

**Bringing the State and Locals Together:
Developing Effective Data Systems in California School Districts**

Springboard Schools

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I. Introduction

Public education in the U.S. is placing higher and higher value on the collection, presentation, and use of data as an important component of an effort to improve the nation's schools. Policy makers are actively using data to evaluate programs and using research to design programs and interventions. This is in sharp contrast with past practice in which leaders often cited data to support pre-formulated positions. With the introduction of the No Child Left Behind Act, states are also collecting and disaggregating data in order to track the achievement of different groups of students. The growing emphasis on using data to support decision-making is encouraging greater attention to developing effective data systems at both the state and local levels. School districts clearly have the potential to play an important role in bringing data to bear on a host of decisions that affect children, but their capacity and progress in developing data systems varies widely. The purpose of this paper is to report findings from a review of research conducted by Springboard Schools to examine data systems and their use within school districts and explore how state policy can aid in data management and data use at the district level.

The following overarching question guided this review:

In what way does lack of information hinder policymakers and practitioners from making the most effective decisions, and what additional information would be most helpful?

After initial discussion with leaders in the field, and our first steps in the literature review, Springboard refined this question into the following parts:

- *How does the policy context and California state system shape and support school district data needs?*
- *Among school districts, what data are most needed?*
- *What is known about the desired characteristics of effective district-based data systems and data use?*
- *What are the key issues to consider in designing and purchasing a district-based data system?*
- *What district practices support good use of data?*

To address these questions, the report begins with a discussion of the Federal, state, and district context influencing state and local education data systems. This is followed by a review of research and Springboard's own findings related to district data needs, desired qualities of district data systems, and issues that need to be considered in developing a district data system. The report concludes with a discussion of policy implications for how California and its school districts can support the development of effective data systems and data use.

The first section of the report provides a review of methodology. The findings described in this report are drawn from a literature review and fieldwork conducted through the California Best Practices studies at Springboard Schools.

II. Methodology

The Springboard Schools team began the literature review by developing a bibliography of potential sources of guidance on data systems that reflected the input of experts both internal and external to Springboard. The sources that seemed likely to be most relevant in addressing our research questions were highlighted, and our examination of these sources was prioritized. The bibliography continued to evolve throughout the entire review process. Some new sources were identified and added, while others were dropped if they appeared to be of limited value for our purposes.

Samples from several different bodies of published and unpublished literature were included in the review including: academic research, advocacy statements, and policy papers. While some sources were aimed at a research audience, others were geared more toward practitioners. Some of the sources reported results from a single study, while others were themselves literature reviews or syntheses of multiple studies. We concentrated our efforts on newer studies/documents that were not included in the existing reviews. For older sources, we relied on secondary reports through the existing reviews, rather than direct review of these sources. One of the limitations of the review is that research focused on school district data systems and data use in California, in particular, is sparse.

Each source that was deemed to have relevance for our research question was intensely reviewed and distilled into bullets of critical findings, after which the bullets were combined and common themes identified. These themes became the basis for our synthesis.

Finally, one of the unique features of this review is the added dimension of interviews with leaders from selected high poverty, high performing districts. The interviews were designed to achieve three objectives: first, to provide illustrative examples from the field of issues raised in the literature; second, to collect data in areas where the literature was thin or raised critical questions; and third, to draw lessons from the unique perspectives and experiences shared by leaders from district leaders who have achieved success, even in light of challenging conditions. These districts were selected based on their overall performance and achievement of English Language Learners and high poverty school sites. Interviews were conducted with data directors, district superintendents, and principals representing schools across the entire K-12 grade structure. Where appropriate, we also drew findings from surveys disseminated as part of a Springboard Schools study of high performing, high poverty school districts. These surveys were sent to a representative sample of principals leading schools that ranged from high to low performance in improving student achievement, and closing the achievement gap for

targeted groups (Springboard Schools, 2006). Finally, Springboard interviewed a selection of state policymakers concerned with data issues.

The remainder of the report discusses background and findings pertinent to the questions that have guided Springboard's research.

III. The Federal, State and Local Context for Education Data Systems

The movement towards a culture that emphasizes data as a valued source of guidance for making decisions is vast and goes beyond the purposes of this study. What is more relevant to this study is the wider education policy context and how it has shaped this trend for school systems. Attention to the use of data in making decisions about strategy and instructional practices emerged at the practitioner level in the 1980s and accelerated in the 1990s as states began to develop reform policies that included standards for student learning and assessments designed to capture the degree to which those standards were being met. The No Child Left Behind Act (NCLB) in 2001 grew out of the standards and accountability movements in many states, including California. NCLB created, for the first time, a consistent set of demands on state systems for testing and data reporting in order to qualify states and their school districts for Federal funding. NCLB profoundly changed both the intensity and nature of dialogue within the education community about data-based decision making.

NCLB calls on states to develop and implement assessments which reflect state-adopted standards. The expressed goal is to create state-level accountability systems to ensure all students, regardless of race, class, gender, native language and disability status achieve proficiency in Math and English Language Arts (ELA). According to NCLB, by 2014 all students must test at a level designated by the state as "proficient" or above on the appropriate state tests of math and reading. States were free to establish what constituted "Adequate Yearly Progress" (AYP) toward this goal so long as the goal of proficiency for all was to be attained by 2014. In order to make AYP, a Local Educational Agency (in California, a school, district or county office of education) must meet a minimum participation rate of 95% for each subgroup and in aggregate on Math and ELA as well as meeting the Annual Measurable Objectives (AMOs, also known as percent proficient). AYP also includes other indicators including a graduation rate target and additional indicators as set by the state. (The API, or Academic Performance Index, a key element of the California accountability system which is used as an additional indicator for AYP is discussed below.)

NCLB also moves beyond an aggregate measure of all children in a school or district to focus attention on the performance of all student subgroups, each of which must meet an AYP target. In this way, NCLB has exposed achievement gaps in unprecedented ways and for the first time holds schools and districts accountable for making progress toward closing these gaps. The full range of subgroups on which performance is measured includes:

- School as a whole;
- Students who are English Language Learners;
- Students with disabilities;
- Students from all racial subgroups; and
- Students from low income families (economically disadvantaged).

States determine the number/percent of students in a given school needed to constitute a “significant subgroup” (referring to statistical significance). For example, in California a significant subgroup is defined as 100 students or 50 students who comprise fifteen percent of the student population. For example, California schools with a very diverse population may not have many or any significant subgroups if each group is small, and some smaller school districts may have more significant subgroups than their schools have. Nevertheless, each significant subgroup must make adequate yearly progress (AYP) in both Math and ELA each year. Schools and districts starting out with the lowest student achievement on tests will need to make the greatest gains per year in order to bring all students in each grade level to proficiency by 2014.

If schools or districts do not meet their proficiency targets under NCLB, they become subject to a variety of sanctions and interventions. Schools receiving Federal Title I funding (for low income students) in which one subgroup fails to make AYP for two consecutive years in the same subject are placed in Program Improvement (as it is called in California). States interpret and administer the Federal sanctions in slightly different ways, though all Title I schools who fail to make AYP as described above experience sanctions.

Even the brief summary above suggests the change brought by NCLB and the in extent to which data are collected and school systems are held accountable on the basis of data. At the state level, NCLB has brought annual testing and reporting of data on progress for all schools. It has introduced the idea of accountability for improvement of performance by all subgroups. And it requires organized interventions to assist schools (and, ultimately, districts) that fail to meet targets. To make all of this work, states must collect and analyze data that pushes the capacity of state data systems. At the local level, these new requirements have resulted in increased attention to the creation of data systems that both support required reporting but that also help district and school leaders understand and improve performance trends in their schools.

Data and Accountability in California: the Academic Performance Index (API)

As mentioned above California was one state which adopted standards and accountability before NCLB. Consistent with the movement which also shaped NCLB, California’s *Public Schools Accountability Act of 1999 (PSAA)* is a major state initiative and works in tandem with NCLB to shape data systems in California. NCLB and PSAA differ in

important ways, and although NCLB has caused the state of California to make some shifts in its approach to accountability, California schools are now subject to two parallel accountability systems which intersect at several points (such as the use of API as an AYP indicator) but also diverge in important ways. LEAs must balance these two systems, regardless of their opinions.

The *Academic Performance Index (API)* –the cornerstone of the PSAA -- gives schools credit for growth and sets annual improvement targets. While NCLB looks only at the percentage of students who score at “proficient,” the API give schools credit for moving students from “far below basic” to “basic”. Second, API is a composite indicator (or scale). The result of these two key design decisions is that API includes multiple subjects and tests to produce a rating that ranges from a low of 200 to a high of 1000. API combines student proficiency on ELA and Math, and the percentages of students improving in these two areas. A school's score on the API is an indicator of its performance level. For AYP, the state set an API performance target for all schools of 800 for 2014. A school's growth is measured by how well it is moving toward or past that goal. The current API calculation includes:

- For grades 2-8: the criterion-referenced California Standards Test (CST) scores in ELA (.048), Math (.032), and Science (.20); and the norm-referenced California Achievement Test (CAT/6) 3rd and 7th grade scores in Reading (.06), Language (.03), Spelling (.03) and Mathematics (.08).
- For high schools: CST scores in ELA (.0300), Math (.0200), Science (.0150), and History (.225) and California High School Exit Exam (CAHSEE) pass rates in ELA (.0300) and Math (.0300).¹

API is currently reported at the School and District Level (prior to 2002 API was only calculated for schools). An API reporting cycle consists of a base score and a growth score. As with AYP, API is disaggregated by student subgroup. Prior to the 2005 reporting cycle (see below for more information on reporting cycles), API was only calculated by racial/ethnic subgroups and Economically Disadvantaged students. Starting with the 2005 API Base, English Language Learners and Students with Disabilities also receive subgroup API scores.

The California state system differs in another key way from the federal system. AYP, as an indicator contains stable components. In contrast, the API calculus has been edited on an almost annual basis, correcting problems and adding new tests to the composite indicator as they come on line. For example 2005 API Base results from the spring 2005 testing use the API calculation for 2005-2006. The 2006 API Growth scores use the same 2005-2006 calculation on the 2006 test results to make a directly comparable score which allows LEAs to see their growth over one year.

¹ *(weights are in parentheses; they do not add up to 100%)

Finally, API includes a comparison with schools serving similar populations. This means that API base results yield both a Statewide Ranking (decile based) and a similar schools ranking as compared to 100 demographically similar schools. Thus a school might have a statewide ranking of “8” (in the 80th percentile overall) and yet be a “2” (in the 20th percentile in comparison with similar schools.) Alternatively, a different school might be a “2” overall but an “8” in comparison with similar schools.

A New Reality

School districts in California have been looking at student achievement data for several years longer than many other states. As data systems are developed, they need to track their progress on both AYP and API. LEA's receive from the state detailed results of state testing, including raw scores, and proficiency levels (such as far below basic, advanced) which are reported for each student, but also for classes, grade levels, and schools. However, data and accountability are linked, and our interviews indicate that both state and federal programs have created incentives for district and school leaders to use data not just to understand but also to predict and improve their performance on state assessments.

At the state level, California has begun to focus attention on how it can both build the state data system and also support district data systems. However, California's system still lacks a number of key elements needed for effective data tracking and reporting at the local level. In general our interviewees agree that one barrier has been the focus on mandated reporting. The resulting system is often experienced by local leaders as disconnected from their authentic data needs. Currently, the policy focus in Sacramento has not been on changing this fundamental situation but rather on defining the “what” of accountability – what should schools be accountable for – and on the effort to resolve the conflict between the state and federal approaches. Perhaps as a result, the design of local systems has been viewed as largely a local responsibility. California has not provided separate funding to school districts to support development of either data systems or the infrastructure needed to support them. These issues related to data systems are discussed in detail below:

- ***Elements Needed for Meaningful Data Tracking and Reporting: The Unique Student Identifier***

Many states currently are pursuing the development of a coding structure that includes a unique student identifier. Such systems have the potential to track students over time, ensure that records follow students as they move from place to place, and help understand the performance of subgroups or schools with very transient populations. In California in 2002, after a long debate, SB1453 authorized the assignment of unique student identifiers. However, funding to implement this legislation took longer and in 2006-07, California is just beginning the third year of working with districts to assign and maintain

the accuracy of those identifiers. This process involves districts reporting data on all currently enrolled students on a census day in early October of each year, as well as exit dates and exit reasons for all students for whom these data have not yet been submitted. Data files are then updated when students take state mandated tests in the spring.

Researchers and practitioners in district central offices offer positive and negative perspectives regarding both the progress and promise of the student ID. Dougherty (2003) and Hamilton (2002) offer insight as to how the student identifier will make certain that no student in the system goes unaccounted for. They both argue that the key advantage of having an ID is that it allows for linking students' records over time. This is important for districts and schools that are concerned about the mobility of students and its effect on their performance levels and test scores. Hamilton notes that in California's multi-year study of its major class-size reduction program, researchers could not track individual students to determine how many years they participated in reduced-sized classes. Instead, they had to rely on a combination of district-level aggregated student data for cohorts of students. This suggests that the student ID system could benefit both teaching and learning, and also educational research designed to assess the effectiveness of major initiatives.

In theory, the statewide student identifier should be useful in tracking individual student progress across years and across districts. However, in order to maximize the impact of this new tool, a longitudinal database must be designed and built. This new system – called the California Pupil Achievement Data System (CALPADS) – is being developed, but will not be launched until 2008.

In the interim, ownership of the data has been controversial. California School Information Services (CSIS), an agency with a complicated history and administrative relationships, was given the task of assigning the unique student identifiers and building a database that would include records for all of California's 6.5 million students. The system maintained by CSIS contains basic demographic and program participation data (such as National School Lunch Program eligibility or participation in Migrant Education services), but not data from state assessments, which is housed with the California Department of Education. The full set of state assessment results will not be linked with the CSIS database until CALPADS is launched. Thus the current database allows districts to track down a student who has left their program and enrolled elsewhere. However, CALPADS may add other capabilities such as the ability to access to results from the California English Language Development Test (CELDT) or the California High School Exit Exam (CAHSEE) for transferring students.

Despite the promise the student ID holds for richer data analysis, many in the field are identifying potential issues that will need to be addressed. One interviewee was blunt: "We have not even begun to use the student identifier." At the Escondido Union High School central office in San Diego County, another district leader articulated one reason why he thought the student identifier may not be as helpful as expected: He compared

the identifier to a social security number, and explained that the former involves too much human interaction, while the latter is computer-generated. His main point is that the integrity of the number suffers when human interaction is required, which is why the integrity of the social security number is generally not questioned. Everyone agrees that the system is not without challenges. In particular, students throughout California are already receiving more than one identifier. Nancy Sullivan, CSIS Administrator, acknowledged that a small percentage of the state's 6.5 million students do have errors in their IDs and explained that there is an anomaly resolution process to correct these errors.

- ***The state data system is still highly focused on compliance with government regulations and managed foremost through mandated reporting***

At the state level, California has generally been focused on the *outputs* – required reports and information – of school districts' data systems, but not on the design of the systems themselves, which has been viewed as a local responsibility. Furthermore, California's large number of highly-specified categorical programs helps ensure that state reporting is complex. For example, Springboard interviews discovered that in one year a district in California was mandated to produce 156 different data reports to the state. It is not clear how these align or how these reports help school or district leaders, or even the larger system as a whole. In fairness, many local leaders have taken the initiative to develop and use highly functional data systems: Springboard interviews identified districts and schools using data from both the California Standards Test and local assessments to make decisions about curriculum and instruction, and even to allocate resources. Still, in general, the interviews found districts struggling – and often failing – to find ways to use data systems intended to generate state reports to inform their local improvement process.

Increased support for district's data use could result from the design of CALPADS. CALPADS was envisioned by some stakeholders as a system that could help build the capacity of school districts to use the data they report to the state. However, the recent RFP released by the CDE for CALPADS shows that it will initially be focused on meeting NCLB reporting requirements as its primary objective, with limited attention on helping districts use the data in locally meaningful ways. A second phase for CALPADS is being planned that will potentially focus more attention on local capacity to use these data, but this is clearly viewed as a secondary purpose. At the same time, it is worth noting that currently other parts of the California Department of Education are dedicated to helping schools use data. However, this function is primarily focused on low performing schools, and is not part of a coordinated statewide effort to support school systems as a whole. Furthermore, CSIS is working to help support local capacity though at a relatively modest scale.

Alhambra Unified School District: Modeling How to Use State Data

High performing districts are building systems locally to help teachers use data reported to the state for local use. According to district leaders, this effort requires staff who are deeply familiar with both the state's Coordinated Compliance Review (CCR) process and state and federal reporting requirements and who are committed to this effort. A good example is in Alhambra Unified where Assistant Superintendent for Special Projects, Terry Larson, has helped the district adopt the state's tool for monitoring categorical programs, Categorical Monitoring Program [<http://www.cde.ca.gov/ta/cr/cc/>]. They are using this as a system for tracking the value of categorically funded programs as aligned with student achievement data and other measures. Faculty and school leaders are joined by district leaders in reviewing these data to identify examples of progress and needed adjustments. They have further designed what they call a *Portfolio of Student Assessments*. In this portfolio the state reported data – CELDT, CST – are included within every student's portfolio in a manner that provides easy view for students, teachers, parents or guardians.

- ***Minimal financial assistance and guidance are provided by the State to support district data system development and management***

Historically the state has not provided separate funding to help districts purchase computers or software for administrative purposes. In many districts, years of lean budgets and the oft-repeated promise to “keep the cuts far from the classroom” have led to delays in building data infrastructure. In the 2005-06 budget, for the first time, separate funding was provided for school districts to build local data system capacity. However, this was a voluntary option for school districts and was intended to provide an incentive to early adopters of the student identifier. One district administrator noted that, “Basically we have a very underfunded infrastructure at the district level I think other districts are running into the same problems.”

Technical assistance has also been in short supply. CSIS offers web based trainings for district-wide teams consisting of leaders and “people doing the work.” The team orientation to training seeks to support more coherent learning as a group, and collective buy-in to what group members are learning. Potentially this creates better conditions for supporting follow through back in the home district. However, without ongoing funding, the impact of this effort is likely to be small.

The Promise and Challenge of Data Systems in School Districts

Although in California building a state structure to support local data use is clearly still a work in progress, the role of school districts in supporting school improvement through data systems has been widely noted (Armstrong & Anthes, 2001; Thorn, 2001 & 2002; Mac Iver & Farley, 2003; Schmoker, 2003; Celio & Harvey, 2005; Halverson, Prichett,

Grigg & Thomas, 2005; Wayman, 2005). In particular, districts can play a significant role in helping ensure that data collected and reported through the state for NCLB purposes are also used at the local level. Districts can also work with schools to collect additional data that are more fine-grained and designed for immediate use to teachers. Yet even as the promise for improving decision-making through district-based data systems emerges, it is also clear that districts vary largely in their capacity to design and use an effective data system.

In California, local data collection and storage are normally conducted through the district central office, though some schools also maintain their own simpler systems for data independent of the district. Halverson, et al. (2005) studied four California schools and found the district central office played a central data management role in three of the four schools. These offices collected district and state assessment data and made it available to principals online. However, in all four schools the principals rarely relied on district data to support decision-making. They mainly used their own simple spreadsheets, printouts and notebooks to keep track of data relevant to their school program. Aside from standardized attendance and budgeting programs, local school-based data systems often operated independent of district data systems.

The district data systems which Springboard investigated vary widely in design, level of accessibility, cost, content and scope. In fact, this variation was a key finding from the Springboard Schools research. Some high functioning districts are launching into innovative practices with regard to their data systems.^[SBCA1] Both small and large districts have successfully built internal capacity for data use. For example, the Oak Grove school district (a small K-8 district in southern San Jose) is experimenting with new practices for disaggregating data, providing critical feedback loops on performance, and using data to build a strong professional development culture. Another small district, the National Elementary School District (NESD, near San Diego) has recently begun using data to study which interventions positively impact student learning, particularly for at-risk students.

Some districts have invested in internally created data systems. These systems vary in platform, architecture and functionality. Elk Grove, outside Sacramento, made an early and significant investment in building its own database. Long Beach Unified has also engaged in a sophisticated effort not only to collect data but to engage in its own research to monitor their own local assessments and understand which ones most accurately predict student performance on the state test (Springboard Schools, 2005; Springboard Schools, 2004a; Springboard Schools, 2004b). These examples – and there are many more -- provide evidence that strongly led districts are seriously seeking to harness the power of data to help them build local capacity. Still, these are examples of isolated districts engaged as seekers without a roadmap. And many were only able to build this capacity because of their ability to access resources from private foundations – a strategy which is hardly scaleable throughout the state.

In contrast to the systems in these districts, most often district data systems continue to focus on the systems that track student attendance and schedules, monitor income and expenditures, produce classroom rosters, and generate the information the state requires to provide funding to districts. The next step for many is to develop or purchase a system for analyzing and displaying assessment data. The assessment data may include data from state and local tests, and may be widely accessible to teachers, or focused exclusively for district level decision makers. Parts of these systems are typically purchased from private sector vendors, with other parts and the interfaces between them developed or maintained locally. Given districts' inability to fund, hire or retain highly-skilled technical staff, it is easy to predict that systems that rely on local ingenuity often suffer from an ongoing series of software and hardware glitches. The long and short of this analysis is that school districts in California have primarily operated on their own in developing their data systems, that the systems that result appear to vary in quality and effectiveness in ways that have implications for their usefulness, and that the statewide variations in these systems may constitute an important equity issue for students who attend districts with limited data capacity.

A growing literature has emerged which can inform thinking about how to build better district-school data systems, and how local data use can be encouraged. Furthermore, there are many examples of high performing districts in California from which we can learn. An important starting point is the nature of the data needed by school districts.

IV. What Data Matter Most

Drawing both on our review of the literature and on interviews with district and school leaders, we find that the data most needed in the field is that which is most closely linked to improving student outcomes. Many researchers, including Thorn (2002) and Wayman, Midgley, and Stringfield (2005), agree that in order for schools and curricula to be improved, teachers and principals must have access to summative data that provides an overall sense of progress, *and*, more critically, formative or diagnostic data. District and school leaders almost uniformly agree that their greatest need is for data on student achievement. They are especially interested in fine grained data on student performance and progress in targeted standards-based subject areas, topics, processes, and skills. Such data may come from "benchmark assessments" which track students' progress toward standards; curriculum-embedded assessments, which assess students' mastery of the curriculum; and diagnostic assessments which may focus on sub-skills such as reading fluency. Not surprisingly, given the focus of NCLB and related state programs, interviewees were also interested in data on the performance and progress of particular students and subgroups who are struggling.

Another strong interest among district and school leaders is for data that link instructional interventions to student achievement. For example, Chris Oram, Director of Technology and Student Assessment at National Elementary School District talked about how data on instructional interventions helped the district plan for future programs: "Our initial

findings show that regardless of specific skills, having a structured program is more effective than one-on-one help from a teacher . . . We also found that intervention is most effective when it is done after school by teachers with their own students, rather than hiring outside teachers or tutors. Finally, intervention four days a week had a far greater impact on students, rather than two days a week.”

There are a vast number of other data points that could potentially be of use. Other data elements cited in the literature include:

- Graduation and retention rates:
- Nature and quality of instructional practices impacting student success
- Nature and quality of professional development
- School and classroom redesign
- Resource allocation to schools and classrooms (fiscal and human)

V. Desired Qualities of Data Systems

Given the emphasis on data related to student performance, step one for most districts appears to be the creation or purchase of a system which allows them to manage, analyze and display test data. Often, this system may not be tightly aligned with financial or even administrative data. Right off it makes sense that the accuracy and relevance of data are important qualities of an effective system. Furthermore, Thorn (2002) adds appropriate accessibility, school-level ownership, and ease of use as essential conditions or qualities that can enhance data use at all levels of the system. These qualities are briefly discussed below.

Accurate and Relevant Data

If data are designed to support decision making, it is essential that they be accurate, and provide a clear picture of what is occurring in classrooms with regard to teaching and student learning. Inaccuracy of data, in these terms, may occur through data collection, cleaning and organizing of data, data analysis, or actual reporting of data. As districts use inaccurate data or data that do not fairly represent their district, schools and classrooms, harm can occur. Resources may be invested and changes occur which would not be merited by an accurate reporting of data. However, it is important to note that data accuracy must only be sufficient to the purposes at hand: a diagnostic assessment used by a teacher to fine-tune her instruction need not rise to the standards of data that will be used to make major programmatic decisions. In many cases, districts are opting to ensure accuracy either by having answer sheets scanned or by having teachers enter data themselves into electronic “grade books.” Alternatively, centralized data entry may reside with a secretary or a teacher who may also have a “data mentor” role (see below.)

Relevance and credibility of data are also important attributes. Accuracy is meaningless if the data are not meaningful and pertinent to local needs, issues and problems. There is

much evidence that teachers routinely ignore data that they find not to be credible. Credibility is of more importance in this way than technical validity. On the other hand, relevant data can also help districts and schools reframe their problems and strategies. Relevant data that engages local leaders and practitioners can help them see a new or even a better picture of their district, or stimulate ideas for strategies that help them accelerate to the next level.

Appropriate Accessibility

Accessibility refers to the degree to which districts and school staffs are empowered to review and/or manipulate the data most relevant to their role in improving student learning. Writing in 2002, Thorn notes that a number of key data points relevant to district level staff are not usually accessible to school personnel. He also says that student achievement data, such as grades and results from centrally (and often annually) administered tests are often inaccessible to schools in a form that disaggregates for particular student sub-groups. (It seems likely that this situation has changed dramatically in the ensuing years, however, due to the increased use of web-based data analysis tools.) State test data in California today is widely available on the web in user friendly formats.

Though data from state tests are important to district and school leaders in gaining an overall sense of progress occurring in their schools, of more importance to teachers and principals is the more fine-grained data that helps them respond to student needs and discuss possible instructional strategies. Supporting this finding, Thorn (2001) notes that data must be gathered at a level of aggregation appropriate to the “user with the most fine-grained analytical needs”. Often, teachers are most interested in having access to data that helps them support learning for individual students. Though most of the emphasis from policymakers has been on annual testing, and most district data systems begin with state tests, research suggests that teachers may be helped most by data collected frequently from locally adopted diagnostic assessments (Schmoker, 2003). As the state moves forward toward the goal of developing a consistent picture of district-level “best practice” in developing and using data, it may be useful for the state to offer guidance on the frequency and focus of the local assessment data which is to be captured in district databases.

Ownership of Data

In order for educators to feel invested and dedicated to using data systems, research as well as our own interviews conducted for this study, show they must feel a sense of ownership over the data and some part of the data system. The components of a data system around which ownership can be attached include data collection, storage, analysis, interpretation, and reporting. However, there is disagreement in the literature as to what players should be in charge of which aspects of the data system. Clearly the component which is most controversial is that of data analysis. Experts disagree about whether

teachers should be empowered to manipulate and analyze the data themselves, or should simply receive data analyzed at the district level, or by principals and coaches. While some researchers support the notion of districts developing teacher capacity to do their own data analysis, others argue that teachers need to trust, value, and understand the data analysis provided by districts. A middle position in use in some districts is to create teacher leader positions and empower these teacher leaders to take on important roles either in data analysis or in helping their peers understand and use data.

If the analysis is performed at the district level, districts are better able to use that analysis to articulate priorities and expectations for student learning in the district and to use data analysis to make programmatic decisions. Stringfield (1997) demonstrated the need for school districts to become ‘high reliability organizations’ that not only build rich databases, but also institute processes for data-based decision-making. If decisions are being made at the district level, he argues, data analysis should also be completed at the district level. District level analysis will also free teachers from the added burden of performing their own data analysis. Clearly, when data are being used for decisions at multiple levels of the system, multiple types of analysis may be required and multiple players may need to be involved.

This sentiment was captured in interviews with a district administrator at Long Beach Unified, who talked about the growing interest among teachers for data: “We are very sensitive to teachers concerns about data...At one time schools didn’t want to be compared, but now they want all the other results. The more that’s available, the calmer teachers become.” This view is supported by researchers (see McLaughlin et. al. 2001) who note that data often creates an appetite among teachers for more data.

On the other hand, MacIver and Farley (2003) point to studies suggesting that some districts lack the skilled human resources to conduct complex data analysis, and instead purchase software packages and hire consultants to do the analysis. Currently, more and more districts in California appear to be moving to purchase software packages from for-profit vendors. Though these purchases require an ongoing investment, and there are examples of districts buying the wrong system for their needs, often this strategy is a quick route to building technical capacity. However, technical capacity must work hand in hand with human capacity for any system to be maximally effective.

Thorn contends that when the data in question is diagnostic and specific to particular students, teachers are likely better positioned to analyze the data in a way that is responsive and relevant to needs in their classroom. The same finding holds for school leaders who are assessing fine-grained data related to school practices and progress. Some researchers like Thorn (2001) carry these points further by arguing against centralized control and organization of data. Thorn recommends an interdependent system that specifies varying levels of ownership and roles for district leaders and staff, data mentors, school leaders, and teachers. However, while we see the data systems that

are currently emerging in California as empowering users at multiple levels and in multiple roles, they are definitely centralized in design and maintenance.

MacIver and Farley (2003) deal with the trade-offs between district versus school-based data systems. If the main goal is improving the quality of instruction and resource allocation to enhance student learning, then some mixture of roles in data system design and analysis is needed. Principals and school leaders may be capable of implementing their own data systems with district support, but school capacity to do this effectively will likely vary across schools in ways that are not consistent with the goal of good teaching and learning for all. These findings suggest that district-school relations are an important factor to consider when developing a data system and considering relevancy, accessibility and ownership, as well as ease of use.

Ease of Use

Finally, ease of use relates to the degree to which technology and data can be easily manipulated to provide meaningful analysis and interpretation of findings. Research shows that teachers are generally more likely to use a particular technology if it is supportive of their teaching tasks and does not require a great deal of personal investment (Wayman, Stringfield, & Millard, 2004; Frank & Zhao, 2003). In part ease of use has to do with the technology itself and how easy it is to use. The current generation of web-based systems provides ease of use far beyond what anyone could imagine even a few years ago. But the goal of ease of use also has to do with the manner in which data are organized and made ready for meaningful and focused review.

“The technology available to schools can be frustrating.” Says a district administrator at Long Beach Unified, “Web browsers are really slow. Sometimes we launch (a project) and it doesn’t work well...sometimes using technology seems more of a gift than a skill.”

Without a coherent framework for organizing the data within the technological system, end users may be left with mounds of data – or page after page of bar charts and graphs -- that over tax their capacity and motivation to use the data to support decisions.

In light of these issues, Knowledge Management is cited as an important concept for supporting ease of use. Thorn (2001) discusses the importance of providing data as part of a more comprehensive “knowledge management” system. He describes KM as “the use or application of information,” and notes that “data becomes information when it is categorized, analyzed, summarized, and *placed in context*” (p.4). In a similar manner, one respondent to a Springboard survey on this topic discussed the important role of her highly intelligent “data reporters” who could turn raw data from the central office into *useful information* for teachers. Thorn talks about how this is not just a question of the technologies employed. He notes that an important role is played by district culture, and argues that a district with a collaborative approach to interacting with schools will

typically be more equipped to develop analyses and present data in ways that better connect with the school context and relevant school needs.

VI. Developing Effective Data Systems

There are a number of barriers to developing an effective data system and active use of data. Some barriers stem from the technical elements of the data infrastructure, while others relate more to human will and skill. Drawing from the literature and data collected from high performing districts, we can identify structures, processes and ideas for guiding California school districts in designing or purchasing and subsequently using an effective data system. These include:

- Engaging school leaders and teachers as part of an extended, interdependent community to design and implement the data system;
- Investing in the data infrastructure;
- Providing frequently measured fine-grained data on student achievement and instruction from multiple sources;
- Disaggregating data to focus on subgroups of students;
- Using the unique student identifier as part of a system that creates incentives for and conditions for data use and connects a number of data fields with individual students;
- Placing a premium on high quality professional development and technical assistance;
- Using professional learning communities to support ongoing collective learning, analysis, and ownership among teachers; and
- Defining and investing in new roles including both technical support and data mentors who can build support and capacity for implementing the data system in schools.

The first five points are discussed below. Helping schools build the capacity to effectively use data through professional development, professional learning communities, and technical staff and data mentors are also very important. These issues are discussed as a separate section.

Engaging School Leaders and Teachers as Partners

Wayman et al. (2005) shows that, at the local level, engagement in the design of the data system should begin by forming an extended community of district leaders, school leaders, and teachers to define clear goals for the system aligned with rigorous standards for student learning. Engaging school leaders and teachers during the design process can enhance the degree to which the data system matches data needs in the schools.

Engagement in these processes also enhances the degree to which teachers and school leaders feel their input is valued, and creates opportunities for encouraging positive attitudes about data systems (Ingram et al., 2004, Mason, 2003; Thorn, 2002; Wayman, et

al., 2005). Wayman, et al.(2005) noted that districts that involved principals and teachers in these processes were generally able to make more rapid and effective use of data for school improvement.

Corcoran, Fuhrman, and Belcher (2001) looked at the district role in instructional improvement in three large urban districts. They found that the central office in these districts were under great pressure to achieve results quickly and scale up practices before evidence on effectiveness could be collected and assessed. Regarding data systems, decisions were made quickly, and without engagement of school leaders and teachers. Tension developed as school staff ignored the data system. Such rapid or poorly planned construction of a complex system can be counterproductive if stakeholders do not have a solid understanding of the functions of the new system or the challenges of linking it with the district's existing data infrastructure.

Extrapolating from these research findings suggests that a similar dynamic exists at the state level. Since it is obvious that the design of the state data system will constrain and enable local systems in important ways, state leaders charged with developing the data infrastructure would be well advised to involve local leaders in the design of the system.

Cromey (2000) suggests local school and district administrators consider the following:

- Decide which tests and assessments are necessary. This review of the usefulness of local assessments should be an ongoing process. Assessment tools that are of limited value should be discontinued and those that prove not be well aligned with standards or state tests may need to be revised.
- Involve teachers in efforts to develop assessment practices that satisfy local needs, align with rigorous standards, and track student progress over time. Since both teachers and parents will be quick to complain about “too much testing” if tests are not both useful and used, an ongoing effort to demonstrate the utility of assessment is essential.
- Allocate more time – or modify existing schedules – so that teachers may analyze and reflect upon student assessment data, plan revisions to their curriculum and teaching practices, and receive in-service support on how to use student assessment data effectively. If teachers become more involved in the development of a student assessment system at their school, they will either need additional time to be allocated to this work, or that the time they have in school be allocated differently.

These practices offer district leaders a choice on what assessment tools should be used, and how teachers and schools can effectively cooperate with districts to design a data system that supports instructional improvement. This has implications for the data systems purchased by school districts, and the key factors involved in their decision-

making. When National Elementary School District (NESD in San Diego) started looking for a classroom oriented data system back in 1997, they wanted web-based accessibility for state assessment and demographic information. The district initially adopted a software program teachers did not find user friendly, and they tended not to use the system. Based on this experience, and insight gained from school leaders and teachers, the district switched to a system that teachers ended up using more frequently. Engaging teachers in the process of choosing the data system helped to ensure that it was used effectively.

The Oak Grove School District (OGSD) in San Jose provides yet another example. The Stupski Foundation provided the district with a consultant who advised them as to which system to purchase. The district purchased an off-the-shelf student information system and created their own data warehouse. This is an example of a district where district-school relations are positive. The district is highly trusted by school practitioners, and district leaders are valued for listening and continuing to learn about the needs of the schools. There is a fundamental trust that the school system will use the best available information to make good decisions designed to meet school needs (see Springboard Schools, 2006). In order to build trust, school leaders and teachers must be partners with the district in designing and implementing data systems. Such a trusting relationship helps to defuse the potential for union leaders to argue that teachers' involvement with data entry or data analysis constitutes a change in working conditions that requires formal involvement with the collective bargaining unit.

Investing in the Data Infrastructure

Reaping the benefits of an accurate, accessible and easy to use knowledge management system will require a substantial investment in the infrastructure needed to properly collect, store, analyze and present data. Decisions need to be made regarding each step of this process. Infrastructure cuts across a number of issues.

In purchasing an off-the-shelf system districts need to make sure they are selecting the system that best matches the needs of their school and district (Pare & Levitz, 2005). Data systems are originally created with different criteria in mind. Each type of system has its advantages and disadvantages, but unfortunately, there seem to be no example of one successful, stand-alone system that addresses all of a district's data needs. Wayman et al. (2005) underscores the challenge of simply choosing between varieties of data systems. He points to three common types: student information systems (SIS), assessment systems, and data warehousing systems. Ultimately, every district will need all three.

An SIS is an interactive system that provides real time accounting of daily school functions (e.g. attendance, schedules) for the current school year. Every California district either has such a system, or, in the case of very small districts, contracts with their County Office of Education to provide this function.

An assessment system is an analytical tool that can quickly analyze and display assessment data. School districts can access a number of websites that analyze and display state assessment data, and a number of the County Offices of Education have built their own capacity to provide this service to districts. Thus districts may opt to build or buy their own system that displays data from only state assessments, only local assessments, or both.

Finally, a data-warehousing system stores data from multiple sources, offers access to a wide range of historic data, and may have the capacity to retrieve a student's entire history for one analysis. Although the latter system does not provide immediate turnaround of new data, Wayman et al. argues that data warehousing is a key factor in organizing and, importantly, linking together multiple databases so that each of the complex relationships in the educational system can be examined. Do students struggling with certain assessments also have poor attendance? Do students who stay in the district do better than those that are more transient? Data warehouses and the capacity to link the various data systems is essential for districts to be able to track student learning over time (Pare & Elowitz, 2005) but also to answer a myriad of questions like these.

While there are differences among these three types of data systems, they are complementary rather than mutually exclusive. A district may want to build student information and assessment systems which feed into a data warehouse, or allow one of these to remain a stand alone system because of the costs and complexity involved.

Districts need to know what they want and need before purchasing or building a new system. At the same time, there are essential issues concerning the data infrastructure that need to be addressed regardless of which type of system is developed or purchased. Some of the most critical include:

- Developing the technological infrastructure needed for networking systems to function reliably and consistently. Without appropriate networking capability a system may experience unnecessary interruptions of service.
- Providing an adequate level of technology at all levels of the system. As districts move toward web-based systems, access improves but school site technology is often a problem. For example, in one California district, teachers can gain access to their students' course history, test history, demographics, parent contact information, and more. Yet, these data are often input at the school level by a data clerk whose computer has relatively limited capacity. In other school systems a limited number of teachers have access to computers.
- Restructuring budgets to ensure sufficient resources are available for both short term and long term needs. Grants are sometimes secured which enable the districts to purchase but not maintain equipment. With technology changing daily,

it is essential that funds of this nature be planned for and made available. Funding for long term technology obligations might need to come from the district's general fund in order to upgrade and maintain hardware, software, and provide training. Yet the pressures on general fund revenue are never-ending. Districts that opt to purchase off-the-shelf software need to be aware that they are making a long-term financial commitment to a vendor whose price structure or capacity to provide technical support may change.

- Providing sufficient time for staff development and training (see later section). Enabling administrators, teachers, clerical staff and other personnel to develop and implement basic and intermediate technology skills requires a commitment beyond the staff time currently available for such activities. Basic skills will provide a variety of opportunities that address the basic educator competencies as well as the integration of technology into all curriculum areas.

Sufficiently investing in the data infrastructure is essential to building the capacity needed to operate a data system, yet data infrastructure rarely heads the wish list of teachers, parents, school board members or community leaders. Building a consensus to invest in building infrastructure for improvement is an important – and challenging – assignment for school superintendents. State leadership can help make such investments the norm rather than the exception.

Fine Grained Data on Student Achievement and Instruction from Multiple Sources

Researchers and district leaders believe that focusing on fine-grained student achievement data from multiple sources is the key element in effective data use. While a number of districts begin with state assessment data, the most effective districts will also collect and use data from locally adopted tests as well. This involves "triangulating" data from different types of assessments administered at different intervals and with different purposes.. Assessing student learning by looking to a variety of data sources provides a more comprehensive picture of a student's profile (Ingram et al, 2004, Johnston & Lawrence, 2004).

California has responded to teachers' calls for more diagnostic information with an increased emphasis on the inclusion of additional assessments in the state-adopted textbook series. Formative data, or more frequently gathered data, may include data from chapter tests (which test whether students have mastered the material taught), diagnostic tests (which test whether students have mastered underlying skills) or benchmark assessments (which assess whether students have mastered standards). These various kinds of tests are given every few weeks or months at school and provide teachers with the information they need to understand which instructional strategies trigger student progress, and which do not. However, while such tests are now a regular part of life in elementary schools, and are used with some frequency at least in some subjects in middle schools, at the high school level diagnostic data – and even common end-of-course

assessments – are still a rarity. This appears to be as much a cultural as a technical problem. As one administrator in a high school district put it, “We need to use more frequent common classroom assessments. [But] it’s very tough to convince teachers that they’re not independent (Springboard, 2005).

According to O’Day (2002), data must be available both on student and adult performance in order to improve instruction. This should include both the fine-grained and frequent information of student learning discussed above and also feedback on instructional practice tied to that learning. O’Day documents that although data-based decision making is a common feature of standards-based school improvement initiatives (Goertz & Duffy, 2001; Leithwood & Riehl, 2003), most of these efforts focus on using student achievement data (Snipes, Doolittle, & Herligy, 2002) without adequately connecting these data to empirical data on classroom instruction. Data on teacher practice is sometimes collected in the context of “walk-throughs” by administrators or more informally by teacher coaches (who may work primarily with beginning teachers). But there is no doubt that data about students is far more available than data about teachers.

As teachers focus attention on students and bring their own experience and knowledge to bear on these discussions, data about learning and data about teaching come together and serve as an anchor for professional learning that is both context-specific and meaningful. Instead of starting with a focus on teaching practices, basing teachers’ professional learning on the implications of student achievement data can effectively links to instruction in a natural, less threatening, and productive way (Ingram et al., 2004, Mason, 2003; Thorn, 2002; Wayman, et al., 2005).

Disaggregating Data

An extremely important value in public education is the need to provide a quality education that helps all students achieve high levels of learning and performance. Federal legislation such as the Individuals with Disabilities Act (IDEA), No Child Left Behind (NCLB), and provisions rooted in the 14th amendment to the U.S. constitution have focused increased attention on the performance of key subgroups on reading and mathematics assessments. This concern about helping all students learn has sparked interest in data that appropriately disaggregates performance by particular subgroups of learners. In the past, the opportunity to assess adequacy for all students was often masked by data systems that failed to disaggregate for critical sub-groups, in particular for students who are economically disadvantaged, students from major racial and ethnic groups, students with disabilities, and English Language Learners (EL) (Kim & Sunderman, 2005). Today, however, NCLB and related state requirements have made disaggregated data the norm rather than the exception throughout the state.

In California, data on the performance of English Language Learners (ELLs) is of special concern, and therefore it makes sense for districts to invest in software which can

separate data for this group. Benadom (2005) discusses how California's Proposition 227 has changed the way districts and schools use "smart data" to help ELLs. Benadom (2005) specifically refers to the increase in the use of PowerSchool, a commercial data system that provides language proficiency data that can be disaggregated. Investing in a data system that already has this sort of function eliminates the need to purchase additional software. For the Lennox School District in Los Angeles County, whose Latino students comprise 97% of total enrollment, such a tool was essential meeting accountability standards and track their students' progress toward English language proficiency. After seeing and interpreting disaggregated data on student performance, the district was able to implement an English Language Development profile of student progress. Because California parents have the choice of putting their child in a bilingual program (a waiver program), rather than the English immersion program, data on program effectiveness was also an issue in this district. Three types of programs would need to be evaluated: 1) the mainstream English program, 2) the structured immersion program, and 3) the alternative program (taught in the native language). Data systems that strategically focus on the specifics of California law regarding ELLs, and how to track progress, is essential for many California school districts.

At National Elementary School District (NESD), tracking data for subgroups is accomplished by looking at the Student Information System data, and other district data sources. In Oak Grove School District (OGSD), the central office houses SASI and eScholar, both off-the-shelf commercial education software systems. eScholar also has an element, called an "Analysis cube." CELDT, STARS, and local assessment data, are all tracked in the cube. This allows for an ELL student to be compared with an English only student, or a Redesignated Full English Proficient (RFEP) student. While teachers have access to the cube, it can be difficult for teachers who are not technologically proficient to use and understand. Most teachers in the OGSD use eScholar Express instead, which provides a simpler format without the lengthy analysis provided by the cube. Moreover, teachers generally prefer the express format. Still, the district is committed to the more sophisticated analysis as well. District leaders from OGSD believe that tracking the achievement gap among subgroups is the district's specialty.

The Director of research at OGSD acknowledges that the district has bold and specific five year objectives built around kids who have been in the district three or more years (i.e. 3rd grader who has been there since Kindergarten who are not ELL or SDC vs. 6th grader who has been there since K, 1st or 2nd including ELL students who should be redesignated and are proficient). They are creating a system where:

- All data can be disaggregated by each subgroup for API and AYP;
- New students can be compared to existing students within the system based on AYP and API
- New students can be compared to a student who has been in the district since Kindergarten.

The ideal situation in the Research Director's words would be a system where "the student who has been there longer has higher results than the kids who just moved in." The director believes that having a system that could do this analysis would "eliminate the assumption that mobility is always a huge factor."

Despite this example, in many districts there is no uniform process used to track data for different subgroups over time, and instead local capacity is focused on generating required state reports on these groups. In many cases, this means that the data systems have not adequately adapted to the changing manner in which instructional services are organized and delivered for students with disabilities (Walsh-Symons, 2004).

Effectively Using the Unique Student Identifier

The unique student identifier is a resource that is only beginning to be tapped for strengthening local data systems. One of the powerful features of the student identifier is that it provides the basis for integrating a variety of data points for specific students. Many districts have for many years assigned such an identifier to their students and used it, for example, to track students and link their records over time. However, the advent of a statewide identifier will also allow districts to monitor mobility patterns of students entering and leaving the system, provide for more accurate accounting of students currently enrolled in their system, and better track dropouts and target drop out recovery efforts. The student identifier allows the district to link data from the Student Information System to assessment data. Combining these data elements provides a much more effective way of identifying students at risk than looking at data in isolation. One district leader talked about using it to identify those students who need to be visited at home.

In another example districts are using the student identifier to retrieve current year CELDT results for transferring students rather than re-administering that assessment. This is resulting in faster placement of students in English language development classes. In each of these cases the student identifier helps the district sort differences among students with greater clarity and specificity.

Nancy Sullivan, CSIS Special Project Administrator, warns that the field will need to invest in learning how to use these data. She suggested that district and school practitioners periodically test their system to see how the data can be used to enhance student achievement. For example, districts that seek an answer to the question, "Have any of the students we think are dropouts actually enrolled in other districts?" are likely to find that some of the students coded as dropouts are registered elsewhere. Using the system in this manner allows districts to better target dropout prevention efforts to students who are at risk and maintain more accurate records.

VI. Providing Support to Encourage Good Use of Data

A technically well-developed data system by itself does not automatically ensure that local practitioners will be inclined to use data to support decision making and instructional improvement. Current research and first-person testimony from California district and county leaders shows that local beliefs about data and data use are as important as any of the more technical components of the data system. Researchers have found that decisions made by local leaders and teachers are as often influenced by politics and their own intuitions and feelings as they are by data. This is one reason for engaging an extended community of school-based partners in designing the data system (Ingram, Louis, & Schroeder, 2004; Wayman, 2005; and Wayman and Stringfield, 2005).

The literature further discusses how school districts can potentially play a role in transforming professional assumptions about the usefulness of data and creating cultural change among school leaders and teachers. This section discusses how districts can support better use of data by placing a premium on high quality professional development and assistance related to data use, building the local capacity of professional learning communities to use data, and using data mentors to support good use of data. A key element in building a culture of data use is the honest identification of questions that data will not answer. For example, teachers are highly likely to be frustrated if administrators consistently imply that data will tell them not only which students lack particular skills but also which new instructional strategies they should employ. Answers to the latter question are unlikely to come from the data system.

Professional Development and Technical Assistance

The most highly effective districts place a premium on professional development for data use. They invest in professional development as a central component of their reform (McLaughlin, 1992). There is little new literature on this matter; however our interviews with district staff confirm this perspective. Many are experiencing success with data mentors and coaches, data resource teams, professional learning communities, and other specialized assistance that helps build capacity to effectively use data. Some are experimenting with school networks and teacher networks (Darling-Hammond, 2001; Massell & Goertz, 2002), while others structure the expectation that teachers examine data as a part of regular teacher collaboration time (Springboard, 2004).

As an example, the National Elementary School District uses a professional development model that uses peer coaching and tutoring and is tied to using data to support instructional innovation. The Director of Technology and Student Assessment says, “This has been a nice next step.” Massell and Goertz (2002) found pioneering districts cultivated new teacher roles by providing access to professional development that enhanced their knowledge and skills. Rosenholtz (1989) found similar evidence, and that instructional improvement is more limited in districts that were less pro-active in taking responsibility for expanding learning opportunities.

Research shows that professional development and training in how to use data are crucial for helping teachers understand how to transform the wealth of available data and statistics into practical, relevant information. Several experts have recommended that professional development on data use be conducted at a more informal, person-to-person level to achieve greater relevancy and immediate impact (e.g., Armstrong and Anthes, 2000; Heritage, Lee, Chen & LaTorre, 2005; Khanna, Trousdale, Pennuel & Kell, 1999; Lafee, 2002; Love, 2004; Prichett, Grigg, & Thomas, 2005; and Wayman, 2005). However, some more recent research (Springboard, 2004, 2005) documents how high performing high poverty districts manage the tradeoffs between focusing teachers' work on data analysis and focusing it on identifying and using instructional practices to respond to student skill gaps that the data reveals.

Massell (2001) found districts were likely to use two different channels for building school capacity to use data. One approach involves a central office that studies data and dispenses information to school personnel. The other provides training of key personnel at each school, who are then responsible for handling the analyses and information for their school. These two approaches involve different perspectives, opportunities, and challenges for achieving appropriate data access, ownership and ease of use.

In the 2006 Springboard interviews, several California district leaders attested to the benefits of school level training. The Director of Research at Oak Grove Unified School District talked about how her district models the use of their data system (eScholar) for principals and teachers. She explained that while they also have continuous improvement meetings with school teams four times a year, and can supply one tech mentor, informal opportunities have proven to be more effective. She added that training on eScholar became the norm ever since it was implemented, although not every teacher is using eScholar in her district.

Another leader from National Elementary School District (NESD) touched on the benefits of a professional model called "Teach First," which uses peer coaching, tutoring, and recognition of short term gains. There is also ongoing training for the Edusoft tool, and he described how a staff person from the central office spends 80-90% of his time at schools training teachers.

Not all districts have the capacity to offer this kind of high quality professional development on data use. Many lack a strategic sense of how to invest resources in professional development as part of a coherent system that aligns professional development with their most critical needs. Others prioritize their professional development needs in such a way that training on data use takes a back seat.

Under-investment in training and ongoing technical support is one reason why teachers and even some districts school administrators are excluded from the task of data analysis (Thorn, 2001). In order to support the development of effective data systems, districts must invest in professional development that builds individual and system capacity to

constructively work with data. However, in a resource-limited world, what constitutes the right level of investment in training on data use is open to debate.

Professional Learning Communities

Research identifies professional learning communities as effective structures for supporting ongoing teacher dialogue on student achievement data and such collaborative structures often provide the most productive forum for teachers to make the necessary connections between data and teaching practices. Professional learning communities also hold promise as a bridge for building greater collective access and ownership of data analysis (Love, 2004; Mason, 2003; Wayman, et al., 2005; Wayman, 2005). These activities, when combined with the expertise of data mentors (see next), appear to be an especially effective support for creating a school culture in which both collective responsibility for students and also professional or peer-to-peer accountability for results is a norm. Springboard's own research (2004, 2005) documents a number of interesting examples of ways in which professional communities of teachers and data use are mutually reinforcing and profoundly transformative. For example, in National City Elementary, teachers use assessment data to re-group students by CELDT level for a daily thirty minute period of English Language Development instruction. Students are re-assessed regularly, so these groupings are fluid, and data on student progress is prominently displayed on the wall of the teachers' lounge. Strategies like these both link data to instruction and build the sense that all teachers are responsible for the progress of all students.

Wayman, et al. (2005) and McLaughlin and Talbert (2001) report that as teachers work together to examine student performance and reflect on teaching in light of specific students, they develop:

- Deeper understanding and knowledge of their students;
- Deeper knowledge of each other;
- More supportive social relations and communication with one another;
- Increased confidence; and
- Enhanced sense of ownership.

Teachers collaborating in healthy professional learning communities around data are more likely to draw on each other's strengths and gain confidence. They are also more likely to experiment in ways that demonstrate passion and responsibility for student learning, and a healthy sense of ownership.

McLaughlin and Talbert (2001) found that where teacher communities struggle most in working with data has less to do with understanding patterns and problems related to student performance, and more to do with understanding what actions to take to address these problem areas. McLaughlin and Talbert note that data can help teachers develop a new appetite for information about best practices. This role of data in helping to reframe

and potentially to solve the challenge of diffusion of innovation in education is often overlooked.

New Roles for Educators: Data Mentors and Resource Teams

Literature on the benefits of data mentors can provide additional insight on how districts can help teachers understand the important relationship between data and improvement, and thus bring data into more active use. Data mentors are cited as providing the following in their work with teachers and school leaders:

- Provide assistance in analyzing and interpreting data;
- Help to focus collective discussions around data;
- Instill standards and acceptable norms regarding data use;
- Build capacity of lead teachers to use data in working with teachers;
- Facilitate school community's sense of ease with data; and
- Serve as a data liaison with district analysts.

Love (2004) and Nichols and Singer (2000) show how school level instructional coaches, teacher leaders, and others can operate as data mentors by assisting individual teachers and collective groups of teachers use their experience and expertise to analyze and reflect on data in meaningful ways. Love emphasizes how data mentors foster ongoing data-driven dialogue that promotes widespread data use and literacy. They also provide data as feedback for continuous improvement. Interestingly, data mentors in this study agreed that it is important to collect and analyze several types of data to help teachers draw valid conclusions.

Wayman, Midgley, & Stringfield (2005) discuss how data teams are especially effective in developing a trusting environment for using data to examine practice with more clarity and transparency. Less formal, more intimate settings with data mentors are more effective in helping teachers become data-literate. Furthermore, as a smaller group of teachers or lead teachers become increasingly adept at using data, these newly developed school-level data experts can be effective in helping other faculty members and school administrators learn how to use data in ways that are especially relevant and meaningful to their school and classrooms. What is less clear in the research is how the data mentoring role can or should interact with the coaching role. Data mentors presumably help teachers use data to understand problems; teacher coaches help teachers to learn or improve instructional strategies which might constitute solutions. However, the specific ways that teacher leaders make these connections for their peers are worth further investigation.

Nichols and Singer (2000) implemented a data-mentor program in a Midwestern district where District level mentors trained school principals and teachers to become data mentors back in their schools. The program focused on developing skills related to collecting, organizing, analyzing, and interpreting data; using technology to represent

data; and telling a building's story with data. Data mentors were also taught how to develop school improvement plans on the basis of data, and to create and use alternative assessments. During these sessions, mentors found that it was much more powerful for teachers to identify weaknesses in their building's instructional program than for outsiders from the district level to point out the same problems. Ultimately, the newly trained mentors were eager to go back and train other teachers in their schools.

In addition to data mentors and data teams, teams of highly experienced district leaders and teachers have also proven to be effective in building school capacity to use data effectively. Wayman, et al. (2005) report findings on a Stupski Foundation project focused on district partnerships and how districts can play a role in supporting effective data use in local schools. They found that district support for data use can be enhanced through resource teams comprised of highly experienced educational leaders, including superintendents and teachers from other districts.

VI. Conclusion: Implications for Policy

At the state and district levels in California the policy focus on data has never been more urgent, with many stakeholders agreeing that data are an important key to improving teaching and learning. Still, the state's data system appears to suffer from fragmentation and the quality of data systems in California school districts vary to a large degree. Following are recommendations for what the state can do to improve their own state level system and support school districts in developing their data systems.

California should:

- Invest the resources to develop an integrated state data system which will bring coherence to the disparate kinds of data being collected by the state for compliance purposes. A statewide relational database designed both for reporting to the federal government and also to support local use could support both state and district decision making and bring greater legitimacy to these reports.
- Form a professional learning community or advisory group that brings together policymakers, state leaders and experts from districts that are effectively using data. This community can inform and support the design and construction of the state data system.
- Develop and support a "best practices clearinghouse" effort to identify models of good local practice for using data and potentially to provide guidelines for local decision makers as they struggle to build useful local data systems.
- Provide earmarked funding for districts seeking to develop, upgrade, or maintain local data systems.
- Build on the beginning work of the California School Information Systems through their web-based training for districts on using the emerging state data tools. Develop web-based guidelines and modules of best practices. Provide liaisons to work with clusters of individual school districts.

- Continue to invest in the full range of technical components of the state data system needed to help the state and districts use the student identifier to its fullest potential.
- Review the role of County Offices of Education in developing and supporting local data infrastructure with an eye to identifying potential economies of scale and ensuring equitable access to good data systems especially for small districts.

Following are recommendations for districts. District leaders should

- Work with the local governing board to set measurable data-based improvement goals for the district and its schools and ensure that the district data system has the capacity to track and report progress on these goals.
- Include progress toward meeting established data-based improvement goals into the evaluation of key leaders including both the Superintendent and principals.
- Set goals for the development of the district data system, match those goals with available resources, and develop a multi-year plan for developing and supporting the district data infrastructure.
- Include in the district's data plan the goal of linking data from the student information system to assessment data.
- Engage district staff, school leaders, parents, community leaders and teachers as partners in developing and implementing the data system plan.
- Align the data system with state requirements as well as with local goals.
- Invest sufficient resources in the data infrastructure to quickly attain a threshold level of technical capacity to collect, organize, analyze and report data.
- Focus on encouraging data accessibility, ownership, and ease of use at multiple levels of the system, including at the district, school leader, and teacher level.
- Consider designing into the system the capacity for a two-way data exchange in which the district central office reports data to schools, school level participants have varying levels of access to data most relevant to their needs, and school staff report back findings from their analysis to district central office staff.
- Learn from the state and other districts how to effectively utilize data including data available from the state.
- Ensure that the district data system also includes fine grained data from a useful set of local assessments.
- Build the capacity to use the student identifier to its full potential.
- Build capacity to use the Standard Accounting Code Structure and link multiple data points related to resources, students and test results.
- Invest in creating new roles for both teachers and administrators who can help to develop capacity to use data effectively.

In the current policy climate, each of these attributes and structures will likely play out differently in varying districts. Yet it seems clear that a high quality data system is emerging as a key support to school improvement. For this reason, it is essential that policymakers at both the local and state levels invest in creating a policy framework and

building the infrastructure required to ensure that all of California's students and teachers reap the benefits of this important new tool.

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