strategies that we think are going to be necessary in order to help all kids be successful. To monitor that, to see that it is making a difference and, if it isn't, then to use the data to help us do something a little bit differently.

> What we try to inform people about is when you get the data and it shows that you're not attaining the results that you wanted, it doesn't mean that you kill the program. It just means that you need to identify what's not working and improve it. Part of the challenge with certain elected officials is that they believe that the data should be used to see whether you fund a program or not fund a program, as opposed to using it to make improvements that you need in that program.

Student Engagement

Several districts used different measures – including student surveys and classroom walk-throughs – to address the issue of student engagement at the school level. For example, one central office administrator explained the district's use of "focus walks":

> We do a thing called focus walk, and we have teams of staff members go into a building and, basically, they peek their head into a classroom for a few seconds and they look at the activities that are going on in the classroom and they rank how students are engaged in the classroom. Everything from passively sitting there and being lectured to, to taking control of their

own learning and doing activities that are helping create their own meaning from what they're doing. And we gather [and look at] that data. . . . We benchmarked a couple of years ago, and so now we're looking at the data and in terms of best practices and how we want students engaged in learning, what do we look like, what do we sound like in terms of growing our schools.

A district principal agreed, saying that:

Teachers have gone out of their way to develop rubrics, gathering that kind of data, which increases student engagement and also should increase student success.

Districts also reported that they did frequent student surveys on topics ranging from technology use to students' social-emotional needs. An administrator from one district said,

So we survey all of the students and ask them everything from, "Do you ever feel bullied at school? Do you feel welcome at school?" to find out the social-emotional status of the school.

Another central office administrator pointed out, "So we do a lot of internal surveys, climate surveys of schools, senior exit surveys, the climate series of parents, students, and staff."

However, some admitted that student engagement is not easy to quantify. One central office administrator said,

I believe our students on task is certainly a correlational behavior, but we have struggled with some of the things that we think are good key performance indicators, getting them to a point in which they roll up and can be quantified and used in a format such as this.

Thus, there's a belief that student engagement, as defined in a myriad of ways (e.g., school climate, time on task) is important, but there are only limited ways to easily measure and aggregate student engagement data so they become useful for administrators and teachers. Several of our districts expressed an interest in finding better measures of their students' well-being but had found limited ways to get to this data. Participants from one district in particular almost universally commented on its importance. The superintendent said,

We have been struggling with issues around diversity, how to tackle it. Interesting question across the district: kids in this school are tolerant of kids different from them on the survey. The number was still high, but there was a drop from last time. What can we do at the district level to modify what we are trying to do with social-emotional learning?

A principal in that district added,

If a kid feels valued in the system, he is going to learn better. Right now, it is hard for a teacher to get [that information]. We have to survey [the kids]. Probably each teacher is doing the same survey in each class. We might be able to provide that for him or her.

A central office administrator summed it up best, saying:

How to assess social-emotional data is an area where we tend to go by gut rather than data. We need training on what tools are out there, what really is going to inform how we help kids in that area. Lots of research shows that social-emotional concerns can affect achievement. We do have some; we introduced the Manners Matrix and are trying to tweak [it] with social-emotional learning goals, and a school perceptions survey [was] completed recently. [We] got some; we need to collect in a systematic way that will inform our decisions around the social-emotional piece.

Efforts to understand student engagement that were described earlier are nascent attempts at getting at the broader construct of students' social and emotional development.

Teacher and Principal Quality

Districts have started thinking about measuring teacher quality in instruction, though it is still at an embryonic stage in most of them. At the most basic level,

For me, I look at teacher turnover every year, that's a big piece for me, looking at trying to hire twenty-five middle and high school teach-

ers. The goal is to reduce that turnover number. So it's a critical piece of data. I need teachers who are a good fit for my building. A large piece is determining whether these teachers work with the students in my school.

Coaching is a major strategy for developing the skills of both new and experienced teachers. As a central office administrator described,

> When you're a good coach, you're coaching people's technique. People out here go pay lots of money to get their golf swings coached, so what's the matter with coaching teachers? You're having somebody there examine the swing and help them get better. You turn upside-down the whole idea of learning and you make a whole bunch of learners. We're all in this together and you have observers and coaches and idea banks and you create councils on teaching and learning that we create in every one of our buildings. You create embedded staff developers that aren't evaluators. You create unions and support systems. You create all kinds of ways that create mentor/coaching relationships.

The difficulty with this kind of coaching technique is the labor-intensive process of collecting data and using that information to train teachers to be more effective. The administrator also described the district's development of a database to track all of the different variables that go into teacher effectiveness. As he described,

> Well, there's a database on how you use time. There's a database on how you measure quality. There's all of these databases on teacher abilities and it's a relational database of what you're trying to match all of these things, the Rubik's Cube. Did I get the right teacher with the right student with the right amount of time with the right skill set and interventions that will cause this student's performance on these indicators that we have agreed upon to go up? Does the student know and be able to keep track of that and does the teacher know and be able to keep track of that? And can we engage anybody from the outside to know and keep track of that?

Like collecting data on student engagement, getting easily quantifiable and usable data on teacher and principal quality is complex and difficult. Furthermore, as the administrator pointed out, the data system itself may not be the crucial factor in improving practice, but rather the conversations that arise from that data:

> How do we put that data out there in such a way that causes us to have a conversation about what's right, what's wrong, where's the variance? Because what you're doing all the time is, you're trying to look at the variance. Anytime you introduce [multiple] schools, you've got a lot of variability. Then within those schools, you've got variability, and within the class age range, you've got variability.

> So what you're always trying to do is to find those most efficient and effective practices that actually engage the learner and cause the learner to want to participate. You know, the right learning culture – you can't embed this in a bad learning culture. And cause the adult learner to want to learn more about the learner and cause them both to look at these objectives that they want to hit or these targets or standards or whatever you want to call them.

> And how do you facilitate that? So you're always facilitating a culture and time and all of these other things simultaneously and we learn from Citystat or Comstat or whatever Bratten called it. We learned that there are ways to depict this type of data that cause conversations, but to send the data out doesn't do any good. It's the conversation that does the good.

In another district, a teacher evaluation has been implemented, after three years of discussion and planning. They also reexamined surveys on teacher satisfaction to determine whether that had any impact on student achievement. Another survey of teachers and administrators showed that supervisor ratings were meaningful to teachers. A central office administrator said, "We want to know whether we are giving the quality feedback to a teacher or . . . saying, after so many years, 'you're an excellent teacher.'" Additionally, the district has implemented an interview tool that

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scores teacher applicants. The district plans to determine whether this tool is "actually sorting out who are the best teachers." The district also tracks teacher professional development and teachers who are released and has developed an exit survey with the collaboration of the union.

In a related effort, the districts were particularly interested in gathering additional data about teacher preparation and training. For example, one district's vendor said,

> I also wonder how good universities are doing with teacher preparation for training teachers on how to use data. I doubt [the local university] has very much of this. [A data specialist] is invited once in a while to speak to students, but other than that, I don't know. How do we help our teacher-preparation programs and the universities prepare our teachers better to enter a data-driven system?

A central office administrator from the same district said,

> Another area we didn't talk about is K–16 – connecting with colleges around matriculation, training teachers. Going to the schools, sharing information, talking with teachers, and realizing in every building there is something you can learn.

Another central office administrator, commenting on the changing nature of the economy, said,

> The president of [the local university] system said in a presentation recently that if you take a student coming out of school today, he or she may have eighteen career changes. If that's what we're looking at, then the future is now. You can't prepare students for that type of future if you give . . . a teacher a piece of chalk and close the classroom door. We need to bring community organizations and businesses into the conversations.

Similarly, several central office administrators were interested in gathering additional information from universities about student teachers and teachers coming from their programs:

> I would like to gather data from student teachers. Talk to supervisors. What universities and colleges are they coming from? Are there areas where they are lacking? Areas where they excel?

> [I would like] more data on the teacher. For example, what college they attended. Is it possible to use school code like ACT does? Once we get that electronically, we can do more with the teacher piece.

In the end, we heard much focus on principal and teacher training and quality, but less emphasis on how to measure those variables in a systemwide fashion. There are emerging strategies, however: the coaching model, facilitating conversations about teacher quality, and looking at easily measured variables like teacher turnover. Creating a robust system to look at teacher and principal quality, however, is only just emerging.

The Need for Better Lagging Indicators

Like most districts, the four districts in our study collect a lot of data. But there are still areas where more information is required. We've highlighted a few of these above. Harder-to measure constructs like teacher quality and student engagement require easier-to-gather and more reliable measures.

But it's not only the leading indicators that can be lacking. Our districts also indicated that data about outcomes – the lagging indicators they have access to – are also inadequate. What we learned from our study districts is that a sound data-informed decision-making system needs robust leading and lagging indicators. Currently, districts typically have data on graduation and dropout rates, test scores, and grades, but they need to know more about other kinds of lagging indicators like post-secondary enrollment, job placement, and life satisfaction.

For example, all of our districts were able to minutely dissect student outcomes through the twelfth grade. But as soon as their students graduated, they had limited ways to track them. The ultimate proof of the education that districts

provide is not the students' scores on standardized tests or their grades, but their success after high school ends, in college or the world of work. It was extremely difficult for our districts to know what happened to their graduates.

> Right now, one thing that's so frustrating is how little information is coming from colleges. We have a working group to meet with the local college presidents to look at data. Across the country, there is just an appalling college graduation rate. Forty-five percent of kids graduate in six years at the [state university]. We don't know what correlation there is between grades, are there courses they need to take in high school, or the impact of ACT scores. If we're really talking K–16, why can't we pick a hundred kids from [the district], look at their transcripts, and begin to see paths to success? I want to know from each school. We just don't know what the recipe is for college success.

Two of our study districts were working in partnership with the National Student Clearinghouse to get some information about post-secondary college enrollment, but the data are limited and expensive. Informants in our study districts desired more systematic and easier-to-access data that would help them understand their students' post-secondary outcomes.

Using Indicators to Target Supports to Individual Students

The four districts we studied were very different in terms of size, student and community demographics, and student outcomes. But there was a remarkable similarity in the reasons they gave for developing a data-informed decision-making system and in describing the future focus of those efforts. In this section, we describe their rationale for using data – differentiation and action – and their nascent work in understanding what they called "student trajectories."

The Goals: Differentiation and Action

> One of the fundamental flaws is people never figure out where they're going. And when they're building data systems, all they're trying to do is keep track of all the stuff that they're doing. And so if I were to give some advice to anybody, it's, What's your target? And I see so many data systems that are just *that* – data systems – and that means a systematic gathering of something. For what?
>
> – *Central office administrator*

While our respondents talked about a number of reasons for having a data-informed decision-making system, the two overarching themes of their efforts were *differentiation* and *action*. They felt that a robust data system, manipulated appropriately, could give them information about the needs of specific schools, students, and, in some cases, teachers and could point toward actions that could be taken to improve outcomes for students. As a central office administrator said succinctly,

> Our goal is to differentiate instruction for our students, to give teachers tools to be more agile, and to free up time from doing and scoring, and placing kids.

Another central office administrator described this emphasis on understanding each child and acting on that understanding:

> So, if one of our standards is a student's ability to make connections to real-world problems to what they read – whatever it is – you dig down, and it's not only what are we doing as a school, what are we doing as a grade level, or what are we doing as a classroom, but who are the kids that are getting it, who are the kids who are not getting it.
>
> We've kind of had this mantra of, "It's each child" and really put the emphasis on "Every child learns," maybe a little bit differently, but how do you get down to each child, and just that kind of philosophy of thinking, "It's not every child, it's not my classroom of children, but every child is a little bit different." And the

idea is to easily present and access information . . . the most efficiently and effectively so we can affect that child's learning.

These three respondents also articulated this focus:

> Across the board, the big curricular instructional change is a focus on differentiating instruction. Taking every kid and moving them just a little.
>
> *– Teacher*

> If you go into a school, I think from just three or four years ago, the practice has changed so dramatically. . . . It truly is helping teachers get down to the individual child. I think often in the past we just had the groups of kids, so we would look at if African American kids weren't doing well or if poor kids weren't doing well. Now . . . what I see is getting down to the individual student and really beginning to focus on putting in place strategies and interventions to help those individual students. So I really think that teachers now have the data and they're using data to drive that individualized instruction.
>
> *– Central office administrator*

> One thing we really focused on came from a conference I attended: we have to start talking about each student instead of every student. Data is the answer to that; when looking at the gross level, we miss some of the detail, [such as] special education kids not achieving as well. Data analysis makes sure we provide educational opportunities for each child.
>
> *– Central office administrator*

Another central office administrator used a medical analogy when describing his district's use of data for differentiation and action:

> So we can drill down and find out what is the issue after we take the "x-ray" at a child level, a classroom level, a building level. Then that triggers an alarm somewhere about what to do.

Later in the same interview, he continued the analogy, describing the data produced as a kind of "diagnosis":

> And the more time you spend on diagnostics and knowing what your trajectory is, the better [the impact is] you're going to have with your treatment, because you can target your treatment.

One respondent differentiated the work in his school system, compared with most school districts:

> I'm telling you, most schools in America are stuck in Phase I, [which is] "data as information." You've got to go farther and say, "So what? Now what? What does it mean?" . . . Okay, you've got the information. You've got all this stuff. What kind of knowledge are you putting it in and then how do you take that and move that to action?

Understanding Student Trajectories

This emphasis on differentiation led three of our four study districts to use statistical modeling to identify particular trajectories and pathways for students, based on multiple indicators. They had already successfully prioritized a set of indicators as described in the leading indicators section. Their next step was to synthesize these and other indicators to create even more precise and accurate portraits of their students and schools. The models the three districts were developing are designed predicted future student performance and could provide opportunities for educators to intervene before negative outcomes occur. As one central office administrator told us,

> We're looking desperately at what are those indicators that are predictors. And what are those ways of measuring them that are not so intrusive, yet tell a story that doesn't consume a great deal of time and gets you feedback quick.

In one district, understanding students' trajectories, particularly whether students are on track for graduation, started as early as kindergarten:

> What we did was take AP Calculus and we took AP English, that's your math and your

language arts, and said, Where did you have to be . . . in grade two to get [to AP Calculus and AP English]? . . . Then we looked at the trajectory. . . . If they're on track here, is there a high probability or correlation [with the next point]? We did a study to predict that if you're on track [at a particular point], would you be able to do this? Then we found out there was a strong positive correlation [between] second- or third-[grade reading proficiency] and high school [achievement].

And so now we're trying to figure out how to measure an individual student's performance along this trajectory. You, for example, and you're in the fifth grade, where are you at? . . . Are you above the line of trajectory or are you below the line of trajectory?

Supervisors of principals in the same district use the data from the trajectory in discussing school performance:

We, as supervisors of principals, will go into schools on regular visits and we will directly talk about, according to level, how schools are doing with those points, but we will come in with data. Principals have data.

We will sit down and we'll analyze, where are you with middle school math completion in elementary school? Who's in these classes? How are you preparing kids to get to that point over a five-year period from kindergarten through grade four? Who's in the classes? Who's teaching and what's the certification? Are you making progress? What do you project for the future for all the subgroups? So, we'll have data, and they have data, and we'll talk in depth about those things.

Another district's respondents described their beginning work on using statistical modeling to understand typical student pathways, including critical stepping-stones that can determine whether they are on track for success. They referred to this effort as a *growth model*:

Part of what we're also building into the warehouse is a growth model, so we can better look at student data trajectory and student growth –

what's expected, who's above, who's below – and earlier find and target students who don't look like they're going to be on an expected path of academic growth. That's really this big piece kind of pulling this all together that's driving the implementation of that system at the moment.

An external partner working with this district focused on what such efforts would produce:

[If you have] an eighth-grader scoring at this level, give them the path. This is where they will be as sophomores in high school. You can expect them to be at this point. You can see the trajectories, these pathways. [We're] talking about . . . the ways [students] can move and what we [as educators] can do [to improve outcomes].

A third district not only examined the pathway of a successful high school graduate, but also tried to define what helped them achieve:

[We asked,] What does an accomplished twelfth-grader look like? Then, internally, we looked at what five or six things that if we did right will actually more likely create that to happen. . . . One of them was workforce excellence and starting earlier.

So, after examining six years of data on prior graduates, we found out that there were some things that got them more work ready and college ready, and we followed them by individual social security number and identifier and got a special latitude from the state to do that. And we found out that kids [who] had certain levels of preparation actually earned more money, got out of college quicker, and those kinds of things.

So then it became, how do you back-map that, and are there predictors that you can pick up early on so when the train gets off the track, you can start doing something about it. We found out one of the major predictors was great teachers, and we found out that one of the major predictors of having a group of great teachers was a [great] principal. So we just started putting it all together.

The hope in these districts was that understanding various student trajectories and what contributed to them would help identify students who were in danger of failing, dropping out, or otherwise underperforming.

The Role of the Central Office

The central offices of our four study districts played a big role in building the data-informed decision-making system of which the leading indicators described in the previous section are a major part. They did this in three primary ways:

- advocating for equity
- providing supports for data-informed decision-making
- establishing a data culture

Advocating for Equity

One of the common underlying stories that our respondents told us was that district leaders, particularly the superintendents, set out early in their tenure to use data to highlight variation in performance among the schools in their districts. As one central office administrator told us:

> Within the first three weeks that [the superintendent] was here, he had developed charts of student data and he had disaggregated it by race and ethnicity and he had worked with the folks . . . in facilities planning to develop maps to chart out all of the results from the different data. And it basically showed, within the first three weeks that he was here, really two different school systems. And the results of those two different school systems were very different.

A second district told a similar story. One of the critical indicators the district's data office produced evolved from the superintendent's mandate, at the beginning of his tenure in the district, that all the county's larger high schools develop theme-based high school academies. To ensure that each of the new academies was recruiting diverse students and effectively supporting their academic achievements, the data office produced for each high school charts dubbed "circuit breakers"

because they immediately identified areas of inequity, potential tracking, or disparate achievement results based on class, race, gender, or language proficiency.

The district's data office also provides reports and studies that help individual high schools identify their challenges and opportunities. When one high school's leadership team, for example, analyzed the school's district-provided data, it found that not only had the school achieved a 9.2 percent increase in its ninth-to-tenth-grade promotion rate, but that the school's African American students were being promoted at an improving annual rate. However, the state assessment results suggested persistent race-based achievement gaps. Additionally, only twenty-six minority students (27 percent of the eleventh- and twelfth-grade minority student population) took the ACT in 2004-2005, and minority students continued to be underrepresented in AP and other advanced courses.

The high school used these data reports to target interventions, provide staff development, realign curricula, and increase student supports in each of its academies. These cultural shifts in data use and the impact of teaching and learning is reflected in what one of the district's coaches said:

> We now break down data for each academy, focusing on their graduation rate and average GPA. Our teachers look at disaggregated data for race, gender, and the other NCLB categories; we focus particularly on the percentage of students who go on to college and set improvement goals based on what the data tell us.

Providing Supports for Data-Informed Decision Making

But telling a story with data is not enough. Each of our study sites provided the supports to make data-informed decision making a reality in the district by developing the technical capacity to collect information, ensure its accuracy and completeness, make it accessible, and present it in a user-friendly format. Our study districts complete these tasks in a number of different ways. We

identified several features that are common across our study districts, including:

- use of data warehousing technology
- system of standardized summative and formative assessment
- easy data input and interface
- time and supports to foster data-informed discussions

As one central office administrator told us, "There's more to it than just buying a bunch of equipment and software."

Use of Data Warehousing Technology

To support their work, all four sites have developed data warehouses, which link information stored in different locations and formats.[1] One central office administrator told us how their data warehouse came about:

> For years, the district has had a formative assessment program . . . and about a year ago, we needed to get better ways to get that data easily accessible by staff. Staff had been using spreadsheets and different programs, and data was all over the place. So we . . . started submitting [the data to] a data warehouse. . . . We're kind of in the process of putting all of our data together – everything from big-picture state assessment data to local benchmark state assessment data, and we'll be bringing in more down-to-the-classroom-level data. The important part is not just collecting the data, but being able to present data by concept, or skill, or strand areas and give the teachers easy-to-look-at reports.

External partners such as vendors and local education funds provide some sites with needed additional capacity on technical elements and/or the development and implementation of processes. Sustainability is an issue when such expertise is lodged with one or two people, as is the case in at least one of the districts in the study.

[1] For more information on how to develop a data warehouse, see Mieles and Foley 2005.

A System of Standardized Summative and Formative Assessments

Each of our study districts relies heavily on state and local standardized tests for information about school and student outcomes. State tests are the most frequently used and manipulated to understand those outcomes, but many of our study districts also added local standardized-test data, including end-of-course exams, and districtwide formative assessment data.

Having formative assessments that could measure student skills as they develop, rather than just at the end of the year or through end-of-course tests, was critical. One principal told us, "Until you get to the point where you can inform yourself about where your students are . . . it's not just summative assessments with pass or fail, but what did you learn along the way." Another principal summed it up: "The formative assessment piece is really key."

Having formative assessments that could be used districtwide required clear districtwide agreement on the curriculum. All four of our study districts have developed districtwide curricula, at least in the major subject areas. For example, one central office administrator described the impetus for moving to a districtwide curriculum in math:

> One of the early things we did was we did an audit of our math curriculum and we found out that we didn't *have* a math curriculum. We had lots of different things going on and lots of inconsistency across the system and fifteen or twenty different books that we were dealing with. . . . So the superintendent said, "We're going to have this consistency across the system."

Teachers were less enthusiastic about standardized formative assessments, particularly in the one study district that included a pacing guide with its districtwide curriculum.

Easy Data Input and Interface

All the districts in our study worked to make collecting and organizing this information easy and included some form of classroom- or school-based input or scanning of some assessment data, such as

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DIBELS reading assessments or end-of-course exams. They also provided an easily accessible way for school-based personnel to examine data about students or groups of students of interest to them, usually through a Web interface. A pair of teachers in one of our focus groups was excited to describe how this worked in their district:

> Teacher 1: [Students] take [the test] on the computer. Then at the end of the day the person who's administering uploads it to the Web site, and then you can go in the following day to the Web site.

> Teacher 2: Right. It's really neat because . . . for each class, you can get a printout that shows the scatter of kids from the lowest to the highest . . . the mode and median and all that. So you can see the outliers so you can actually differentiate using that information. It shows you kids who maybe you thought were poor readers and actually they've got higher scores. So it's only a reading test. It doesn't test writing or anything and it's on the computer, but it does give some valuable information.

A principal in another district talked about the detailed information she receives from the central office.

> They break data down to the point where I can see kids who are behind, look at how many grade levels they are behind, can be broken down for any individual student. I just came here from meeting with my math teachers about [our formative assessments]. We have it broken down to the point where each faculty member knows what to do with each student.

Similarly, a central office administrator walked us through what is available to each teacher in his district.

> If you're a fourth-grade math teacher, for example, you get a list of your twenty-three students. Get their history in the district, their attendance, suspensions, strengths, and weaknesses on the last standardized test, projections for what they are likely to do without some kind of intervention. If you taught all four major subject areas – math, reading, science, and social

studies – you'd get that for each student. If you take that same scenario to middle school and you teach a block schedule, three classes of math, then you'd get it for those three classes.

In another district, results are color-coded and "clickable":

> So these are the fourth-grade students at [a district elementary school], and it's broken down by reading and by math on their [state test] scores. The visual of blue, green, and pink stands out because you want your kids to either be green or blue – blue meaning advanced, green meaning proficient, and pink meaning basic [or below]. If I want to sort to anything that's underlined you can just simply click on it, and I can simply pull those kids up, and we can look at the kids that are scoring basic. . . . So, I may end up talking to the assistant principal about the data and results of the data, and I might say, "Do you have a plan for these kids that are right here?" And I'll literally mention the kid by name . . . because we want to get to that level.

This same administrator noted later in the interview that the results for each child are linked to an instructional planning page with suggestions for what to do in the classroom to address particular academic skills.

Time and Supports to Foster Data-Informed Discussions

Sites also have set-aside time and systematized processes and structures that foster conversations about key data. This involves training for central office staff, principals, and teachers to examine and use data and data systems, as well as regular data meetings and other opportunities to benchmark against other classrooms, schools, and districts and share best practices.

TRAINING

The districts had multiple ways of providing training in data use. In districts where school-based staff have access to a database, principals (and sometimes teachers) were either trained in the use of the database during the summer or offered online training. However, in one district this

training was only offered to central office staff and principals, not teachers. More often, training and professional development around the use of data was offered by districts to school-based teams and provided on-site by central office staff.

The kinds of training and professional development around data-informed decision making that interviewees found most useful was when it included all staff and when it was embedded within existing groups or programs, such as a school-based leadership team or a principal leadership program for assistant principals. Principals in one district talked about data retreats for multiple school-based teams. As more teacher teams are trained in data, the use of data has become "part of the culture" in schools. However, as another principal said,

> Certain populations are more adept at using data. We haven't dealt all the way down to the teacher population. We can do more in this district, and it's probably the next step we'll take.

Another district embeds training in the use of data in their assistant principal development program. A central office administrator described the program:

> When you're assigned, in your first development team meeting, you hit the ground running. You are responsible for creating what's called a school profile. . . . You're basically doing a synopsis, if you will, of all the programs that are in the school. It would be like me giving you a small booklet of everything that's happening in my school, including the state of the union as far as the data is concerned – a breakdown of the data.

There is also a specific course on data-informed decision making required for assistant principals. One principal said,

> That was really powerful because it helped you to do that drilling-down process and to move away from the blame game, but come up with the root causes and then possible solutions for it. You developed an action plan by the end of that class. You chose what you were going to tackle. That was helpful for me.

And beyond the training in looking at and using data, the assistant principal development program fostered relationships and trust in looking at data. Another principal said, "You have a network of people to call and talk to and pose questions to."

REGULAR DATA MEETINGS

Our districts also relied on "Data Chats," "Data Retreats," or some similarly named process consisting of regular meetings (annual, semiannual, or monthly) with school leadership teams to discuss school performance data. One teacher described the process:

> At our elementary school . . . after every [formative] assessment round . . . we meet right after those rounds. We look at [the data] as the teams. Our principal has us doing data chats with her and the administration once a quarter.

A principal from a different district described a similar process:

> [At the data retreat], the leadership team is there together; we're looking at data and getting that a-ha together. . . . [We have] two days of rich discussion. Are we seeing results? Identifying kids early for interventions? Are they making a difference?

And an external partner from a third district in our study described a similar process.

> Maybe half the regions are trying to do some kind of cyclical process, where at some point early in the year they were talking about the problems they saw in the data, the root causes, coming up with some strategies they can try. And now they're at the point where they are, in some way, sort of following up on those. Or, even if they didn't start this right at the beginning of the year . . . a lot of them – we gave them kind of a form, like a handout that they could use, that had plan, do, study, act. It had kind of the key questions. And so several of them after that [professional development] actually gave that [form] out at their meetings, put the data up for a particular [key indicator] on the screen, and said, "OK, we're going to go through this ourselves together, and you're going to write it down, and we are using that to then track going forward."

BENCHMARKING AND SHARING BEST PRACTICES

Our study sites frequently also took part in processes to collect data on classroom activities and student engagement, such as classroom walk-throughs, and quality processes, such as the Baldrige process or something similar that fosters continuous improvement. A human resources department in one district worked with human resources administrators in other districts to understand how their own salary, benefits, and other incentives for staff compared and to share best practices.

Such efforts typically involve benchmarking, that is, providing information that helps educators compare their performance to similar classrooms, schools, or districts. As one principal described:

> The [assessment] data is there and . . . you see how [for example] your girls may be doing in a particular instructional area, as opposed to the boys. So, it's broken down in many different ways. We look at that and we go over it and I review that with my team, as well, and then I copy it and I meet with my superintendent and we review it in teams [with other principals].

> And on a team level, we're looking at our individual school data, but we're also making comparisons as to how one school is doing compared to another school. And we discuss all of the targeted areas as a team, what strategies are most effective or what best practices are being implemented in different schools that you may want to take back and share with your staff and perhaps implement in your school. So, that's a very meaningful process because you get a lot of ideas [with] respect to best practices based on the data.

As reflected in the quote above, benchmarking and sharing best practices went hand in hand in our study districts. Study participants from each district talked about developing and using opportunities to share best practices determined by looking at data.

> For example, I might have five teachers with data on the table and I see that four of them,

the kids were really struggling in one area, whereas this fifth teacher, kids were doing really well. So the question might be for that teacher, "What did you do? What do you think helped your kids be successful here, because it wasn't working somewhere else." Maybe that teacher might suggest, "Well, I can demonstrate something – we can do some peer observations." She might have something real concrete that she can answer, because the answers are not always simple as, "This is what I did. Just do it and it's going to work for you."

Another principal talked about ideas he has received from his team meetings with other schools in his district:

> Our attendance [improvement program] is called "Are You Present?" So, that's where we take each month's class with the highest attendance and we give them a pizza party. Well, that program has been very effective in my school and that came from a school where that program was going on. I just implemented it here. So, I get other ideas on things that other schools are doing that I can turn around here. That's just one. Some of the ideas are not as clear and concrete, but it also provokes thought of how you may apply or connect different parts of the program.

Another principal described how having discussions about data

> allows teachers to take a look, and a hard look, at the data and start talking about, or having discussions about, "Well, what did you do in your class?" Especially if you have a team of teachers who maybe have individuals whose kids did really well on their tests, as opposed to . . . a teacher's classroom who didn't do so well on the test, then that fosters that kind of a discussion. So, it helped me because I can help facilitate that and essentially, "Well, what did you do differently?" So, it's not – it becomes less of a "gotcha" and more of a situation where it's really bringing the best ideas, the best practice to the table.

Establishing a Data Culture

All of these efforts have helped build a culture of data use in our four study districts. While not every person in every district is a "power user" of data, our respondents told us that a critical mass has emerged in each of their districts. Data-informed decision making has become a regular part of their practice.

> I think [the superintendent's] cabinet doesn't fear data anymore. [The research director] has helped them to understand that we don't have to be reactionary. We have trend data, we can show it, and we can begin to ask better questions about why, instead of thinking, "We have to get the message out that math teachers [for example] better start doing this." We don't panic any more. It can be about growth rather than reacting to any given force. We don't have to walk on eggshells at a principals' meeting; we can throw up district data by school or district and we can have conversations about it.

Similarly, a central office administrator described how teachers have reacted to efforts to share data:

> My data is going to go up against another teacher. Some people are nervous, and some people are excited; [sometimes] we compare my first [period class] to my fourth [period class]. It's not the culture to keep things a secret. . . . You don't have to worry about people thinking that my class is poor because they're not getting it. [Everyone] understands that it is about helping the kids, making connections with each group. It's a very healthy process; we look at trends over time. One blip does not . . . if you have a down year, you ask "Why?" If you have two down years and didn't do anything, then, probably, shame on you. It's a question, not something to freak out about. It's all about "How do I get better?"

One external partner described the "appetite" for data that existed in the district, which he saw as unique compared with other districts he had worked with.

Respondents in several sites actually spoke about data as empowering and contributing to a sense of efficacy. Our informants made it clear that this was not just a monitoring or compliance-oriented function, but rather that examining data was a key aspect of developing a professional learning community.

> We're going to build a professional learning community. We're going to establish a system where data drives our decision making and that we feel that we are equal partners in the decision making, and we're going to take a very close look, a transparent look, at our school data. We're going to open it up for all to see so that we all take ownership of the problem.

In one district this sense of data as an integral and powerful part of its work extended to involving students in keeping track of their own progress and using data to inform students' efforts:

> The individual kids have data books and . . . you can go up to them and they'll tell you, "You know, I didn't do so good on punctuation today," and you say, "Well, what's the matter?" and they go, "I don't know about the capitalization," you know, little kids. So they know what they're trying to achieve. They know how to keep track of what they're trying to achieve.
>
> – *Central office administrator*

The educators in this district believe that using data not only improves their own practice, but also increases student engagement in learning.

Central Office Self-Evaluation

While our respondents were able to talk in depth about the indicators they used to understand student, teacher, and school performance, they could provide little information about how they determined the effectiveness of central office supports, one of the central questions of the study. When central office staff did respond, their responses fell into two broad categories – *internal evidence* (from school staff) and *external evidence* (from the community or another external partner). In only one district was there any evidence

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that this data on central office supports was used to make changes within the central office.

Internal Evidence

When central office staff talked about internal evidence, they cited informal evidence such as e-mail or conversations, as well as some more structured data such as survey data.

> Most feedback comes as appreciation.

> When I trained teachers, I asked for feedback from them. I went to schools twice a year and gave a short survey: What do you like? What could be improved? You have hit on something that's very weak. There's nothing formal I have right now. The fact that my e-mail stays clogged and lots of people call me is an indicator people think I can help them. We need something more, in a formal sense.

> We don't do enough of that [getting feedback on central office supports]. [Another assistant superintendent] and I started giving surveys and asking for feedback at our principals' meetings. We did that for a while. Most of the time our principals have come so far that they give us honest feedback. We went away from the formal types of feedback. We gave some year-long surveys last year by topic areas and also asked, "What do you need? This year we asked, "What was our strong point this year? What do you need to make your job easier?" We want to give them what they need to help them, not waste their time.

Also, one district talked about developing surveys for teachers and school leaders, though at the time it was in the strategic plan and not yet enacted.

External Evidence

Feedback on central offices also came from external partners and the community. One central office administrator talked about an external organization that led an inquiry into central office practice: "[The external review] revealed powerful information on how we [the central office] could operate. I think that move to be viewed as a support organization was affirming."

Another district routinely held meetings with businesses and parent organizations to give feedback. As part of these meetings, parents received trainings on assessments and data, allowing for "input both ways."

Finally, one district went beyond informal data and surveys and actually used data to make changes at the central office. One central office administrator said,

> I'm in the process right now of reducing regional superintendents. Just for economic factors . . . and it was done on data. It was done around regional's ability to move schools. It was done on looking at the key performance indicators and the whole issue around growth after we got past issues around certification and things of that nature. . . . Data is the thing that helps us make those kinds of decisions.

Overall, however, there was not a lot of evidence from our respondents that central office was addressing the quality of its supports to schools.[2]

While many schools and districts have begun the important process of examining data about teachers and students, few have put central office practices under similar scrutiny. To be sure, districts are accountable to the community for student performance and for proper management of taxpayer funds. But just as with schools, these lagging measures of performance do not say whether districts are putting in place the infrastructure that will ensure positive results for students in the coming months and years. They do not say whether districts have the capacity to support schools' instructional-improvement efforts, or whether they are

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[2] The dearth of data might be explained by a problem with data collection. In one site, questions focused more on how knowledge is spread throughout the district, not on the effectiveness of central office supports.

providing the curriculum and professional development support schools need. As a respondent in one district told us:

> Interviewee: What we want to do is, we want to be able to say, "This AP's leadership made a difference in student achievement. The leadership behaviors of this person increased student achievement." We want to make that link. Now, that's my goal.

> Interviewer: So, are you tracking that in some way?

> Interviewee: Well, we're trying to. It's difficult to track. I'm finding it's more and more difficult to track, but . . . I can leave this with you – this is a draft of a survey that I expect to use at the end of next year to collect this data. It walks the AP through what they really should be doing with this team or department to get to this end result where they could say at the end, "Did student achievement increase, and which of your actions had the most impact?"

Lessons Learned: Using Data to Inform District Decision Making

The four districts in our study are advanced in using data to inform their decision making. We learned a number of things from them that should inform the work of other districts that want to improve systemwide.

✣ Though they might not be referred to as such, leading indicators for education exist and are being used to differentiate instruction and improve outcomes for students.

✣ Many of the leading indicators already in use, such as third-grade reading proficiency and student age compared with credit accumulation, are data that school districts have long collected and are relatively easy to measure. But there are other indicators, such as student engagement and teacher quality, that are harder to measure and are essential to understanding student success.

✣ Our study districts have already prioritized a set of indicators, which we call leading indicators. Their next step however, is not just to let a few indicators rise to the top, but to synthesize these indicators along with other data they collect, so that they can create precise portraits of student and school achievement. By understanding various student "trajectories" or "pathways" these districts hypothesize they can intervene earlier and more effectively to ensure that students meet their true potential.

✣ School district central offices play a critical role in developing leading indicators as one part of a broader data-informed decision-making system. Central office leaders do this by advocating for equity, especially in terms of outcomes by race and ethnicity; by providing time, infrastructure, and supports that align all the work of the district; and, perhaps most important, by establishing a data culture, where information is sought out, discussed, and acted upon.

✣ For all the emphasis on understanding school, student, and teacher performance, there was no comparable focus on measuring the efficacy of central office supports. Central office staff relied primarily on anecdotal evidence to assess whether they were adding value to the work of school-based educators.

✣ Leading indicators are only one part of a data-informed decision-making system. In addition to the elements described earlier – a data warehouse, well-aligned and well-implemented curricula, formative and summative assessments, easy access to data, and support for using data – educators need not only good *leading* indicators but also good *lagging* indicators. For example, the desire of many of the respondents in our study districts to have more information about the performance of their students in college is an effort to understand the outcomes of the education they provide.

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✤ Similarly, the leading indicators we've identified so far are dominated by relatively easy-to-measure types of data and are what many would describe as *intermediate outcomes*. For example, depending on when the data is looked at and how the data is used, third-grade reading proficiency could be either a lagging or a leading indicator. As our study districts and others make progress in identifying student trajectories and the critical indicators along the way, understanding what is a leading and what is a lagging indicator will be less important. The critical task will be incorporating harder-to-measure constructs such as engagement and teacher quality and implementing and building the interventions that will be necessary when such indicators show that these are lacking.

This is an enormous challenge. Our study districts – which are on the cutting edge of data collection and use – have made big efforts to use the data they already have more effectively, to collect new data, to synthesize data and understand student trajectories and to act on what they learn from all of it. But even they struggle to find the time, the resources, or the expertise to also collect data on harder-to-measure concepts that reflect the kinds of rich learning environments we want our children to have. For them and others to do so will require much deeper collaboration with partners – higher-education institutions, community-based organizations, and local governments, to name three – through the sharing of data and resources. Some districts have begun that process with higher-education institutions, but its breadth and use are so far limited. This collaboration would more widely and deeply share accountability and responsibility for children throughout the community.

However, there is strong interest by these districts in developing new indicators that would push into these more difficult-to-measure areas. At a convening of representatives from the four districts in June 2007 to review initial findings from this study, participants were particularly interested in developing tools for looking at central office practice and program implementation and for assessing teacher beliefs and student engagement. Furthermore, there is a great desire to connect districts that are doing advanced work in data-informed decision making, as well as working with less-developed school districts. Creating multiple safe spaces for districts to share challenges around data (or a district's "dirty laundry," as one district representative put it) is a crucial next step in the development of leading indicators.

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Appendix: Research Protocols

This appendix contains the role-specific protocols used for the interviews in our study. Most protocol questions are mapped to the Annenberg Institute's *Framework for Data-Informed Decision Making* using the following notation:

KM – Knowledge Management

KS – Knowledge Support

KC – Knowledge Creation

KD – Knowledge Dissemination

Preliminary Interview for District Research/Accountability Director

Opening statement: Hi, my name is _____ and I am part of a research team at the Annenberg Institute for School Reform conducting a series of interviews with districts that are leaders in data-driven decision making. Your district has come up repeatedly as one doing innovative things with data-driven decision making and I'd like to ask you a few questions. It should take no more than 30 minutes or so.

1. Tell me a little about the ways your district uses data to inform its decision making.

2. What data do teachers get about students from the district? How are teachers supported to use those data?

3. What types of data do schools get from the district? How are school leaders supported to use those data?

4. What kind of training on interpreting and utilizing data does the district provide for
   - teachers?
   - principals?
   - district administrators?

5. In addition to student-outcome data, what other data does the district systematically collect?

6. Can you give me an example of a way in which the district uses data to change the system by which schools are supported?

7. Can you give me an example of a way in which the district learned something from data that led to a change in central office practices?

8. Do you consider [district] a data-driven district? Why or why not?

9. How do you share the district's data with your stakeholders?

10. What are the things the district is focusing on now to improve its data system?

11. Is there anything else we should know about your data-driven decision-making system?

Pre-visit Profile: Basic Dimensions of the Data-Informed Decision-Making System

The goal here is to collect information to describe the basic dimensions of the district's data-informed decision-making system. We seek the basic layout of the system by getting responses to the following questions. Many of these may have already been addressed in our preliminary interview and it is not necessary to ask every respondent about all of them.

Research teams should attempt to address these questions before visiting a site. The teams should make note of items that can't be answered through preliminary interview information or other documents and ask these questions when they get to the site.

1. What are the different components of your data system? (KM)

2. What technology (hardware/software) does your system require? (KM)

3. What are the particular indicators/data points regularly collected by the system? (KM) [Make sure to probe specifically for implementation or process indicators]

4. Who has access to the data (district leaders/school leaders/teachers/parents)?

5. How regularly are the different components used? (KM)

6. What does professional development for using data look like in the district for the following: (KS)
   • District administrators
   • Principals
   • Teachers
   • Others

7. District Context
   • Centralization of curriculum
   • Stability of superintendent
   • District demographics
   • Reform history
   • State/local context

General Interview for Cabinet-Level District Leaders

Opening statement: Hi, my name is _____ and I am part of an Annenberg Institute for School Reform research team investigating data-informed decision making in school districts. We did some preliminary work and selected just a few districts as innovative data users – yours among them. The purpose of this interview is to learn more about the ways that your district is using data.

1. We have already gotten a sense of the key components of your data-informed decision-making system. They are ____, _____, and _____. Have I left anything out?

2. There seems to be a fair amount of effort to analyze student impact data in your system. Are there other data that we haven't talked about that are collected in the system? [such as central office customer service surveys; professional development evaluations, etc.]
   • What other kinds of data don't you have access to that would be helpful to have?

3. Your district seems to have made a big commitment to Data-Informed Decision-Making. Why? (KS)

4. What kinds of training have you received to use [ask for each, X, Y, Z] of the district's data system? Is it sufficient? Why or why not? (KS)
   • What other kinds of training do you think would be helpful for you? Why?

5. How are data used: (KS)
   • in central office meetings?
   • in your departmental meetings?
   • are there other meetings or opportunities to look at data?

   [Probe for why they have chosen to use data in this way.]

6. Are there specific "high-leverage" indicators that have emerged – either for the system or for your department – as particularly powerful, useful, or predictive? (KM)

   [If asked for clarification, examples might be number of teaching vacancies or number of over-age ninth-graders.]

7. What other data or indicators would it be helpful to have access to?

8. How is your use of data changing district practices? (KC)
   • Can you give me a specific example? [If the example is about teaching and learning then probe specifically for changes in central office; if it's about central office practice then probe for teaching and learning.]
   • How, if at all, has this data system influenced central office practices/teaching and learning in the district? Can you give me an example? (KC)
   • How do the things that you learn get spread throughout the district [teachers, principals, schools]?

   [Note: This is the only Organizational Learning question. Be sure to stress it.]
   [Probe for specific systems/mechanisms to spread knowledge through the system]

9. How do you get feedback on how the data system is functioning and how, if at all, does that change the way the system works?

10. How, if at all, is your use of data changing the district's relationships with external stakeholders, such as parents or community organizations? Can you give me an example? [Transition: Now I'd like to ask you about how you use data personally.]

11. How do you personally use data to inform your decision-making?

12. What's something you have learned from your data that has changed how you do your job? (KC)

   [Going back to the ways the district uses data]

13. What do you think are the biggest challenges for your district in using data to inform decision making?

14. Who else should we talk to in order to understand how data is used in this district?

General Interview for District-Level System Specialists

This interview is for specialists associated with a particular component of the system.

Opening statement: Hi, my name is _____ and I am part of an Annenberg Institute for School Reform research team investigating data-informed decision-making in school districts. The purpose of this interview is to learn more about the ways that your district is using data.

I'd like to focus on [component] of the district's system in this interview.

1. Can you give me a brief overview of how [component] is used in the district? (KM)

2. Please describe the training that people get to use [component]? (KS)
   [Probe for:]
   - central office staff – who, frequency, and type of training
   - school leaders – who, frequency, and type of training
   - teachers – who, frequency, and type of training
   - others – who, frequency, and type of training

3. What meetings or other opportunities exist for people to discuss the data that come from [component]? (KS)

   [Note: Need to ask separately for district and school levels]

4. How are data influencing practice in the district? (KC)
   - Can you give me a specific example?
   - [If the example is about teaching and learning then probe specifically for changes in central office; if it's about central office practice then probe for teaching and learning] How, if at all, has this data system influenced central office practices/teaching and learning in the district? Can you give me an example? (KC)

- How do the things that you learn get spread throughout the district? [teachers, principals, schools]?
  [Note: This is the only OL question. Be sure to stress it.]
  [Probe for specific systems/mechanisms to spread knowledge through the system.]

5. How do you get feedback on how the data system is functioning and how, if at all, does that change the way the system works?

6. Are there specific "high-leverage" (i.e., useful, predictive) indicators that have emerged – either for the system or for your department – as particularly powerful? (KM)
   [If asked for clarification, examples might be number of teaching vacancies or number of over-age ninth-graders.]

7. What other kinds of data or indicators would it be helpful for the district to have access to?

8. How, if at all, is your use of data changing the district's relationships with external stakeholders, such as parents or community organizations? Can you give me an example?

9. What do you think are the biggest challenges for your district in using data to inform decision making?

10. Who else should we speak to in order to understand data use in the district?

Interview for School-Level Users

This interview is for principals and teachers, either individually or in focus groups.

Opening statement: Hi, my name is _____ and I am part of an Annenberg Institute for School Reform research team investigating data-informed decision-making in school districts. The purpose of this interview is to learn more about the ways that your district is using data.

1. I've heard of these elements of the data system in your district: X, Y, and Z. How useful do you find these different components of the data system?
   - [Probe for each of the different components.]
   - [If respondent says he/she doesn't find them useful, ask why not.]

2. What kinds of training have you received to use [ask for each, X, Y, Z] of the district's data system? Is it sufficient? Why or why not? (KS)
   - What other kinds of training do you think would be helpful? Why?

3. If you have questions about using data, who can you go to for assistance? (KS)

4. As a school community, are there other ways you use data regularly? Please describe. [e.g., data from a grade group formative assessment, a schoolwide writing prompt.]

5. Can you give an example of how if at all, your instructional/leadership practices have been influenced by data? [Clarification if needed on district vs. school-collected data] (KC)

6. Are there specific indicators that emerged as particularly powerful for your grade group, subject, classroom, or school? [If asked for clarification, examples might be performance on open-ended items, or reading comprehension scores]
   - What other kinds of data don't you have access to that would be helpful to have?

7. How, if at all, has the data system influenced the ways in which you work with families and community groups? (KD)

8. How, if at all, do you learn about best practices from other teachers or schools in the district? (KC)

9. Do you think the benefits of using data are worth the investment of effort you are required to make? Why or why not?

10. What do you think are the biggest challenges for your district in using data to inform decision-making?

General Interview for Outside Vendors/Partners

Opening statement: Hi, my name is _____ and I am part of an Annenberg Institute for School Reform research team investigating data-informed decision-making in school districts. The purpose of this interview is to learn more about the ways that your district is using data.

1. How long have you been working in [district]?

2. Tell me about how you/your organization support the use of data in [district].
   [If respondent does not mention providing training, probe for that. If they don't provide training, skip to question 4.]

3. Please describe the training that people get to use [component]? (KS)
   [Probe for:]
   • central office staff – who, frequency, and type of training
   • school leaders – who, frequency, and type of training
   • teachers – who, frequency, and type of training
   • others – who, frequency, and type of training

4. Are there specific "high-leverage" (i.e., useful, predictive) indicators that have emerged as particularly powerful?

   [If asked for clarification, examples might be number of teaching vacancies or number of over-age ninth-graders]

5. What other kinds of data or indicators would it be helpful for the district to use?

6. How are data from [component] influencing practice in the district? (KC)
   • Can you give me a specific example?

7. How do the things that are learned from [component] get spread throughout the district [teachers, principals, schools]?

   [Note: This is the only Organizational Learning question. Be sure to stress it.]
   [Probe: Are there specific systems/mechanisms to spread knowledge thru the system?]

8. How do you get feedback on how the data system is functioning and how, if at all, does that change the way the system works?

9. Does [district] differ in any ways they are using data compared to other districts that you are working with? How so?

10. What do you think are the biggest challenges for [district] using data to inform decision-making?

11. Who else should we talk to in order to understand how [district] uses data to inform decision-making?