TRAVELING THROUGH TIME

The Forum Guide to Longitudinal Data Systems

Advanced LDS Usage

National Forum on Education Statistics

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National Cooperative Education Statistics System

The National Center for Education Statistics established the National Cooperative Education Statistics System (Cooperative System) to assist in producing and maintaining comparable and uniform information and data on early childhood education and elementary and secondary education. These data are intended to be useful for policymaking at the federal, state, and local levels.

The National Forum on Education Statistics (the Forum), among other activities, proposes principles of good practice to assist state and local education agencies in meeting this purpose. The Cooperative System and the Forum are supported in these endeavors by resources from the National Center for Education Statistics (NCES).

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Foreword

The National Forum on Education Statistics (the Forum) is pleased to present *Traveling Through Time: The Forum Guide to Longitudinal Data Systems.* This document, *Book Four of Four: Advanced LDS Usage,* is the fourth and final installment of this Forum series of guides on longitudinal data systems (LDS). One goal of the Forum is to improve the quality of education data gathered for use by policymakers and program decisionmakers. An approach to furthering this goal has been to pool the collective experiences of Forum members to produce "best practice" guides in areas of high interest to those who collect, maintain, and use data about elementary and secondary education. Developing LDSs is one of those high-interest areas. These systems hold promise for enhancing both the way education agencies use data to serve students and the way they do business, from the policy level to the school office and into the classroom.

LDSs are increasingly becoming the state of the art in education data. These systems move us from relying on blunt, aggregate, snapshot student data; to detailed and timely, student-level data that reflect the student's entire academic history. An LDS makes it possible to not only monitor the success of individual students, but also to identify trends in those students' education records. Freeing educators from guesswork and lessening the burden of painstaking data analysis, these systems provide powerful and timely insight about students and allow educators to tailor instruction to better meet individual needs. An LDS can reveal with great clarity what effects our policies, programs, and decisions have on schools. These systems allow agencies to track students across institutions to facilitate appropriate course placement and to determine who has transferred and who has dropped out. Longitudinal data systems also offer a new level of sophistication at the business level that can streamline operations; improve data quality; and free up valuable resources previously allocated to inefficient data entry, maintenance, and reporting practices.

For these and others reasons, states should continue to introduce, develop, and expand their LDSs. The *Traveling Through Time: The Forum Guide to Longitudinal Data Systems* series is intended to help state and local education agencies meet the many challenges involved in developing robust systems, populating them with quality data, and using this new information to improve the education system. The series introduces important topics, offers best practices when possible, and directs the reader to additional resources related to the LDS development process. In sum, it is intended to help agencies establish LDSs that will have lasting, far-reaching impact on the education system and on students' lives. For a description of the entire guide series, see appendix A.

Book Four of Four: Advanced LDS Usage

This fourth book in the guide series focuses on issues important to the effective use of longitudinal data.

- **The introduction** explains the purpose of book four, as well as the format and conventions used throughout the series.
- **Chapter 1** takes a historical look at data use, comparing what was done in the past with what is possible today thanks to detailed longitudinal data.
- **Chapter 2** describes several preconditions to effective data use.

- **Chapter 3** summarizes the many uses of longitudinal data, and the types of users who can leverage the information.
- **Chapter 4** offers tips on implementing effective training and professional development programs on the use of longitudinal data.
- **Chapter 5** discusses the road ahead for LDS development and use.

The appendices include an overview of the four books in this series, references, additional resources, and other relevant Forum and NCES resources.

The National Forum on Education Statistics

The work of the Forum is a key aspect of the National Cooperative Education Statistics System (the Cooperative System). The Cooperative System was established to produce and maintain, with the cooperation of the states, comparable and uniform educational information and data that are useful for policymaking at the federal, state, and local levels. To assist in meeting this goal, the National Center for Education Statistics (NCES), within the U.S. Department of Education, established the National Forum on Education Statistics (the Forum) to improve the collection, reporting, and use of elementary and secondary education statistics. The Forum deals with issues in education data policy, sponsors innovations in data collection and reporting, and provides technical assistance to improve state and local data systems.

Development of Forum Products

Members of the Forum establish task forces to develop best-practice guides in data-related areas of interest to federal, state, and local education agencies. They are assisted in this work by NCES, but the content comes from the collective experience of the state and school district task force members who review all products iteratively throughout the development process. Documents prepared, reviewed, and approved by task force members undergo a formal public review. This public review consists of focus groups with representatives of the product's intended audience, review sessions at relevant regional or national conferences, or technical reviews by acknowledged experts in the field. In addition, all draft documents are posted on the Forum website prior to publication so that any interested individuals or organizations can provide feedback. After the task force oversees the integration of public review comments and reviews the document a final time, publications are subject to examination by members of the Forum standing committee sponsoring the project. Finally, the entire Forum (approximately 120 members) reviews and formally votes to approve all documents prior to publication. NCES provides final review and approval prior to publication.

Contents

Introduction

The three preceding books of this series covered the groundwork for successful longitudinal data systems (LDS), creating a foundation of good data governance; envisioning the desired system with broad stakeholder involvement; developing a robust and sustainable system that collects and maintains valuable new data; ensuring data quality by training staff, enforcing the data governance process, and adhering to data standards; and securing the data and protecting privacy. But, as with any useful tool, building an LDS is not enough: the system and its data must be put to good use. The vast new inventory of longitudinal, student-level data education agencies will amass should be used frequently and effectively to help policymakers determine what works and ensure investment in the right educational inputs; help educators target instruction to improve student outcomes; give students and parents access to valuable, real-time information; and streamline agency and school operations. This book focuses on the ways the data can be used by stakeholders, as well as the tools and training that will allow users to access and turn student-level longitudinal data into actionable information at all levels of the education system.

Figure 1 lays out the major issues discussed in each of the four books in this series. For more information on the purpose, format, and intended audience groups of this guide series, see *Book One: What is an LDS?*

Figure 1. Summary of the Forum Guide to LDS series

Book I: What Is an LDS?

- Understanding what an LDS is (and is not)
- Appreciating the organizational steps needed to institute and effectively use an LDS
- Identifying the technical features and capabilities of an effective LDS and the additional features that can enhance the system's utility
- Recognizing the benefits of an LDS

Book II: Planning and Developing an LDS

- Engaging stakeholders
- Describing the current system
- Envisioning the desired system
- Defining needs, including data and functionality
- Gaining buy-in and funding
- Building relationships
- Writing an RFP
- Building or buying a system or components
- Transferring knowledge (e.g., from developers to staff)
- Defining and measuring success
- Refining the system

Book III: Effectively Managing LDS Data

- Defining governance structure
- Defining roles and responsibilities
- Collaborating to improve data quality and streamline operations
- Managing changes to the system
- Training staff to ensure data quality
- Auditing/validating data at all levels
- Establishing/following data standards
- Securing data to protect privacy
- Providing users access to key data

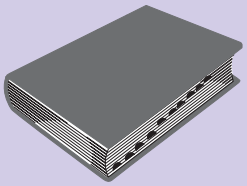
Book IV: Advanced LDS Usage

- Collecting, storing, and delivering key data
- Developing useful reports to fulfill common data requests and needs
- Developing user-friendly data tools to facilitate access and analysis
- Training users to utilize the technology
- Building awareness, understanding, and analytical capacity

Conventions

Throughout this series, important terms and topics will be highlighted in sidebars. Notable subject matter will be easily identified by the following icons:

Definitions



LDS lore
(fictional tales)

Key points

Bright ideas

Tips

District
difference

Chapter 1

Data Use: Where Has It Been, Where IS It Going?

While education agencies have long been collecting large quantities of data, these usually aggregated, group-level data have mostly been used to meet state and federal reporting requirements for funding and accountability purposes, and to periodically provide blurry, high-level glimpses of the reality on the ground. Data use to improve education services at both the policymaking and classroom levels, on the other hand, has been rare.

Data Use: More than just IT

If you implement it, they may come...but will they like what they find? As stressed earlier in this guide series, an LDS should not simply be an IT project, and data use is the reason why. While technical staff will develop the system, an LDS should be designed *by* and *for* the end users if it is to meet their needs.

The IT staff can translate the business needs into a system that includes all the specified data elements. They can follow the defined business rules as requested and validate the data; and, in the end, they can create a system that "works" in a technical sense. But ultimately, the end user may find the system lacking if it is merely a collection of data and government reports. And, without useful tools and stakeholders who understand how to use these data in a meaningful way, the LDS will likely be under-utilized and fall short of its transformative potential. In a sense, it could end up being just an IT project after all. To avoid this, the system's design and development should be focused on using data not only to improve operations, but to ensure greater student success.

Many factors have contributed to this reality. Educators have lacked data that were timely and granular enough to be very useful at the classroom and student levels. High-level snapshot data were often available, but educators and researchers did not have access to the detailed longitudinal data needed for deeper and more meaningful analysis. Motivated educators hungry for data found accessing and manipulating the information difficult as it required collecting data from disparate sources and points in time, then painstakingly analyzing them by hand or through other time-consuming means. In general, educators have not been taught how to use data effectively (during pre- or in-service teacher preparation programs), largely because institutional cultures simply have not valued and encouraged data use (Wayman 2005). Education agencies have made laudable advancements in recent years, developing LDSs with many or all of the major components and functionalities. Yet these systems have often failed to lead to the effective use of the new student-level, longitudinal data; and, thus, to substantially benefit the full range of potential stakeholders.

But the landscape is quickly changing. At both the state and local levels, carefully planned, skillfully developed LDSs–in combination with user-friendly tools and strong cultures of data use–are moving the education community into an era rife with objective inquiry. Agencies are beginning to transcend the historical purposes of data collection, empowering stakeholders throughout the education community by expanding their use of data to improve their work and student outcomes. They are increasingly using data to inform decisions about everything from policymaking and resource allocation, to professional development programming and targeting, to instructional planning and intervention at the classroom and student levels. As increasingly sophisticated LDSs are implemented and expanded, and greater use of data is fostered among stakeholders, major changes are occurring.

Data: From Local Burden to Universal Resource

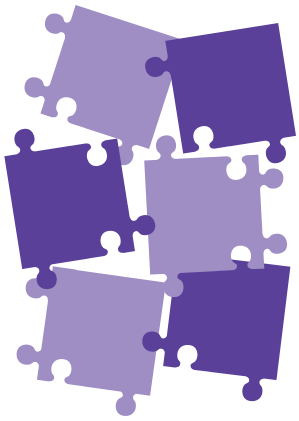
With a sophisticated LDS, data become a universal resource, not just a local chore.

Historically, many local education staff might have summed up their relationship with data as "we make them, they use them." That is, school and district staff collected and reported data to comply with state and federal requirements and receive funding, but rarely used them to enhance their own work. Making data locally available in a useful and timely manner was difficult due to technological challenges, and often was not a priority. With the advent of robust and accessible LDSs, however, the local data burden is increasingly leading to greater reward.* When useful data are made available to local stakeholders, the dynamic shifts to "we make them, everybody uses them." From the local perspective, this is a fundamental repurposing of education data from an administrative requirement to a valuable resource–an informational asset that empowers stakeholders at all levels to improve students' educational outcomes. Indeed, data use is growing among educators and, already, many administrators and teachers no longer make significant decisions without objective, high quality facts in front of them.

*Compounding this change is the decrease in burden made possible by interoperability solutions that reduce data entry errors and eliminate the need for redundant data entry into multiple systems.

Policymaking and Administration: From Guesswork to Evidence-Based Decisionmaking

Historical use of aggregate data to gauge performance, evaluate success, and plan for improvement is slowly but surely giving way to the use of timely, detailed data that offer substantially greater precision and reliability. Armed with more granular, accurate facts about what is happening on the ground, policymakers and school leaders can better assess what is working and what is not. In effect, this enables them to allocate resources more efficiently and effectively. For instance, decisionmakers can more objectively and reliably gauge the real impact of policies and programs on student outcomes. And, by linking and aggregating longitudinal, student-level data to various educational inputs, leaders can determine which schools are most effectively teaching which subjects to which types of students (for example, those who have struggled academically with particular concepts and skills, etc.). Professional development needs are also more easily identified and targeted to ensure all educators are well-qualified. In effect, leaders can trade hunches for facts, supposition for the scientific method.



Teaching: From Intuition, Isolation, and Rigidity to Objectivity, Collaboration, and Fluidity

Teaching has traditionally been a private matter, largely dependent upon the instructor's intuition and skills. Today, with detailed, relevant, and timely student-level data accessible through user-friendly tools and reports, as well as social networking processes and tools (online bulletin boards, professional learning communities, and other resources), teaching is quickly becoming a more objective and open endeavor. The reality is, no teacher can discern the patterns in every student's performance and behavior, much less figure out how to meet individual needs most effectively–especially when they are responsible for a large number of pupils. Better data and analytical tools can clarify reality, simplify the information teachers have to process, reveal patterns in performance and the effects of their own actions, and remove biases from interpretation. And with more information available, more and more educators can collaborate to learn from the data, reflect on experiences, and share effective practices and instructional materials as evidenced by the data. Reliance on infrequent, summative tests is fading in favor of frequent, interim and formative assessments that measure growth, pinpoint deficiencies, and help teachers adjust instruction throughout the school year (see the "Balanced Assessment System" section in chapter 3 for more information). With the new insights revealed by the data, educators are better able to assess their methodology, differentiate instruction for groups and individual students, monitor student progress throughout the year, and continually make adjustments to better meet students' needs.

Teaching in this century

The school year had just begun at Century Elementary School in Grafton, North Dakota. Children in this K–4 building had already taken assessments in math and language arts. Results were quickly distributed to staff and, based on the findings, pupils were placed in core and tier instruction groups with similarly scoring peers.

Throughout the year, the students' performance is continually and individually monitored for progress. Teachers meet on a regular basis with the school's response to intervention (RTI) coach, guidance counselor, and principal to adapt instruction to students' advancements and changing needs.

"Teachers today must collaborate and work as a team using timely data," says the principal. "School now follows a fluid model."

Data Sharing: From Partitions to Partnerships

Data sharing among institutions was limited in the past and continues to pose a host of logistical challenges. Today, data sharing is a growing reality among schools as well as districts. In addition, K–12 education agencies share data with early childhood and postsecondary education, and other agencies such as labor and social services. Unique identifiers and improved communication among and across levels of the education system are providing a clearer picture of where students are, how they are progressing, and what their long-term outcomes are; as well as a detailed view of how their experiences relate to their success. For instance, what effects might early childhood education have on performance in elementary school? Elementary years on middle school? Middle on high school? High school on postsecondary education and workforce success? And for students who go on to be teachers, what effects might pre-service training have on their future pupils' performance? Data sharing throughout the P–20 system can help provide the answers to these important questions.

Asking the data: Then and now

Longitudinal, student-level data help put reality under a microscope in order to understand the details of what is going on. This allows much more precise analysis of the effects of policymakers' and educators' actions, as well as other factors that contribute to educational success or failure. (For the types of questions these data can answer, see chapter 5 of *Book One: What is an LDS?)*

Table 1 illustrates the transformation enabled by student-level longitudinal data. The before-and-after presentation compares the types of questions traditional, aggregate snapshot data can answer about the education system (questions without an LDS); to the more detailed information available with an LDS. As the table shows, the data offer a better understanding of what is actually happening in schools. The questions in this table, taken directly from *Information Won't Be Used If No One Can See It* (Dougherty 2008), are policy-level questions that rely on summative assessment data. More detailed questions can be answered with more detailed data, such as formative assessment data, input data, and other information.

Table 1. Policymaker questions: Before and after development of a sophisticated LDS

Data use	Questions without an LDS	Questions with an LDS
Analyze assessment results	■ How many students were proficient in 8th grade?	■ Disaggregated by prior achievement: How many students who were proficient in 8th grade stayed proficient in 10th grade?
	■ How many students scored below basic in 4th grade?	■ What percentage of below-basic 4th graders normally reach proficiency by 8th grade?
	■ What percentage of this year's high school seniors took at least one Advanced Placement (AP) course and passed the corresponding AP exam?	■ How is completing an AP course and passing the AP exam related to students' 8th grade achievement levels?
	■ Which schools and districts have the highest test scores within their demographic category?	■ Which schools and districts do the best job of producing growth among academically advanced students? Are these different from the schools and districts that do the best job of helping students who are academically behind catch up?
Analyze graduation rates	■ How many students graduated this year?	■ What percentage of students who completed 8th grade four years ago graduated on time this year, taking into account transfers and dropouts?
	■ How does the number of 12th graders in each high school compare to the number of 9th graders three years earlier?	■ What causes these differences, taking into account transfers, dropouts, and students held back a grade?
	■ Does the number of graduates relative to 8th graders in this district appear to be declining? Were 8th grade test scores increasing or declining four years ago?	■ How are students' graduation, dropout, and transfer rates related to academic performance levels in 8th grade; and how are those relationships changing over time?

Analyze course completion data	■ What percentage of students in each grade received course credit for algebra II?	■ What percentage of students receiving course credit for algebra II met college readiness benchmarks on the ACT* or earned a corresponding score on the SAT*? ■ What percentage of students who completed algebra II also demonstrated proficiency on an algebra II end-of-course exam?
	■ What percentage of high school juniors and seniors took algebra II or courses beyond algebra II in the past two years? What percentage of students in the state's colleges needed remediation in mathematics this year?	■ How many of last year's graduates who completed mathematics through at least algebra II in high school and entered college this year needed remediation in mathematics?
	■ What were 8th grade proficiency rates for math two, three, and four years ago?	■ How do the answers to the questions above vary for students based on their mathematics performance level in 8th grade?
Compare K–12 performance to postsecondary success	■ What are the high school graduation trends in this district? What are the college enrollment trends in the region and state?	■ What percentage of the students from this district enroll in higher education within two years of high school graduation?
	■ What are the trends in student grades, majors, and graduation in the two- and four-year colleges in the region and state? ■ What are the trends in the academic achievement levels and course-taking patterns of this district's high school students?	■ What are the trends in college grades, majors, and graduation for students from this district; and how are they related to those students' 8th grade achievement levels, high school course-taking patterns, and high school academic achievement?
Compare elementary and middle school performance to success in high school	■ What are the achievement trends in this district's elementary, middle, and high schools?	■ How do students from this elementary school perform after they move on to middle school? How do these middle school students perform on state assessments and college readiness tests in high school?
	■ What are the course-taking patterns in this district's high schools?	■ How many of the students from this middle school take rigorous courses in specific subjects in high school, and how do they do in those courses?
	■ What percentage of students are performing at specific achievement levels in the middle and high schools that students leaving this school normally attend?	■ How does the performance of this school's students in the next level of education relate to their academic achievement level when they leave this school?

SOURCE: Dougherty, C. (2008) *Information Won't Be Used If No One Can See It.*
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*American College Testing (ACT), Scholastic Assessment Test (SAT)

A Case Study: From Inches to YARDs

Part I: The struggle to expand data use

The Cambridge Public Schools in Massachusetts had been working on its districtwide LDS for some time. Several years of student data were housed within the district's local data warehouse—demographics, enrollment, attendance, discipline, classroom grades, state and local assessment results, etc. But despite this rich collection of data, use of the information was limited. In fact, only a few staff members in the entire district were capable of accessing the data to track down information, conduct analyses, and produce reports. And, aside from fulfilling reporting requirements, the district had used the data for only two purposes.

First, they produced annual reports that compared student outcomes disaggregated by demographics. This established benchmarks to help the community see how well the school system was achieving its goals. Then, the district provided teachers with historical data snapshots of each student they would have the following year—a resource educators found very helpful in preparing for the new school year.

Despite these two very productive data uses, district leaders knew that their inability to provide broader access to the system was a significant missed opportunity. They needed to provide administrators, teachers, researchers, parents, students, the public, and city programs and services with greater access to these valuable data. The district had a history with commercial technology solutions, but its experience suggested that, rooted in the business world, these products were inadequate to meet the unique needs of the education community. In spite of this, the district again turned its sights outward for help.

Over the next year or so, the district tried to determine how they could more effectively use their data. They held meetings with various stakeholders and came up with a list of five main indicators of student success or failure that they wanted to track. They also knew they wanted to follow student cohorts and explore the factors related to their performance, and to extend analytical functionalities down to the classroom level. Armed with a basic idea of what they wanted, the district released a request for information (RFI) to see what solutions were available. They received over a dozen responses. After a few presentations, the staff culled out their favorite functionalities from the vendors' recommendations and crafted a detailed request for proposals (RFP) to find the right solution.

After hearing from the few respondents who said they could meet the requirements, the district chose a start-up company whose suite of technology solutions was designed to make education data more useful and accessible to stakeholders. The vendor promised it had solved many of the problems that had plagued the education data field for years, and was capable of delivering within a short time frame a flexible solution that would meet the district's current requirements yet accommodate future needs.

Confident in their choice, district leaders chose a number of modules from the vendor's suite that would provide a wide range of functionalities:

- a data warehousing solution would integrate and store data from various sources (e.g., state and local assessment data, data from other city agencies and services) and provide role-based access and extensive reporting and analysis capabilities down to the classroom level;
- an online testing platform with reporting capabilities would allow educators to easily craft online assessments tied to academic standards, and to then quickly pull up detailed analyses of the results;
- an instructional management system would put a host of resources at users' disposal to help educators create lesson plans and assign work to students; and

- a social networking tool would connect students, parents, teachers, principals, and district administrators in a secure environment. With a look and feel similar to leading modern social media and networking tools, the application's familiarity would hopefully make the tool second nature to many users.

These modules would be rolled out individually and accessible through a single, user-friendly interface where users would be able to view longitudinal data, gauge progress towards education goals, access testing and instructional resources, and easily communicate with one another.

Now it was time to put the vendor and its solution to the test. The district moved forward with cautious optimism.

Part II: Rollout, training, and a look to the future

Rollout of the Youth and Resource Development system (YARDs), as the district's system was named, was planned in stages, with broad expansion of access to longitudinal data as priority number one. A speedy timeline was set for the initial phase and the vendor was able to quickly integrate ten years worth of longitudinal student data from various sources, correcting many data quality issues in the process. Within phase one, teachers, principals, and district administrators were also given access to customized dashboards to provide access to this wealth of information:

- District administrators received easy access to up-to-date information on districtwide operations and performance data, drillable down to the school, classroom, and student levels.
- School principals were given school and classroom overview data that can be disaggregated down to the classroom and student levels.
- Teachers gained easy access to classroom- and student-level information such as demographics, attendance, assessment performance, participation in programs offered by the district or other city agencies, and alerts about struggling students. Teachers can access these data during the summer to learn about the students they will soon have in class. Whereas previously teachers needed to request most data from the school office, the new software put even a wide variety of historical data at their fingertips.

Through these dashboards, data coaches and other staff were able to conduct analyses at the aggregate level to help teachers and administrators monitor student outcomes, identify trends in cohorts, gauge the effects of programs, and determine how to boost learning and improve performance. School principals and administrators were able to generate and publish reports online to share with specific audiences; for example, reports on grade-level assessments might be shared and used to collaborate with teachers. In the next phase, teachers will use electronic grade books and report cards; and educators and students will gain access to goal planning and progress monitoring tools towards grades, graduation, higher education objectives, etc.

Training

Professional development efforts began before the system was in place. But rather than introduce the technology as the main issue of training, the district decided to address the broader issue of data analysis and introduced the technology as a part of the bigger picture—the tool rather than the focal point. At the high school level, training focused on administrators and teachers; for K–8, data and curriculum coaches were trained to work with teachers only. When the system is fully operational, staff will have time built into their schedules for professional development so they may learn to use the software and conduct their own data explorations and analyses.

The future

The district is very excited about the YARDs initiative. While implementation has suffered some setbacks, mostly related to difficulties defining a districtwide vision for data uses, the district has been encouraged by its success so far and continues to actively pursue its goals for the new system. Leaders envision extensive use of data with the help of their new tools. As new modules are introduced, they hope to slowly incorporate the technology more and more into the school culture. Their ultimate goal is a significant transformation—a new environment where students, parents, teachers, and administrators can easily and intuitively access data, instructional materials, and assessments; communicate with ease; and collaborate using data to improve education.

In addition, district leaders hope to expand data sharing and use well beyond school walls. The ultimate goal is for YARDs to become a citywide resource that connects a host of city-run organizations. This would enable broad collaboration towards improved city programs and services, and better ensure the academic success and overall well-being of all of Cambridge's students.

Chapter 2

Prerequisites for Effective Data Use

For an LDS to reach its potential, certain conditions of high quality data use must be met. These prerequisites fall into four basic categories: data, access, understanding, and support. Specifically, to exploit the information effectively, users must have easy access to, and an understanding of, high quality data; as well as strong leadership and organizational support. The more effectively agencies achieve these ideals, the more successfully the system will be utilized. Without effective realization of these conditions, the system is likely to fail in various predictable ways.

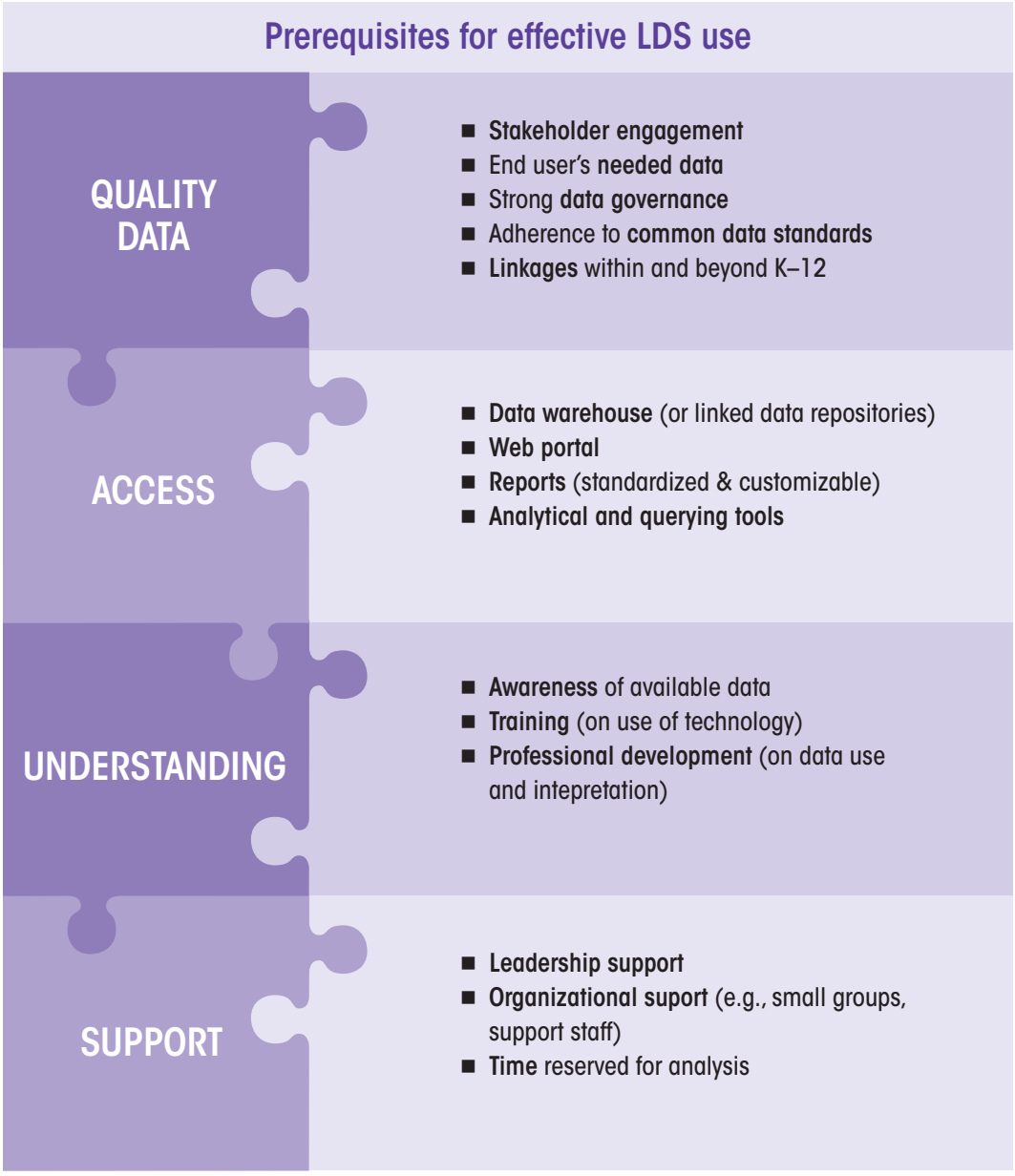
> To exploit the information effectively, users must have easy access to, and an understanding of, high quality data; as well as strong leadership and organizational support.

To fully benefit from the LDS, stakeholders should have

- **high quality data** that meet a broad range of user needs and are accurate, comparable and trustworthy;
- easy **access** to key information (e.g., performance and evaluation indicators) through a web portal, reports, and analytical and querying tools;
- an **understanding** of what data are available to them, how to use the tools to access and analyze the information they need, and how to make sense of the facts presented or interpret the results of their own analyses; and
- **support** from strong leadership, colleagues, and peers who value, model, and facilitate effective data use.

Figure 2 illustrates these requirements.

Figure 2. Data use framework



Quality Data

In *Book Two: Planning and Developing an LDS,* the importance of defining and meeting stakeholder information and analytical needs was discussed. And in *Book Three: Effectively Managing LDS Data,* data quality was addressed in terms of ensuring accuracy, timeliness, validity, and utility. This foundation of high-value, high-quality data provides the raw materials for effective LDS use.

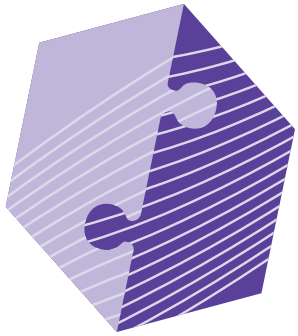
- **Stakeholder engagement to envision ideal and gain buy-in**
  System success begins with stakeholder interest, established through early and continual involvement. End users should be involved in the design and refinement stages, including the selection of data items that will be collected and made available through the system.

- **LDS populated with valuable, needed data**
  The system should be designed to include all data stakeholders need to answer their questions, including those needed for reporting requirements. This detailed information, including historical data, must be linked over time and cover areas such as student, staff, institutional, curricular, achievement and assessment (formative and summative), programmatic, and financial information. The system should be designed to answer known information needs, yet be flexible enough to accommodate newly identified requirements and new data items as needed.

- **Quality data ensured through a strong data governance process**
  Decisions based on bad data are likely to be deficient. Therefore, a strong governance process and staff training program should be implemented to ensure data quality and utility.

- **Adherence to common standards**
  Adherence to common data standards facilitates data quality, interoperability, and comparability across systems. Agencies should follow widely accepted data standards including definitions, code sets, technical specifications, and other guidelines.

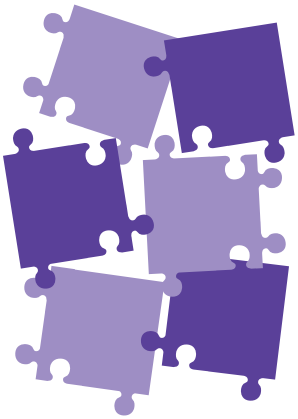
- **Integration of K–12 agency data and linkages to outside data sets**
  Ideally, K–12 data systems should be linked or integrated with data from early childhood education, postsecondary, the workforce, neighboring states, and other agencies as determined by the state or district. This broader integration allows a more complete picture of students' experiences throughout their education and professional lives.



Access to the Information

Beyond the crucial foundation of quality data, users must have the tools to access the information they need and are authorized to see. Without easy access, the information may require tedious work to find and decipher, making data use less likely.

- **Data warehouse (or linked repositories)**
  Agency data should be consolidated in a central data warehouse (or linked across multiple source files) to allow users to easily yet securely access and analyze key information from different areas of the education system. Data from separate systems should be transferred frequently to ensure they are current.



- **Web portal**
  Data should be available via a user-friendly web portal that provides secure access to the agency's reporting and querying tool. This single point of access can provide easy access to longitudinal reports and analytical tools from a wide range of sources.

- **Useful and timely reports**
  Agencies should create pre-packaged, high-quality reports to answer frequently asked questions or provide key information. These reports should clearly and concisely communicate important information and give users context to ensure accurate and appropriate interpretation. They should also be timely to allow stakeholders to take action in the present rather than simply reflect on the past.

- **Analytical and querying tools**
  Easy-to-use reporting and analysis tools built "on top of" the data repository(ies) will help stakeholders quickly access and analyze key data. These tools may include statistical and visual analysis tools that help identify trends and relationships among variables; and may be consolidated in, or accessible from, user dashboards to help educators and other users explore key information in real time.

Capacity to Use and Understand the Data

If users do not understand what data are available and how to appropriately analyze and interpret them, the information will not be used or, worse, may be misused. Therefore users must be trained in data analysis and its predicated technology, and must understand the value and limitations of the data at their disposal.

- **Effective dissemination**
  Access, reports, and tools are not enough. Potential users must know the information is available and understand how to use it effectively. Agencies should thus communicate what data assets are, or will be, available.

- **Training and professional development**
  Stakeholders should be trained to effectively use the available tools to access, query, and analyze the information. This professional development, both pre- and in-service, should also teach how to appropriately interpret and use the data.

- **Staffing capacity**
  Agencies must be able to understand and analyze their data. In-house analysts who understand the data and can use them to answer questions and build ad-hoc reports can be very beneficial. Alternatively, or additionally, agencies may look to outside researchers (e.g. from universities) for analytical support.

Support from Leadership and Peers

All the investment in training and technological tools will be wasted if staff are not given the time to use the available resources and apply what they have learned to improve educational processes and student outcomes.

- **Leadership support for data use**
  Leadership support and a strong culture of data use to improve learning are critical to effective data use. Educators need help to successfully decipher the data and apply the insight they gain to instructional planning and practices. This help often comes from principals, but may also come from others such as department lead teachers, in-house data coaches or hired consultants.

  (Office of Planning, Evaluation, and Policy Development 2009)

- **Organizational support for data use**
  Educators should collaborate to learn from their colleagues, consider their experiences, share best practices, reflect on the data, and formulate strategies. This requires flexibility in the pace of the curriculum and openness to teacher innovation. If teachers are to use data to help their students, they must be able to adjust their strategies when necessary. If the curricular schedule is inflexible, teachers will be unable to respond to the data effectively. Additionally, standardized frameworks, procedures, and tools to guide data use can help educators leap from raw assessment and other data to instructional changes. Tools for this purpose may include data system links to instructional materials and model lesson plans, as well as to instructional frameworks and curriculum guides.

  (Rennie Center for Education Research and Policy 2006)

- **Time**
  If educators have access to masses of high-quality data and state of the art technology, but are not afforded time to review reports or interpret key data, the information will probably be ignored. Education leaders at every level should build time for data use into administrators,' teachers,' and other staff's regular schedules. This may require some creative scheduling and perhaps some extra staffing, but it is essential.

Quality, Access, Understanding, and Support

Once these four prerequisites of data use are met, the stakeholders must then take the final step and use the tools and the new data to inform their work. Identify what works and what does not, adapt to meet the challenges the data have revealed, and increase operational efficiency.

A Case Study: Soaring to Western Heights

Early in the Oklahoma morning, the superintendent of Western Heights (WH) Public School District sits down at the computer and logs onto his personalized dashboard. There, he peruses a host of data on the district's schools. Noticing a new dropout at the high school, he drills down to look at his record, checking the former student's expected graduation date and test scores; and exploring demographic, economic, and other data to try to discover what may have contributed to the loss. Meanwhile, teachers and staff take roll and enter attendance records into the local data system, automatic notifications are sent out, and attendance secretaries at each school contact the parents of absentees. Later that day, several teachers meet to discuss results of a recent formative assessment and to devise a joint plan to meet their students' needs. They view fresh data on their students' performance, seeing which of them has the most success with which areas of the curriculum, sharing effective strategies, and using the district's Professional Learning Community (PLC) website and curriculum management system to find helpful instructional materials. While on the PLC website, which links to the district's many other teacher groups, they post a question to their colleagues. That evening, a state university statistician who is also the district's school improvement director visits the site and reads the question. He begins to gather data from the LDS to try to find the answer.

Under strong leadership from a superintendent who placed high value on data use long before the issue was prominent on the national or state education agenda, Western Heights has created a robust local LDS and paired it with extensive access, sophisticated analytical capabilities, and a strong culture of data use. The combination is a recipe for very effective, data-informed decisionmaking that has gained national attention.

Western Heights dashboards

Administrator dashboard: Administrators have access to a host of school-level summary data, including the number of suspended students, meal status, recent enrollment and transfer counts, and dropouts; a trend-based analysis tool that shows performance on the state annual summative assessments; and an NCLB validation requirement report, that shows the percentages of students tested in each school by subgroup and by teacher.

Teacher dashboard: Teachers are given alerts when their students are falling behind or having trouble with particular areas of the curriculum (e.g., which standards they are struggling to master), class summary reports on test results by academic standards, reports that show student test scores and attendance data, trend data on students' performance by academic standards, and more.

Parent dashboard: Parents can easily access data on their children, including attendance, schedule, meal account, report cards, and standards-based reports on student performance.

System: All the pieces that help make the district a model data user

In building its district-level LDS, Western Heights decided not to rely on any single vendor. Instead, the district pieced together a collection of interoperable products—all Schools Interoperability Framework-compliant *(http://www.sifinfo.org/us/index.asp),* "best-of-breed" technologies. The district's data infrastructure is made up of a dozen or so separate but interoperable systems, including a student information system, a student ID system, a data warehouse, food services and transportation systems, and others. Each system has clear authority over certain data items and automatic updating that ensures the data are current and consistent districtwide.

Beyond this foundation, the district's system and approach include

- **Formative assessments:** A number of formative assessments are used to gauge student performance throughout the school year.
- **Standards mapping:** Tools map a host of state assessments to a common set of academic standards.
- **Dashboards:** Dashboards provide easy access to detailed historical student data, including educational inputs (e.g., teachers, schools attended, program participation, etc.) and outcomes (multiple measures including assessments mapped to standards), and an array of analysis tools. Administrators, teachers, and parents have dashboards with tailored access and functionalities.
- **Cohort-tracking system:** Recent and historical data use identifiers to follow students and cohorts, and to establish appropriate graduation expectations. Three levels of cohorts are followed: local, state, and federal. This gives the district a fairer way to assess value added and accurately assign responsibility for successes or failures. For instance, if a student comes to the district in 10th grade with an expected graduation year of 2011, but actually graduates in 2010, the district can rightfully take credit for that expedited success. However, if the student was held back in an earlier grade while in another state or district, the federal and/or state cohort might be 2011 but the student can be placed with the local 2012 cohort. If the district does its job, the student will graduate in 2012 and the district will not be blamed for falling short of the state- or federally expected graduation year.

The pros and cons of perceptions data

Western Heights collects perceptional data—survey data measuring perceptions or "feelings" about the learning environment—from teachers, students, and parents to inform and evaluate policy decisions. While helpful in many ways, these data can be problematic.

In the first place, they are difficult to collect. Due to limited computer access in the community, electronic surveys were impractical. The district therefore used paper surveys during enrollment and parent–teacher meetings, which led to data-entry problems. Frequent surveying lowered response rates, so the district decided to conduct surveys only when they had a clearly defined purpose. For example, a survey was conducted to gauge opinions about the restructuring of academic scheduling. Surveys were also used in some cases to try to understand why student performance had dropped.

In addition, the district found the data limited in terms of application. Overall, staff found that while perceptions data were useful for informing decisions in the present, they were not well-suited for longitudinal applications. Subjective changes in opinions or perceptions, the district realized, do not represent change in the way that objective data such as assessment scores do and, thus, do not track well over time.

- **Family information tracking:** The district assigns family IDs during enrollment rather than assigning a different ID for each child. These are used for various purposes, such as allowing parents to access information on all their children districtwide, with a single user ID and password. Family IDs can also help ensure all students eligible for free and reduced-price lunch receive program benefits.
- **Growth model:** A sophisticated and publicly accessible growth model is being developed to measure and display growth and value added. The model relies on the district's common classification of academic standards.

- **Automatic reporting:** The system allows the district to produce automated state and federal reports in minutes.
- **Professional learning community (PLC) network:** A districtwide community of teacher PLCs collaborates to improve instruction and student achievement, supported by a website that facilitates communication across the district.
- **Research support:** A university researcher works with the district, providing data analysis and instructional improvement support.
- **Merit pay:** A system for creating merit pay is being developed, based on a host of teacher and student data. This evolving project has been widely supported by stakeholders, including teachers and the teachers union, who view it as a fair approach.

What is the district doing with its LDS?

Digging deep with outside assistance: To better understand the roots of its challenges and improve its students' outcomes, the district brought in an outside statistical consultant to analyze its data. Administrators wanted to build predictive models that could use scores from two annual norm-referenced tests to forecast how students would perform on the state's high-stakes, year-end test. The consultant used the district's norm-referenced and state criterion test data from a previous school year to create models for each grade level and subject. After demonstrating the model's strong predictive value, he applied the formulas to the current school year and created reports that showed teachers where their students were struggling. This allowed educators to focus on problem areas and better prepare students for the year-end assessment. Similar models are now being developed with more frequent benchmark achievement data; this will help the district predict end-of-year assessment performance as well as show academic growth. Additionally, these models will help assess the benchmark tests themselves to determine if they are rigorous enough, and if instructional practices are adequately preparing students.

Beyond the predictive models, the consultant worked closely with the district to observe how staff used the data and software applications. He then analyzed and presented findings, worked with teacher groups, and even held one-on-one training sessions to help educators determine what to do with the available data. This new insight encouraged teachers to work more openly and collaborate more effectively to meet student needs.

Teacher collaboration: Western Heights teachers work together in professional learning communities (PLCs), teaming up to analyze data and devise strategic improvement plans. Some teachers are trained as "instructional leads," learning to work with teachers and data to determine which strategies are working and which are not; and in which content areas students are struggling, both individually and as a group. They also use the data to identify which teachers have the most success with different students and areas of the curriculum. Students are then placed with teachers who possess particular strengths suited to their needs (see discussion below). Teachers also take advantage of the district's curriculum management system to find lesson plans and resources, and to send students materials to help them as necessary.

Collaboration does not end with individual PLCs. Teachers work together not only within subjects and grades, but also across grades to make sure students are ready for the following year. Teacher groups are linked by a central PLC website that allows PLC members across the district to communicate across grade levels; and the entire school district to ask questions, provide answers, and share instructional resources. The district's statistical consultant also actively engages with the staff through this communication tool.

An example of data analysis to inform policymaking

Leaders of Oklahoma's Western Heights School District were determined to identify the factors related to poor student performance in their schools. They hired a research consultant to collect a range of student data and conduct a series of analyses examining the relationships between test performance and variables such as socioeconomic status (SES) and attendance. The consultant found that, contrary to expectations, SES had no strong relationship with student performance. Attendance, however, was strongly correlated with test scores. Based on these findings, the district published a report suggesting that students with less than a 90 percent attendance rate were more likely to do poorly on the state's year-end test. Though no causal relationship was proven, the findings prompted the district to take action.

Policies were implemented to increase the number of students who showed up to school. For example, an attendance secretary was added to each school and an attendance coordinator to each professional learning community (PLC). Parents of absentees received automatically generated notifications and staff worked to maximize the number of students who showed up to school. And the district's superintendent even asked that the district start enforcing its school attendance laws more aggressively.

Further analysis unearthed a more fundamental issue: attendance problems were highly correlated with mobility. In this district with a highly mobile student body—a 70 percent mobility rate—the most transient students, regardless of SES, were most likely to have the lowest attendance rates and the lowest assessment scores. Faced with this reality, the district is attempting to identify other factors that may contribute to the relationship between mobility and student success.

Matching teacher strengths to student needs: By identifying detailed information about student needs (the areas of the curriculum in which they are struggling as identified by online, standards-based testing) and teacher strengths (the areas of the curriculum in which they have produced the greatest student performance gains), the district moves students to different teachers throughout the school year to maximize learning. This is done in various ways to provide the best instruction available as evidenced by the data. For example, if a teacher has notable strength teaching a particular concept, others may bring their students to that teacher to learn that portion of the curriculum while they themselves focus on other content areas in which they have the most success. In another example, students having trouble with a particular skill, perhaps spelling or long division, might be placed with a teacher best equipped to teach this skill. Teacher–student pairing is also used in certain interventions such as after-school tutoring. This strategy has been very effective in helping students gain the skills they need to stay on track to success.

The future

It took Western Heights years to establish its sophisticated system, and to change its culture to not only use but rely on data for decisionmaking. Today, the district continues to expand its data use capabilities; and to delve further into its data to better understand its challenges and find effective solutions.

Chapter 3

What Do Stakeholders Get? LDS Data Uses and Users

The benefits agency stakeholders will reap from the LDS depend on the effort invested in planning, designing, developing, populating, and managing a system that will help improve student outcomes. In the end, education agencies have to deliver on their promises and deliver an LDS that has practical value for users. Ideally, access to high-value data–with appropriate privacy protection–will be extended to state and federal program administrators, education researchers, district and school leaders, teachers, parents, students, the general public, and organizations outside of K–12 education.

Already, some administrators are using the data to more accurately and efficiently administer or comply with federal and state programs and requirements. Some are casually using single points of data to check the status of schools or students by viewing end-of-year summative assessments, periodic formative assessments, schedules, attendance and discipline records, etc. Some are producing reports or using real-time dashboards to get frequent updates on key information and trends; and turning the information into changes in policy, curriculum, training, and classroom instruction to improve education outcomes. And some are conducting sophisticated analyses by combining detailed data integrated over time and across institutions, matching students to teachers and programs, measuring student growth, and gauging the value of various educational inputs.

Don't leave data use to IT

Figuring out how to use the data should not be IT staff's responsibility. Ask business staff and researchers.

This chapter provides an overview of how some stakeholder groups might use an LDS equipped with key data and helpful tools. Building on earlier sections of this guide series, it reviews many of the benefits an LDS can provide.

District and School Leaders

Superintendents and other district administrators, principals, directors and other school staff, school board members, and other local-level leaders are often more avid data users than other stakeholders. This group can benefit greatly from access to real-time, detailed, longitudinal data. These users may, for instance, rely heavily on both aggregate and individual student- and staff-level data to guide decisionmaking about financial and human resource allocation, hiring, professional development, staff promotions and compensation, facilities maintenance, disciplinary policies, student remediation, placement, promotion, program implementation, product purchases, and much more. These local leaders may use portals, dashboards, or other business intelligence tools to view key indicators and trends; evaluate schools, principals, teachers; and assess the impact of programs and policies on long-term success and student learning between marking periods or from year to year. Depending on the flexibility of the tools available to them, administrators may be able to highlight information for themselves and their staff by producing their own reports, charts, graphs, lists and more. Using techniques like the value-added assessment models discussed later in this chapter, administrators can more readily identify the most effective teachers; match teachers with the training they need to hone their skills; promote the most effective educators to lead positions; facilitate the sharing of best practices among staff; inform compensation decisions; and determine which certifications, trainings, and other programs are worth the investment.

Data use: Culture change!

Data use, or lack of use, is a cultural issue. Education agencies and schools must shift from reporting and collecting data for compliance to facilitating data use for education improvement. Leaders should ask:

- What value is put on data use? Are data used only for operational and compliance reasons, or are they also used to inform decisionmaking?
- What is envisioned for data use? Is there a clear plan to achieve this vision?
- How is that vision implemented by leadership in individual schools?
- What emphasis is put on data quality?
- Is support available to help staff use data?
- Do educators have time allotted specifically for data use and reflection?
- Are the tools for accessing and analyzing data user-friendly?
- What is the depth of available analyses—progress monitoring, benchmarking, prescriptive, etc.?
- How is the information the data reveal applied?
- How frequently are data collected about student learning, the educational environment, stakeholder perceptions, etc.?

> ***"(At) the moment, high school principals know virtually nothing about what becomes of their graduates. Most don't even know whether their students make it to college at all.***
>
> ***What data they have is anecdotal. 'Once a graduate happened to drop by and tell us she was struggling with college writing,' Linda Calvo, the principal of Arleta High School in Los Angeles, told us. 'We changed our writing curriculum based on what she said. But her visit was a totally random occurrence.' "***
>
> (Schramm and Zalesne 2009)

The following are some specific questions users might answer with LDS data:

- How well are a school or district's former students faring in later grades, postsecondary institutions, or the workforce? Based on the data, administrators can devise evidence-based plans for improving student outcomes.
- What is the agency doing well and what must be improved? For instance, are many graduates requiring college-level remediation in a particular subject?
- What should improvement goals be? With goals set, educators can use the data to monitor progress towards those targets.
- Which schools and teachers might serve as models for those having less success preparing students?
- Do certain teachers have more success with students of similar socioeconomic status, race/ethnicity, sex, prior performance level, or other characteristic?
- How well do local curricula, materials, and assessments align with state summative tests? How can they be better aligned to ensure students succeed?
- What was the impact of any new textbooks or other instructional resources?
- How are certain student characteristics affecting the school or district's overall performance on assessments (English language learners, transfers, etc.)?
- What are the local rates and trends in attendance and mobility? How do these factors impact student performance?
- Who is dropping out of the school or district? What signals should prompt staff to intervene with struggling students and prevent future failures?
- Are school or district educators equitably distributed in terms of qualifications? Are certain geographic areas, subjects, or grades disproportionately serviced by the least effective or least qualified teachers? Are all district schools adequately staffed?
- What skills do teachers need to strengthen? Based on past outcomes, which types of professional development produce the greatest results?
- What is the value added by individual teachers, teachers with certain characteristics (training, certifications, etc.), grade- or subject-specific instructional strategies, or programs? Do these effects vary by student characteristics or other factors?

- Which programs are working and which are not? What weaknesses within otherwise successful programs might be improved? Does a specific program have a stronger impact on students with certain characteristics than on others?
- What facilities maintenance is needed?*
- How well do students in a specific school (or schools) for a number of years perform in comparison with children enrolled the same amount of time in the highest-performing comparable school(s)? (Dougherty 2002)
- Are other comparable schools having greater success in particular subjects or content areas, or with students sharing certain characteristics? If so, what can be learned from them?

Focusing the lens with better data

Detailed, longitudinal data can provide many types of insights. Knowing that a school's 3rd grade achievement gap has grown since the prior year is useful. But it is much more constructive to be able to account for changes in the school's student population, and know whether the achievement gap in this year's 3rd grade cohort of students actually closed relative to those same students' scores during the prior year.

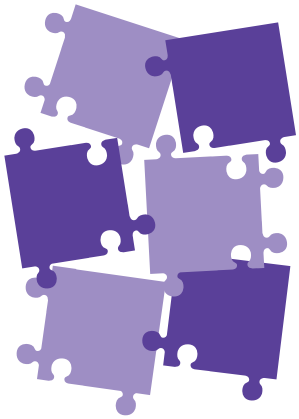
Similarly, a teacher should know that the Latino students in her school lagged White students by 10 percentage points on this year's state math assessment. But it would be even more useful for her to know whether a particular Latino student's math scores were proficient before the student entered her class. And it would be even more valuable for her to know the student had difficulty in fractions and, specifically, that on the last interim assessment, the student repeatedly made the common mistake of adding the denominators together. Based on this information, that teacher can work with the student on this skill, or seek help from other teachers who have been the most success teaching this skill.

Teachers

Teachers could potentially reap significant benefits from access to detailed, longitudinal student data. These users on the front lines of the education system can use the data to monitor individual performance on assignments and assessments, as well as growth through the year; identify struggling students as quickly as possible; target extra help to students having difficulties; adjust lesson plans as needed; and set class-level improvement

*Administrators can use LDSs to identify maintenance needs, compare the physical conditions and maintenance needs of buildings and utility systems across a district, and plan and take preventive action to ensure long-term facilities sustainability.

goals. To ensure all students' needs are met, instruction may be tailored for small groups or even individual students in a class. Teachers may access data in the form of reports produced by the state or district to provide key information on student- and classroom-level performance. Or, they might use more high-tech solutions like analysis tools or personalized dashboards that present key, real-time information that can be drilled down to the student level. Teachers can also use the data to identify their own success and failures in the classroom, share best practices with colleagues, and seek better solutions based on the facts. Some specific questions and might be:



- In what areas of the curriculum are students (the entire class, subgroups, or individuals) excelling or struggling?
- Are students on target to meet proficiency or academic growth targets? Are any students showing signs that they may be heading in the wrong direction? At what point did these students start having trouble in a subject or area of the curriculum?
- Are students with particular characteristics doing better than others? What might this say about teaching style or other factors?
- Are other teachers having greater success teaching particular subjects or academic standards? If so, what can be learned from them?

Parents and students

Though the scope of an education agency's LDS accessibility may not reach students and their parents, access to a student's course schedules, attendance, disciplinary record, credits earned, summative and formative assessment scores, program enrollment, and other similar data can be very useful. Such access can serve many purposes, including setting goals, directing study, and preparing for meetings with teachers. These stakeholders can use the data to answer the following types of questions:

- How is a student doing on assessments this year? Is the child on track to meeting the growth target or the proficiency standard?
- In what areas of the curriculum is more study or extra help required?
- What courses should the student take next year?
- Based on grades and test scores, what colleges would be appropriate?
- What grades need improvement to get into the first-choice college?
- What programs might benefit the student?
- How does the school compare to similar institutions in the district or state?

Researchers

Longitudinal data sets contain all the students across a school, district, or state, and many years of data for each, providing a vast source of detailed information. This should allow less dependence on aggregated data, surveys or studies that rely on samples of students that may or may not be representative of the larger population. Using more complete data will, in turn, allow researchers to derive results that are more reliable and representative of the broader education system. The availability of data should contribute greatly to our understanding of the education system (e.g., to evaluate the effects of programs, policies, curricula, teaching practices, as well as external factors and more). State education agencies may grant researchers access to data through various means, and in accordance with

relevant state and federal privacy laws. These may differ, as states vary in their stance on providing personally identifiable data to researchers: some allow it under strict guidelines, while others require de-identification of all data before sharing with authorized researchers.

Self-service research

While some states have trouble keeping up with data requests from researchers, others have solved this issue by creating a "self-service" model. These states grant approved researchers access to a central data store containing pre-packaged data sets.

Research partnerships, data-sharing agreements and memoranda of understanding

When an education agency has collected potentially useful data, but lacks the in-house staff necessary to analyze them, it may enter into an agreement with outside researchers to get its questions answered. The agreement may take the form of a research partnership, a data-sharing agreement, or a memorandum of understanding (MOU); the researchers may be independent research organizations, postsecondary research centers, the National Center for Analysis of Longitudinal Data for Education Research *(http://www.caldercenter.org),* etc. This can be a mutually beneficial arrangement. For instance, the Florida Department of Education provides authorized researchers with a list of subjects they want studied. In return for access to the data, the researchers conduct analyses to try to answer the provided questions and, at the same time, may also be allowed to explore their own questions, perhaps if they agree to share findings with the agency before they are published (Dougherty 2008). In addition to facilitating potentially enlightening research at minimal cost, education agencies may also benefit in other ways, such as having the data cleaned and converted into more useful formats by the researchers (National Research Council 2008).

Some states require this type of agreement before access to data is granted. An MOU can be established between an education agency and a research organization or other party such as a postsecondary institution, another agency within the state, or a state education agency from a different state. This allows data sharing or access to protected data. MOUs generally articulate the agency's interpretation of the Family Educational Rights and Privacy Act (FERPA) and other relevant privacy laws, establish ownership of the data, set the terms of data use, and establish a common set of goals for the data analyses.

State-level decisionmakers

Governors, chief state school officers, and legislators are some of the leaders at the state level who can use LDS data to learn about their state's student population, including program eligibility, mobility, etc. They might also monitor student performance and outcomes, such as academic performance, dropout rate, National Governors Association (NGA) or four-year-cohort graduation rate,* etc.; apply more sophisticated methods of

*The National Governors Association (NGA) graduation rate is a standard, four-year adjusted cohort graduation rate agreed upon by all 50 governors in 2005.

accountability, including value-added and growth models; and inform decisionmaking on policies and programs, resource allocation, and initiatives to help improve their state's education system. (DQC 2009)

Sample state data use websites

School Improvement in Maryland: *http://www.mdk12.org*
Wisconsin Information Network for Successful Schools (WINSS): *http://www.dpi.state.wi.us/sig*
Indiana Accountability System for Academic Progress (ASAP): *http://www.doe.state.in.us/asap*

Federal government and state education agencies

A successful LDS should enable more efficient, less burdensome data reporting by schools and districts; and help state education agencies (SEA) meet federal reporting requirements such as timely and accurate submission through the ED*Facts* system. State-level decisionmakers may use these data to inform decisionmaking about funding and other issues, including the improvement of state-funded teacher preparation and certification programs, dual enrollment, charter school policies, and more. (DQC 2009 and National Research Council 2009)

Planning big, starting small

Although education agencies may have high expectations about revolutionizing data use, they likely will have to achieve their goals on a small budget. As such, they should identify the most critical issues for stakeholders and address these first. Achieving critical goals first helps garner support from skeptical stakeholders.

Higher education, including teacher preparation programs

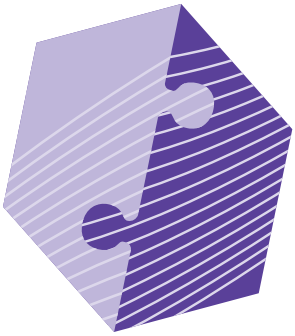
Postsecondary leaders can use LDS data linked to K–12 to prepare for their incoming students' needs, and to better assess applicants' credentials and the predictive value of their admissions criteria on postsecondary success. They can also use the information to ensure the necessary staffing resources and to identify the most effective transition strategies (DQC 2009). Furthermore, if teachers' credentialing programs are linked to student data, those programs can better assess their own effectiveness by examining the educational outcomes of their graduates' students. Additionally, these institutions and programs can use detailed LDS data to understand the geographic distribution of critical shortages schools face in hiring teachers of mathematics, science, English for speakers of other languages, special education, etc. They can then use this insight to respond more strategically to this problem, advising students into these subjects and offering field experience in schools facing the direst shortages.

Industry, workforce agencies, and the workforce development system

Industry can use longitudinal student data to learn more about tomorrow's workers, perhaps considering a state's educational outcomes when deciding where to establish businesses (EIMAC 2007). Workforce development programs can also assess their impact on graduates' success in the labor market and identify areas that need improvement.

Early childhood education

Longitudinal data linked from K–12 to early childhood education (ECE) programs can show administrators how well they are preparing children for success in elementary school. In turn, the results can help them identify ways to improve their services so that students get the best start possible. (DQC 2009)



Social service agencies

Foster care, juvenile justice, health and human services, and other social service agencies that share data with education agencies can use the information to study how their services affect students' educational outcomes (DQC 2009). For example, the connection of education and foster care data can help agencies better understand the needs of their clients; the relationship between their services and academic performance, such as the impact of student mobility across foster homes and schools on academic performance; and the ways they can improve their services to better meet children's needs (Rennie Center for Education Research and Policy 2006).

The public

The public in general also stands to gain from more detailed and accurate data. Taxpayers can understand with greater precision where their money has gone, and how well students are performing as a result of the resource allocation decisions made by school and district officials. Homebuyers will also have better access to information on school quality in the community, a factor in property values and on the education their children receive.

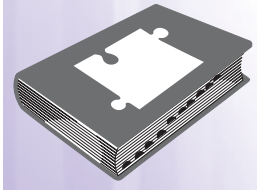
Balanced Assessment System

Assessment results are essential to any LDS focused on improving the effectiveness of educational processes and supporting increased student learning. However, what constitutes high-quality, useful student assessment data is changing. For decades, educators have relied primarily on large-scale, summative assessments to judge student performance and to hold schools accountable. An increasingly large body of research suggests that, while these assessments estimate achievement for groups of students at a specific time, they cannot inform instructional planning for the individual student.

More importantly, these studies suggest that, for a significant and positive impact on learning, a well-designed student assessment system should balance assessment types and purposes to include periodic summative assessment with frequent teacher-generated formative assessment, and ongoing self-assessment by students. This more balanced approach provides teachers with useful information for adjusting instruction to improve student learning, and helps students better prepare for future assessments. Furthermore,

the integration of balanced assessment data with other kinds of LDS data can broaden the scope of questions that can be answered. For instance, stakeholders gain greater ability to assess the effect of instructional strategies and programs, return on investment, and the relationships between policy and learning.

Formative assessments



Formative assessments are relatively short tests that are given periodically throughout the school year "to monitor student progress during instruction."

Source: Rennie Center for Education Research and Policy (2006)

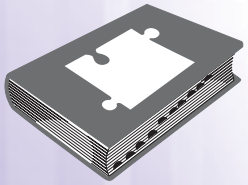
Formative assessments are relatively short tests that are given frequently throughout the school year "to monitor student progress during instruction" (Rennie Center for Education Research and Policy 2006). These tests can be a powerful component of a balanced assessment system. While summative assessment data derived from annual tests may be sufficient for high-level decisionmakers, local-level educators and administrators will benefit from the more frequent formative assessment data to help monitor student learning throughout the school year, guide curricular and instructional planning, differentiate instruction for individuals and groups, and target interventions.

However, education agencies must think carefully about their specific needs when they purchase or build a formative assessment system. For more information and tips on formative assessment solutions, see *Data-Driven Teaching: Tools and Trends* (Rennie Center for Education Research and Policy 2006).

Measuring Progress in Different Ways: Growth Measures, Growth Models, Value Added

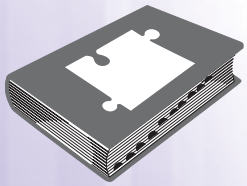
Two common uses of longitudinal student- and staff-level data are growth models and value-added models. While both models focus on student academic growth, they approach this growth from different directions. Growth models consider past academic performance to look forward and set goals for future student growth; value-added models look back on progress that has been made in order to assess the effectiveness of particular educational inputs. Growth measures are the assessment tools used to feed these models with data about student growth, such as formative or interim assessments. Thus, growth measures feed value-added and growth models that calculate results in order to tell us about the past and help us plan for the future, respectively.

Growth measures ≠
Growth models ≠
Value-added models



Growth measures are frequent, short diagnostic assessment tools (e.g., formative and interim assessments) used to measure growth in academic performance.

Growth models

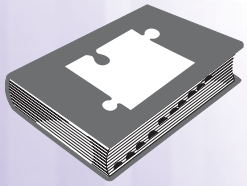


Growth models are statistical models that measure academic growth over time to predict future performance and assign target goals that, if met, will bring students towards a proficiency standard over a period of time.

Growth models measure academic growth over time. This measured rate is commonly used to establish performance benchmarks for points in the future (e.g., grade levels) against which to gauge student progress over time.

This so called "growth to proficiency" method has been supported as a fairer approach to measuring performance and holding schools accountable than snapshot assessment scores and uniform proficiency thresholds that do not take into account prior performance and other important student characteristics (Barone 2009). Growth models are also respected as valuable tools to help teachers plan instruction, target students for intervention, and help them meet their performance goals. Proponents also have argued that this approach encourages educators to help all students improve, instead of focusing disproportionately on children on the cusp of proficiency at the expense of those far below or above the proficiency level in order to seek adequate yearly progress (AYP). Commonly cited limitations of these models include a lack of transparency about how results are calculated, and a narrow scope that may only focus on assessment results as measures of academic performance.

Value-added models



Value-added models are statistical models that use a range of data on student academic growth and other characteristics to estimate the impact of certain educational inputs.

Value-added models analyze student assessments over time to estimate the relative effects of various educational inputs (schools, programs, curricula, teachers, etc.) on student learning (Wilson and Yeagley 2007). These models are commonly applied at the individual student or classroom levels.

Value-added models may be used for a wide range of purposes, such as:

- to identify the most effective teachers and help less successful ones improve their craft through collaboration, professional development, or other means;
- to measure the effects of programs, curricula, or instructional strategies;
- to evaluate the effects of principals and schools on student performance;
- to group students and teachers based on teacher strengths and student needs or characteristics such as disabilities, English language learner, etc.;

- to assess the distribution of teaching talent and guide redistribution or recruitment efforts;
- to inform teacher compensation and promotion decisions;
- to identify the most successful schools and hold the least effective ones accountable; and
- to identify the most and least effective teacher preparation programs, and ensure that all pre-service training programs are producing effective teachers.

Measuring the value added by teacher preparation programs

A small number of states are using value-added models to evaluate teacher preparation programs. By measuring student growth through such a model, linking those student data to teachers, and tracking back to the institutions where the educators received their pre-service training, states and districts can identify the most effective teacher preparation programs. They can also work to improve and hold accountable the programs that produce the least effective teachers.

A prerequisite to value-added assessment modeling is the linkage of individual student- and teacher-level data. This issue alone has been a considerable source of contention; however, the application of value-added data as a basis for accountability has added another layer to the debate.

Critics have raised concerns about these models' ability to prove causality (they cannot), and they question whether it is therefore appropriate to base teacher evaluations and compensation decisions on these data. Others point out that the models are limited in scope and do not present very broad views of student performance, putting too much emphasis on assessment results and, even then, often only assessments in core academic subjects.

On the other hand, proponents argue that value-added models offer a fairer approach to evaluating teacher impact than other common indicators of student performance and proficiency levels. They favor value-added assessments because these consider a range of growth-measure data in gauging academic performance. These models can also factor in variables over which teachers and schools have no control, such as students' socioeconomic status or prior achievement in other classes or schools.

Not without their problems, value-added models nevertheless represent a promising application of longitudinal data. Already, many different models are being used by states and districts across the country, and practitioners are working to refine them in order to get the most accurate and reliable results.

A Case Study: The Buzz on Arkansas' Data Visualization Tool

Ahead of the pack in many aspects of LDS development, the Arkansas Department of Education was struggling to make its data useful to stakeholders. A researcher working with the state had pointed out that simply giving teachers and other users access to raw data was not enough; not enough to facilitate instructional improvement, and not enough for program evaluators to easily analyze the data for themselves. Convinced it needed a better approach, Arkansas decided that a visual application might be part of the solution. So, in addition to developing a dashboard system and scorecards, the agency worked with a vendor to develop a visual analysis tool to help users examine the state's data.

After about a year of development, the state rolled out "Hive" (dubbed after grid computing, not bees), which is now available online to the general public. An adjunct site gives users quick overviews of their data. The tool is loaded with state data, but can also be populated with local level, test, and demographic data by district administrators. System designers hoped to empower users with this sleek and simple web interface that allows stakeholders to explore test scores at the district, school, classroom, and individual levels.* Filter options for program participation, demographics, and socioeconomic status allow users to view additional details or specific records of interest.

In addition to displaying assessment scale scores, Hive incorporates the Colorado Growth Model and allows users to place student growth percentiles on one axis and scale scores on the other. This adds another dimension, with scatter and bubble plots showing not only how a school, class, or student did on an assessment, but also improvement since prior tests. The tool can display scores or growth in two subject areas at once. Scatter plots show each of the individual units of analyses (e.g., schools or students) and users can roll their mouse over individual points. In the case of students, the individual's sex, race, ethnicity, and socioeconomically disadvantaged status are displayed, along with names if the user is authorized to see them. Hive's ability to aggregate students' scores and growth by teacher has allowed authorized users to explore the patterns in school- and classroom-level performance. This allows leaders to learn from successes. In some cases, schools have been identified in which every teacher's students are performing and growing at exceptional levels. The state is using this information to examine the underlying factors that have contributed to exceptional student performance.

Hive lets individuals work on their particular area of interest: a parent interested in comparing schools in their district, a teacher trying to discover patterns of performance for his students, a principal trying to determine if there are weak areas of instruction in her building, etc. However, while Hive provides individual users with many analytical and visualization capabilities, the tool's website was also designed as a venue for collaboration as it allows the exchange of findings and ideas. Users can post and share graphs they created, comment on the work of others, and impart ideas in thread discussions. This allows users across the state to learn from colleagues and others with similar interests. As a result, knowledge about student achievement in the state as a whole is greatly increased.

To prepare Hive users to explore and analyze the state's data, a training course has been offered at regional service centers. School and district staff participate on a voluntary basis; while administrators are required to take

*Initially, no classroom-level aggregation was included; this was added when teachers showed great interest in being able to view their impact on student performance. Careful attention has been paid to protecting the privacy of individual students. For instance, only authorized users are given access to identifiable information. Pages accessible to the public censor student names and suppress sufficiently unique demographic information that could be used to identify individuals.

three hours of data analysis training, and teacher certification requires technology training that may be comprised of data analysis. Rather than taking an abstract approach, the training walks the users step by step through the process of requesting and displaying the data to answer specific questions. For example, to see how a school's students compare to others in the state in a particular subject area, a trainee might be led through the process of finding and graphing scores and growth. To complement the training, Hive has links to helpful resources and training materials, including short videos to help users at all levels. A certified administrator from each district is also trained to upload local data and extend access to individually identifiable data to teachers and other authorized staff. The state uses surveys to gauge the usefulness of the training and the value of the tool in general.

Arkansas' visualization tool and training program are still young and expected to evolve quickly following user feedback. However, the initiative represents a promising, novel approach to education data display and analysis.

For more information, visit:

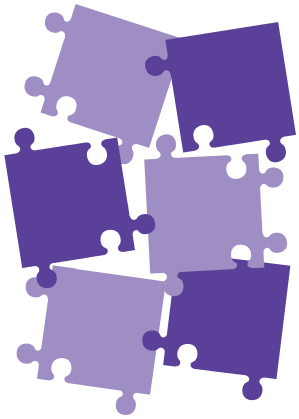
- The Hive website at *http://hive.arkansas.gov*
- The Hive Quick Looks website at *http://www.mrgh.com/ade*
- The Colorado Growth Model website at *https://cdeapps.cde.state.co.us/growth_model_public*

Chapter 4

Professional Development and Training for Effective Use of LDS Data

Simply rolling out an LDS will not help an agency and its stakeholders realize its ultimate benefits. To maximize the return on the system's investment, education agencies should systematically prepare users to take full advantage of the system, offering training to help them effectively and appropriately use the technological tools at their disposal. Users should also be offered professional development (PD) so they know what data are available; develop an appreciation for the value and utility of those data; and expand their skills in areas such as data location, inquiry, analysis, interpretation, application, and communication.

District and school administrators, for instance, should be trained to use data for evaluation and decisionmaking. Teachers should understand how to use data to guide instructional improvement. Legislators and their aides should know how to interpret the data and use them to inform policymaking. The press should know how to interpret the data to accurately depict the education system. And parents and students should know how to track progress and set goals for academic improvement and success.



Professional Development and Training Issues to Consider

Professional development and training topics covered may include logging into the system, understanding report contents, and using analysis tools for various purposes. Federal and state rules, regulations, and policies on data use, privacy, and security may also be included; at the very least, informational materials should be made available. Such training will help the enterprise hit the ground running when the LDS and data become available.

Need

Assessing trainees' needs is important. Before you begin a PD initiative, and iteratively along the way, determine what skills your target trainees currently have and what areas need to be developed.

Current skills and practices

- What type of data do staff and others already use and what do they do with them?
- Do they use state assessment data? Local assessments? Other student data?
- Do they link student data to teacher and other classroom input data?
- How do they analyze and reflect on these data, and how do they use them to improve students' educational outcomes?

Current training programs for teachers

- Do pre-service programs include data use training?
- What data use training are aspiring teachers receiving at postsecondary institutions and through other teacher-preparation programs?
- Does in-service PD on data use already exist?

Focus

Users should know what to expect. This can build excitement and support. Develop a focused plan for the topics that will be covered by training and PD.

Data awareness

- Will training build awareness of the available data, reports, and technology? What new types of data and indicators are, or will be, available through the LDS?
- What reports will be created?
- What ad-hoc querying and analysis tools will users have?

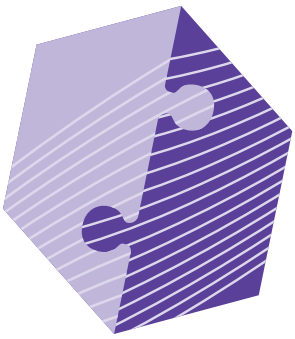
Data use

- Will the program train users to access, create, and use reports?
- Will it teach how to access and utilize analytical tools?

Data interpretation and application

Beyond pulling data up on a computer screen or even conducting analyses, educators should be prepared to understand and act on the numbers. Once they have the facts, they must know how to adjust their practices to address problems and improve performance.

- Will training teach users how to interpret the new data in the reports or the results of their own analyses?
- How will educators and administrators turn raw data, tables, or graphs into information that can inform improvement planning or program evaluation?



Data communication

- How will you ensure users speak the same data language? If stakeholders are going to interpret data and use them to communicate, establishing a common understanding of data and the terms used to discuss them is important. For instance, if staff have different ideas about what "summative" and "formative" assessments are, a certain level of confusion will hinder discussions about the data. To get everyone on the same page and avoid confusion, reviewing key vocabulary terms or creating a glossary for reference is helpful. When discussing individual data elements, a metadata system or data dictionary can also be very helpful.

The heart of "data-driven decisionmaking" is decisionmaking

While proponents of data use in education have long emphasized the use of data in decisionmaking, a caveat should be kept in mind: people, not data, should ultimately drive decisions. In other words, data should be used as a tool to inform decisions, not dictate them. While data are invaluable to objective, evidence-based decisions, they can also lead users astray if not accompanied by critical thinking.

Logic and good sense should inform all educational decisions, regardless of what the data say. Even if the research says a particular program is highly effective, for example, decisionmakers should not automatically implement it. Stepping back to take a look at the data or research results is important. Are the data valid for the requested purpose? Was the research conducted soundly and with accurate data? Can the results be generalized to the education environment? For instance, if the analysis was not conducted with local data, is the local student population similar to the sample studied? Can conditions be replicated? Does the agency have the financial and staffing resources to effectively implement the program?

Target audience

- Will PD and training be offered to teachers, administrators, administrative staff, technical support staff, researchers, legislative aides, students and parents, the public?
- Will it be mandatory or voluntary for educators or others granted access to the data? Will data-use training be tied to educator and administrator certification or other form of recognition?

Provider

- Who will provide training and PD? For instance, will programs be taught by in-house staff with expert knowledge of the system, consultants, researchers from a university, or vendors?
- Will vendors be asked to provide training on the use of their products, both to in-house staff managing the system and to end-users?
- From what level will PD be provided: from the state agency to districts, from regional agencies to districts or schools, from districts to schools, within schools by data coaches or other skilled staff, etc.?

The Forum has more…

… information about professional development and staff training:

- *Forum Guide to Decision Support Systems: A Resource for Educators* (2006)
  http://nces.ed.gov/forum/pub_2006807.asp
  (See pages 17–18 of this Forum document.)

- Forum Unified Education Technology Suite
  http://nces.ed.gov/forum/pub_tech_suite.asp

Format

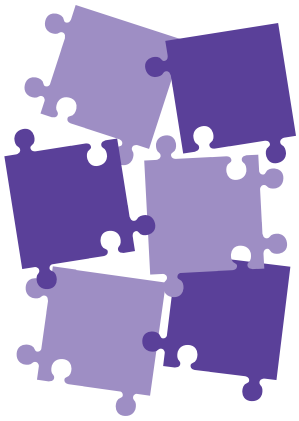
- In what format(s) will PD be provided? Will instructors lead face-to-face courses with lectures and activities, webinars, pre-recorded self-paced online video tutorials, online repositories of training materials, educator collaboration, etc.?
- How structured will the training be? Will users be taught to follow particular steps or procedures when using data, or will training be more abstract? One state education agency, for example, taught trainees a structured, step-by-step approach to using the data visualization tool. Many felt that this was more useful than a less tangible approach. In one basic, yet effective step-by-step data use methodology, users first formulate questions ("question posing"); then find, understand, and interpret data to help answer the questions ("data location comprehension and interpretation"); and, finally, develop an action plan to respond to the reality suggested by the data ("data use"). (Office of Planning, Evaluation, and Policy Development 2009)

Scope

- On what data, reports, and analytical capabilities will the training focus? Professional development may focus on a specific type of data if time is limited, such as state assessments, but if possible educators should learn how to use local assessment and other data as well. Furthermore, workshops that only explain assessment data have been found to be less useful than those that teach how to translate data into actionable information for instructional planning (Marsh, Pane, and Hamilton 2006). Depending on the range of data, the number of reports and tools, and the resources available, an agency may have to decide on the range and depth of the training necessary.

Timing

- When will PD be offered relative to system rollout, or to the introduction of key system components? Agencies suggest that a balance is important. Offering training prior to the unveiling of a system or component will help build excitement and awareness. But, if it is offered too early and trainees have to wait a long time before implementation, this excitement could be lost, as could the knowledge and skills developed in the training.
- How will your agency deal with turnover?
- Beyond initial rollout, how often will PD be offered to users? To keep the staff up to speed, training should be ongoing with new-hire training and periodic refreshers for experienced staff.



Sustainability

- How will the PD program be sustained over time? Some education agencies have dedicated resources to provide ongoing PD as needed. A train-the-trainer approach can establish the capacity at the district and regional levels, allowing agencies to continue training over time and expand the training to reach educators and other data users. Posting materials, videos, and exercises online can also ensure access to training by a broad audience even when more formal PD cannot be provided. One state also packaged the materials on a compact disc that was distributed to districts, as many had difficulty viewing the material online due to insufficient bandwidth. These strategies can be particularly helpful in large states where trainees are far apart. Furthermore, as time passes, new staff come on board, and the system and its identified uses evolve. A need therefore exists to continually gauge user needs and identify areas for refresher courses; more in-depth training; or training on new data, tools, and approaches to data use. Help lines can also be an effective way of serving users on an ongoing, as-needed basis.

Tracking

Recordkeeping serves many purposes. For example, it provides data for audits and evaluations, and for fulfilling funding requests based on training and PD efforts. Tracking who receives training and PD–in effect, who is taught proper procedures for using the data–also offers some level of protection against unethical data use and helps agencies hold accountable any end users who might intentionally misuse or manipulate data.

Logistically, this type of recordkeeping can be approached in several ways. For example, training can be required for the authorization of user accounts for analysis and querying tools. Registration in training and PD courses might also be tracked via individual identifiers maintained in the LDS or staff data system.

- How will the training and PD offered and delivered be tracked?
- When was training last offered?
- What types of training have been most effective (see Efficacy below)?
- Are more or less individuals being trained over time?

> ***"If it's worth sending teachers to a workshop, then it's worth having teachers get together to figure out how to put what they've learned into practice. Otherwise, if you just leave everybody to their own devices, very little of it is going to be implemented."***
> (Jolly 2007)

Efficacy

- How will PD be measured?
- What metrics will gauge its success? Counting the number of staff trained is not enough. Conducting a survey after the training can help measure trainees' impressions of the program, how their understanding and interpretation of data improved, for what purposes they use the data, or how their practices changed as a result of the training. Agencies may also gauge the quantitative effects of the training on student performance by comparing outcomes before and after the training, or by comparing outcomes of students taught by trained and untrained teachers.

Long-term

- How will continued learning and application of the PD lessons be ensured? Onsite data analysts or coaches may help drive local efforts to use the data effectively. These coaches may be specially trained in-house staff or external consultants. A professional learning community (PLC), or collaborative teacher group, can also provide a venue for teachers to practice and hone their skills on a continuing basis (see Professional learning communities box below). Some agencies have also developed local-level user groups that communicate with the state and share knowledge and best practices among districts (DQC 2006). Whatever the method, schools should allow time for teachers and administrators to review, analyze, and determine how to act on the data. If a culture of effective data use is to take root, this time must be built into the schedule rather than being an additional burden.

Professional learning communities

The term "professional learning community" (PLC) has been applied to a range of educator and administrator groups. In this document, a PLC is a small, collegial group of educators who work collaboratively to share knowledge and learn from one another, develop and improve instructional strategies, and increase student learning and performance.

PLCs are usually established at the school level, within grades and subject areas. They may be teacher-driven, but should have principal buy-in to ensure members have meeting time and other needed support. Social networking tools have allowed these groups to easily communicate with one another across schools and districts (see A Case Study: Soaring to Western Heights). These groups can provide an effective venue for improving data use by helping educators analyze, interpret, and mobilize based on facts about student and teacher needs.

A Case Study: The Oregon Trail to Data Use

The Oregon Department of Education, with several partner organizations, embarked on a statewide professional development (PD) program called the Direct Access To Achievement (DATA) Project. To meet the needs of educators in the field, the first year was spent assessing needs through focus groups around the state and written surveys of principals, teachers, superintendents, IT staff, and other stakeholders. Project leaders sought to answer the core question: "What do we need to improve the use of data to improve student achievement in Oregon?" Not only did they receive some resounding responses, the project very quickly gained grassroots interest and support. Based on the findings, a curriculum was developed. After a pilot round of training was complete, the "data use for instructional improvement" arm of the project was adjusted based on trainee feedback. It was then rolled out statewide in 2008, when trainers scheduled and ran seminars across the state for school and district staff.

Data use for instructional improvement: Training framework

Instructional training for the Oregon DATA Project is currently composed of four training strands.

Strand 1 Creating a Data Culture: One of Inquiry

This two-day course for lead and master teachers, superintendents, directors, and principals is meant to plant the seed for a data culture—that is, one that recognizes data as an integral part of teaching, learning, and school management. In this seminar, school leaders examine the story behind the numbers and learn to proactively respond to their new insights.

Strand 2 Using Data to Improve Learning in Districts and Schools

This interactive two-day seminar for school leaders such as directors, principals, and lead teachers offers in-depth analysis activities and strategies. Participants examine data to make leadership and instructional choices within the framework of a data-driven decisionmaking process. Participants examine their own, real data on their own, real students so that the process is experienced and understood in context. By the end of the seminar, participants have learned the methodology and made concrete improvement decisions about their district or school.

Strand 3 Using Data to Improve Learning in the Classroom

Focus in this two-day seminar is narrowed to the classroom level to help teachers and administrators use data to improve individual student learning. Training offers a chance to evaluate common assessments used in Oregon, as well as create an assessment framework and assessments aligned to instructional goals, including content, skills, and cognitive demand. Sessions include in-depth training on using formative and summative data to improve both classroom- and student-level outcomes; practical instruction on how to organize, analyze, and tie data back to improved instruction; and tools for progress monitoring.

Strand 4 Essential Skills in Reading: Impact on Teaching and Learning

This three-part strand was designed to help district teams create a K–12 system to address the skills deemed critical for students' future success. Teams are taught to use benchmark tests, progress monitoring, and scoring guides. Training offers instruction on creating an assessment and instruction system based on the Common Core State Standards (CCSS) *(http://www.corestandards.org)* and research-based practices. Participants also learn how to determine student progress toward meeting the benchmarks; discuss implementation of the CCSS; adjust and target student instruction; and create a vehicle for meaningful reflection and team evaluation.

When designing a statewide PD program on data use for instructional improvement, planners took into account the considerable variation in technologies used for data storage and analysis across the state. Six discrete data warehouses in the state can transfer data to a central state data warehouse for reporting, research, or sharing. These separate systems have administrator dashboards, though only some equip teachers. To deal with these differences, Oregon's training was designed to provide a higher level discussion of data use, laying out guiding principles to help staff analyze information regardless of the technology available. For example, participants gain an understanding of key data and data use terminology to establish a common language, including abstract concepts. Trainees are taught to locate, analyze, and tie data back to instruction and inform improvement plans; and to assess the alignment of district and school improvement plans, curricula, and programs. They also learn to evaluate programs based on merit—how well the programs are achieving their intended, measurable goals.

While the main phase of Oregon's training has ended, sustainability has been, and continues to be, a central goal. Several approaches have been taken to maintain the training effort:

- All training materials and full video segments from the seminars have been posted online and distributed widely as DVDs.
- DATA certified over 100 trainers around the state.
- Leaders partnered with regional Education Service Districts (ESDs) to carry on training at the district and regional levels.
- Several districts decided to build the capacity to hold training sessions locally.
- The project staff teamed up with postsecondary partners to develop a more in-depth curriculum that will eventually be offered at several state universities as part of pre-service training.
- To create further incentive, administrators and teachers can earn credit toward licensure by attending training.

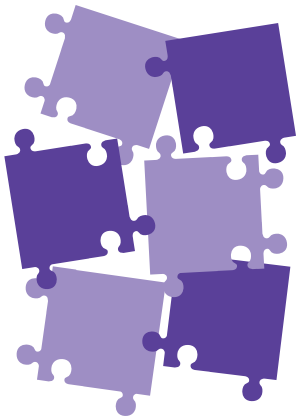
To gauge the project's effectiveness, the impact on student performance has been measured; early data suggest that students of pilot district trainees are performing significantly better since training took place. In addition, teacher data-use skills have been assessed (trainees are asked to respond to a hypothetical scenario using data), and staff opinions and beliefs about data use have been collected; for example, are assessments an unnecessary burden or a valuable tool for improving instruction and student outcomes.

Oregon's data use project has gained national attention and several other states are currently considering using DATA as a model for their own PD initiatives. For more information, including training session videos and supporting materials, visit the project website at *http://www.oregondataproject.org.*

Chapter 5

Conclusion

When the vision for this guide series was crafted, states and districts around the country were already in various stages of LDS development. Some had had them in place for many years and were striving to expand their utility, others were just beginning to find their way. Since then, education agencies continued to make great strides thanks to committed state and district leaders, the federal government, and a number of nonprofit organizations and service providers.



An Impetus for Innovation in Education Data

In recent years, the U.S. Department of Education has elevated data to a new level of importance, tying LDS development and innovative data use to competitive funding opportunities via the Institute of Education Sciences (IES) Statewide Longitudinal Data System (SLDS) Grant Program and the Race to the Top. Indeed, the message from the the federal government on education data has been getting clearer and more resounding: In order to realize a more effective, efficient, and equitable education system, education stakeholders need detailed, accurate data to provide objective facts about what is happening in classrooms, schools, districts, and states.

The thrust has been strong and the progress made towards establishing robust LDSs has been remarkable, exceeding the expectations of many. However, education agencies vary widely on many key LDS features and capabilities, including student and staff ID systems that link data about students and their teachers, the expansion of data access, the implementation of user-friendly analytical and querying tools, adherence to common data standards, and the integration and sharing of data across state lines and through the P–20 pipeline. And despite tremendous advancement and innovation at both the state and local levels, much work still remains.

An Eye Toward the Future

As they continue to develop longitudinal data systems and break down the barriers that once prevented information sharing and access, education agencies are making valuable, detailed facts available to users. How to most effectively and fairly use those data is still being debated across the country, and stakeholders–from state and local leaders to researchers–are exploring different approaches to leveraging the information. While some of these uses have been met with controversy, the possibilities and capacity to utilize this information will only grow. Great insights and improvements in policy and practice will be made but, at the same time, users will have to be careful in their interpretations and applications of the information. Numbers can explain a lot, but they cannot tell the whole story.

No doubt, the road ahead will be filled with obstacles and setbacks. Data quality, detail, linkages, access, privacy, and use will likely remain persistent challenges as education agencies continue to develop and enhance their LDSs. However, the remarkable progress made over the past several years is extremely encouraging. As more progress is made, these data will provide ever greater insight into the experiences of students as they journey through the education system and out into the workforce–a clear view of reality that has been blurred for too long. This is the kind of travel through time that LDSs are making possible. This is what makes all the effort worthwhile.

Appendix A

Overview of the LDS Guide Series

The Traveling Through Time: The Forum Guide to Longitudinal Data Systems series consists of four guides intended to help state and local education agencies meet the many challenges involved in developing a robust longitudinal data system (LDS), populating them with quality data, and using this new information to improve the education system.

Book One of Four: What is an LDS? focuses on the fundamental questions of what an LDS is (and what it is not), what steps should be taken to achieve a sound and successful system, what components make up an ideal system, and why such a system is of value to education. *Book Two of Four: Planning and Developing an LDS,* discusses the critical planning and development phases of an LDS project, from stakeholder engagement and needs assessment all the way through to system evaluation. *Book Three of Four: Effectively Managing LDS Data* explores several fundamental challenges of data management, focusing on data governance, data quality, privacy, and security. Finally, *Book Four of Four: Advanced LDS Usage,* addresses the effective utilization of LDS data, discussing the users and uses of the data; and emphasizes the need for effective training and professional development. The figure on the next page lays out the major issues covered in each of the four books in this Forum guide series.

- *Book One: What is an LDS?* is available online at: *http://nces.ed.gov/forum/pub_2010805.asp*
- *Book Two: Planning and Developing an LDS* is available online at: *http://nces.ed.gov/forum/pub_2011804.asp*
- *Book Three: Effectively Managing LDS Data* is available online at: *http://nces.ed.gov/forum/pub_2011805.asp*

To order a print copy of any of these guides, please contact:

ED Pubs
U.S. Department of Education
P.O. Box 22207
Alexandria, VA 22304

Or call toll free 1–877–4ED–PUBS or order online at *http://www.edpubs.gov*

Book I: What Is an LDS?

- Understanding what an LDS is (and is not)
- Appreciating the organizational steps needed to institute and effectively use an LDS
- Identifying the technical features and capabilities of an effective LDS and the additional features that can enhance the system's utility
- Recognizing the benefits of an LDS

Book II: Planning and Developing an LDS

- Engaging stakeholders
- Describing the current system
- Envisioning the desired system
- Defining needs, including data and functionality
- Gaining buy-in and funding
- Building relationships
- Writing an RFP
- Building or buying a system or components
- Transferring knowledge (e.g., from developers to staff)
- Defining and measuring success
- Refining the system

Book III: Effectively Managing LDS Data

- Defining governance structure
- Defining roles and responsibilities
- Collaborating to improve data quality and streamline operations
- Managing changes to the system
- Training staff to ensure data quality
- Auditing/validating data at all levels
- Establishing/following data standards
- Securing data to protect privacy
- Providing users access to key data

Book IV: Advanced LDS Usage

- Collecting, storing, and delivering key data
- Developing useful reports to fulfill common data requests and needs
- Developing user-friendly data tools to facilitate access and analysis
- Training users to utilize the technology
- Building awareness, understanding, and analytical capacity

Appendix B
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Dougherty, C. (2002). *A Policymaker's Guide to the Value of Longitudinal Student Data.* Denver, Colorado: Education Commission of the States.

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Appendix C
Additional Resources

Chapter 1. Data Use: Where It Has Been, Where It Is Going

Information Won't Be Used If No One Can See It: Why States Should Publish Statistics Based on Longitudinal Student Data

Data Quality Campaign (2008).

http://www.dataqualitycampaign.org/files/publication-information_wont_be_used_if_no_one_sees_it-090108.pdf

This article discusses the need get the right data to users, ensure the data are easily accessible, and make sure users know how to interpret the data.

The New Stupid

American Enterprise Institute for Public Policy Research (2008).

http://www.aei.org/article/28972

This article warns that, while data and research are powerful tools that can be used to improve education, we should use and interpret them with caution.

Chapter 2. Prerequisites for Effective Data Use

State Education Data Systems That Increase Learning and Improve Accountability

Learning Point Associates (2004).

http://dataqualitycampaign.org/files/Tools-State_Education_Data_Systems_That_Increase_Learning_and_Improve_Accountability.pdf

This paper examines the components needed to address system upgrades and provides policy recommendations to help states create data systems that promote accountability and improve student learning.

Addressing the Need for Better Data on Teaching in Colorado: Unique Teacher Identifier Stakeholder Process Report

The Alliance for Quality Teaching (2007).

http://aqt.civicore.com/modules/resources/resources/69.pdf

This report provides information about unique teacher identifier systems, and disseminates the outcomes of the four stakeholder meetings discussing such a system for Colorado.

Telling Compelling Stories With Numbers

http://nces.ed.gov/programs/slds/nov08_presentations.asp

Session VI, a presentation on making sense of data, is relevant for education agency staff who want to know more about data use in presentations. Variations in data presentation through graphs and figures are presented, as are a definition and discussion of dashboards.

Chapter 3. What Do Stakeholders Get? LDS Data Uses and Users

Data Use

The University of Texas at Austin

http://edadmin.edb.utexas.edu/datause/index.htm

This website includes many publications related to the use of data for informed decisionmaking at the local level.

What Is the Role of the State Education Agency in Providing Local Education Agencies With Access to Key Data for Instruction?

Education Information Management Advisory Consortium (2007).

This brief summarizes points raised in an EIMAC roundtable; participants discussed ways state education agencies could provide useful longitudinal data to districts.

Protecting Student Records and Facilitating Education Research: A Workshop Summary

National Research Council (2008).

http://www.nap.edu/catalog.php?record_id=12514

Chapter 3 of this report discusses the benefits of research using longitudinal data.

The Next Step: Using Longitudinal Data Systems to Improve Student Success

Data Quality Campaign (DQC 2009).

http://dataqualitycampaign.org/files/NextStep.pdf

This report discusses a number of key steps that education agencies need to take in order to facilitate effective data use.

National Center for Analysis of Longitudinal Data in Education Research

http://www.caldercenter.org

Visit the National Center for Analysis of Longitudinal Data in Education Research (CALDER) for examples of research made possible by the availability of longitudinal student data. In addition to a large collection of reports that analyze longitudinal data, the site provides links to several longitudinal state data sets *(http://www.caldercenter.org/research/statedata.cfm)*.

Achieving With Data: How High-Performing School Systems Use Data to Improve Instruction for Elementary Students

Center on Educational Governance, University of Southern California (2007).

http://nces.ed.gov/programs/slds/ldsshare/documentdirectory/dataaccessuse/datause/achievingwithdata.pdf

This report looks at several school systems that have successfully used data to improve student learning. The document highlights their experiences and suggests key strategies to help other districts not only become more data driven, but also use the data effectively.

Implementing Data-Informed Decision Making in Schools—Teacher Access, Supports, and Use

U.S. Department of Education (2009).

http://www.ed.gov/rschstat/eval/tech/data-informed-decision/data-informed-decision.doc

This report presents findings from several studies on data-informed decisionmaking in schools. It draws on surveys, interviews, and case studies to explore the prevalence and character of data use in schools, including data availability, use, and understanding. The support provided to help educators effectively use the data to improve achievement is also considered.

A Policymaker's Guide to the Value of Longitudinal Student Data

Education Commission of the States (2002).

http://www.ecs.org/clearinghouse/40/21/4021.htm

This early report addresses the types of policy questions longitudinal student data can answer.

Data Mining and Statistics: What Is the Connection?

The Data Administration Newsletter (2004).

http://www.tdan.com/view-articles/5226

This article describes statistics and data mining, explores the relationship between the two fields of inquiry, and argues that both approaches are valuable in efforts to understanding data.

Teachers' Use of Student Data Systems to Improve Instruction

U.S. Department of Education (2007).

http://www2.ed.gov/rschstat/eval/tech/teachers-data-use/teachers-data-use-intro.html

Using national surveys of teachers and school districts, this report provides the first national estimates of K–12 teachers' access to, and use of, electronic student data management systems.

Making Sense of Data-Driven Decision Making in Education: Evidence From Recent RAND Research

RAND Corporation (2006),

http://www.rand.org/pubs/occasional_papers/OP170

This paper discusses research on how schools and districts are analyzing a range of data, including but not limited to achievement test results to inform decisionmaking to improve student outcomes.

Tapping into the Power of Longitudinal Data: A Guide for School Leaders

Data Quality Campaign (DQC 2008).

http://dataqualitycampaign.org/files/publications-tapping_into_the_power_of_longitudinal_data-a_guide_for_school_leaders-010108.pdf

This guide looks at ways teachers and principals can use longitudinal data to meet students' individual needs and improve performance.

Linking Teacher and Student Data to Improve Teacher and Teaching Quality

Data Quality Campaign (DQC 2007).

http://dataqualitycampaign.org/files/Meetings-DQC_Quarterly_Issue_Brief_031207.pdf

This brief discusses the benefits of linking student and teacher data, important metrics for improving teacher quality and retention, how to develop comprehensive teacher data systems, the pros and cons of value-added measurements, and more.

Involving Teachers in Data-Driven Decision Making: Using Computer Data Systems to Support Teacher Inquiry and Reflection

Wayman, J. (2005). *Journal of Education for Students Placed at Risk, 10*(3), 295–308.

http://edadmin.edb.utexas.edu/datause/papers/Wayman%20-%20Teacher%20Data%20Use.pdf

This article discusses teacher use of data systems and tools, providing insight into their function and discussing conditions that make them most useful to teachers.

What Works Clearinghouse (WWC)

Institute of Education Sciences.

http://ies.ed.gov/ncee/wwc

This website provides educators, policymakers, researchers, and the public with scientific evidence for what works in education. This central, trusted source promotes informed education decisionmaking through easily accessible databases and user-friendly reports on the effectiveness of replicable education interventions (programs, products, practices, and policies) intended to improve student outcomes.

Getting the Evidence for Evidence-Based Initiatives: How the Midwest States Use Data Systems to Improve Education Processes and Outcomes

National Center for Education Evaluation and Regional Assistance (2007). *Issues and Answers Report* (REL 2007–016). U.S. Department of Education, Institute of Education Sciences.

http://ies.ed.gov/ncee/edlabs/regions/midwest/pdf/rel_2007016_sum.pdf

This report reviews the progress of several midwestern states in developing LDSs and the use of data systems in general. Based on interviews with SEA officials and federal agency staff, the authors review the work that was done, the challenges that were faced, and the current requirements being pursued by the states.

Continuous Improvement: It Takes More Than Test Scores

Bernhardt, V. (2004). ASCA *Leadership Magazine,* Nov.-Dec. 2004.

http://eff.csuchico.edu/downloads/testscores.pdf

This article summarizes why analyzing state assessment results is only the beginning of effective data-driven decisionmaking.

Intersections: New Routes Open When One Type of Data Crosses Another

Bernhardt, V. (2000). *Journal of Staff Development, 21*(1), 33–36.

http://eff.csuchico.edu/downloads/intersct.pdf

This article discusses how different types of data can be used to help educators answer key questions about student learning and the effectiveness of educational inputs.

Multiple Measures

Bernhardt, V. (1998). California Association for Supervision and Curriculum Development.

http://eff.csuchico.edu/downloads/mmeasure.pdf

This article emphasizes the need to consider a range of data about education in addition to student assessment data, commonly the sole source of information available. The author suggests we need other types of education data, including student demographics, educational inputs, and perceptions. The article describes why each type of data is useful, and what can be learned by using a combination of these data to gain greater insight before making decisions.

Leadership Summit 2006 Toolkit: Using Data for School Reform

State Educational Technology Directors Association (2006).

http://www.setda.org/toolkit/nlitoolkit2006/data/index.htm

This toolkit offers practical checklists, matrices, survey instruments, sample letters, and other tangible components that can help education technology leaders at all levels to improve teaching and learning at the school and student levels.

Benefits of and Lessons Learned From Linking Teacher and Student Data

Data Quality Campaign (DQC 2007).

http://www.dataqualitycampaign.org/files/publications-benefits_of_and_lessons_learned_from_linking_teacher_and_student_data-120607.pdf

This brief looks at how several states are linking student and teacher data, the benefits of those links, and lessons learned.

Using Data to Impact Instruction

Aldine Independent School District (2006).

http://dataqualitycampaign.org/files/Presentations-DQC_Quaterly_Meeting_Using_Data_to_Impact_Instruction_092506.pdf

This presentation provides an overview of the Aldine Independent School District's approach to data use for instructional planning. The Texan district uses a combination of trailing and leading data, creates action plans based on those data, and keeps scorecards to track progress at various levels of the organization.

Research Partnerships and Data Sharing Agreements

Protecting Student Records and Facilitating Education Research: A Workshop Summary

National Research Council (2008).

http://books.nap.edu/openbook.php?record_id=12514&page=44

See pages 45–46 and 78–79 for practical discussions of research partnerships and data-sharing.

IES Statewide Longitudinal Grant Program's LDS Share

Institute of Education Sciences.

http://nces.ed.gov/programs/slds/ldsshare/slds.aspx

This document-sharing resource contains many sample MOUs submitted by education agencies.

State Educational Agencies Form Partnership to Make P–20 Data System Information Available for Reporting, Analysis, and Research

Kentucky Education and Workforce Development Cabinet (2009).

http://educationcabinet.ky.gov/newsroom/pressreleases/stateeducationalpartnership.htm

This press release discusses Kentucky's work to establish data sharing across P–20 through collaboration between K–12 and postsecondary education organizations, as well as an educator workforce development body. The partnership allows data sharing and analyses across these sectors.

Balanced Assessment System

Professional Papers and Recent Staff Articles

Pearson Assessment Training Institute.

http://www.assessmentinst.com/resources/papers

This page links to a large collection of papers on balanced assessment and related topics. Assessment for Learning Defined (Stiggins 2005) is especially useful.

Data-Driven Teaching: Tools and Trends

Rennie Center for Education Research and Policy (2006).

http://www.renniecenter.org/0224_Brief_FINAL.pdf

This brief evaluates the implementation of three formative assessments in urban school districts. It offers useful information for selecting a formative assessment system that will meet a district's needs; and for effectively implementing the system, and then applying those formative assessment data.

Growth Measures and Models

Are We There Yet? What Policymakers Can Learn From Tennessee's Growth Model

Barone, C. (2009).

http://www.educationsector.org/research/research_show.htm?doc_id=847058

This article evaluates the Tennessee Growth Model, pointing out its strengths and weaknesses. The page also links to a response from the model's developer.

A "Student-Centered" Growth Model for School Accountability

Oregon Department of Education (2009).

http://www.ode.state.or.us/wma/policy/accountability/growth/growth-overview.pdf

This document provides a brief summary of Oregon's growth model, including a short description, explanation of why the state and its stakeholders took this approach to measuring student academic growth, and links to a file that includes a growth-target calculator with formulas.

Value-Added Models

Separating Growth From Value-Added

Yeagley, R. (2007). *The School Administrator, 64*(1):18.

http://www.thefreelibrary.com/separating+growth+from+value+added:+two+academic+models+offer ...-a0157588355

This article points out the differences between approaches to measuring value-added and growth and discusses the merits and uses of each. Another article follows this one addressing the implementation of a growth model in a California school system.

Comparisons Among Various Educational Assessment Value-Added Models

SAS Institute (2006).

http://nces.ed.gov/programs/slds/ldsshare/documentdirectory/dataaccessuse/valueaddedmodels/billsanders_valueaddedmodelcomparisons.pdf

This white paper highlights the differences between several classroom-level, value-added models; and discusses the advantages and disadvantages of each, especially as they relate to teacher impact.

Value-Added Indicators: A Powerful Tool for Evaluating Science and Mathematics Programs and Policies

Meyer, R. (2000). National Center for Improving Science Education.

http://addingvalue.wceruw.org/related%20bibliography/articles/meyer.pdf

This brief highlights the advantages of value-added models over the more commonly used indicators of student performance: average and median test scores and proficiency-level indicators.

Value-Added Indicators: Do They Make an Important Difference? Evidence From the Milwaukee Public Schools

Meyer, R. (2003). Wisconsin Center for Education Research.

http://www.eric.ed.gov/PDFS/ED497583.pdf

This working paper demonstrates the utility of value-added data using a Wisconsin district's data. It discusses why this method of measuring academic performance is superior to other more commonly used indicators.

Methodological Concerns About the Education Value-Added Assessment System

Amrein-Beardsley, A. Educational Researcher 37(2), 65–75.

http://www.aera.net/uploadedfiles/publications/journals/educational_researcher/3702/03edr08_065-075.pdf

This article examines the Education Value-Added Assessment System (EVAAS), focusing on the methodological and practical issues associated with its approach.

Value-Added Analysis and Education Policy

National Center for Analysis of Longitudinal Data in Education Research (2007).

http://www.urban.org/uploadedpdf/411577_value-added_analysis.pdf

This brief describes issues related to estimating and measuring the quality of instruction, highlighting the importance of taking student differences into account and the advantages of using academic growth rather than differences in test scores.

Value-Added Models in the News...

Growth Data for Teachers Under Review

Education Week 28(9), October 2008.

http://www.edweek.org/ew/articles/2008/10/22/09value_ep.h28.html?tmp=164757091

This article summarizes the issues and challenges around the use of value-added data for teacher evaluations.

"Value-Added" Gauge of Teachers Probed

Education Week 28(36), July 2009.

This article discusses several studies that evaluated value-added measures. It provides a good summary of the contemporary arguments around the use of these measures.

Scrutiny Heightens for "Value Added" Research Methods

Education Week 27(36), May 2008.

This article makes cautionary points about the use of value-added measures. While they hold great promise, the article suggests that practitioners must proceed carefully as we learn more about how best to model and use these measures.

Back to School: Performance Data Driving Education Now

Pittsburgh Post-Gazette, August 29, 2006.

http://www.post-gazette.com/pg/06241/717104-298.stm

This article discusses Pennsylvania's plan to implement a value-added system across the state, giving every district access to its results.

William Sanders Describes Value-Added Assessment for Measuring Student Progress

University of North Carolina School of Education (2006).

http://soe.unc.edu/news_events/news/2006/sanders_william.php

This story reports on a lecture by William Sanders on his value-added assessment system.

Chapter 4. Professional Development and Training for Effective Use of LDS Data

Direct Access to Achievement

Oregon Department of Education.

http://www.oregondataproject.org/

This website on Oregon's Direct Access to Achievement (DATA) project contains a host of resources including training materials for instructional improvement informed by data. The site also includes a strand on improving data quality.

Beyond the Numbers: Making Data Work for Teachers and School Leaders

White, S. (2005). Advanced Learning Press.

This book on local-level, data-driven decisionmaking was used in Oregon's professional development initiative, the DATA Project. In addition to discussing the foundational principles for data analysis and the strategies necessary to turn analysis into action, it provides a specific framework for analyzing a range of data, yet is general enough to support data analysis efforts regardless of the specific technology available to users.

Technology @ Your Fingertips

National Forum on Education Statistics (1998).

http://nces.ed.gov/pubs98/98293rev.pdf

See chapter 6 for a collection of best practices on training staff and others to use technology. While the chapter applies to general technology solutions, rather than specific to data systems, many of its lessons are relevant to an LDS training effort.

Collaborative Approaches to Education Data Training and Professional Development

Center for Educational Performance and Information (2009).

http://nces.ed.gov/programs/slds/zip/08_f_09a.zip

This presentation provides an overview of Michigan's approach to professional development on data quality and data use.

Data Wise: A Step-by-Step Guide to Using Assessment Results to Improve Teaching and Learning

Harvard Educational Pub Group (2005).

This book discusses what school leaders need to know and do to ensure that the piles of student assessment results landing on their desks are used to improve student learning in their schools.

Making Sense of Data-Driven Decision Making in Education: Evidence From Recent RAND Research

RAND Corporation (2006).

http://www.rand.org/pubs/occasional_papers/OP170

See pages 7–8 for a discussion and analysis of professional development approaches.

Teaching and Learning Cooperative: Sample Activities

Poway Unified School District.

http://www.powayusd.com/projects/literacy/sttl/pdfs/part%20ii%20samples.pdf

This document describes various approaches to local-level professional development. While not specific to data analysis, it includes a section on teacher research and guides educators through an exercise of data-driven decisionmaking.

Appendix D

Forum and Other NCES Resources

The Forum Guide to Data Ethics (NFES 2010–801)

http://nces.ed.gov/forum/pub_2010801.asp

Every day, educators collect and use data about students, staff, and schools. Some of these data originate in individual student and staff records that are confidential or otherwise sensitive. And even those data that are a matter of public record, such as aggregate school enrollment, need to be accessed, presented, and used in an ethically responsible manner. While laws set the legal parameters that govern data use, ethics establish fundamental principles of "right and wrong" that are critical to the appropriate management and use of education data in the technology age. This guide reflects the experience and judgment of experienced data managers; while there is no mandate to follow these principles, the authors hope that the contents will prove a useful reference to others in their work.

Crisis Data Management: A Forum Guide to Collecting and Managing Data about Displaced Students (NFES 2010–804)

http://nces.ed.gov/forum/pub_2010804.asp

This publication provides guidelines that can be used by elementary and secondary education agencies to establish policies and procedures for collecting and managing education data before, during, and after a crisis.

The Forum Guide to Metadata: The Meaning Behind Education Data (NFES 2009–805)

http://nces.ed.gov/forum/pub_2009805.asp

This guide offers best practice concepts, definitions, implementation strategies, and templates/tools for an audience of data, technology, and program staff in state and local education agencies. This resource was developed to improve these audiences' awareness and understanding of metadata and, subsequently, the quality of the data in the systems they maintain.

Every School Day Counts: Forum Guide to Collecting and Using Attendance Data (NFES 2009–804)

http://nces.ed.gov/forum/pub_2009804.asp

This guide offers best practice suggestions on collecting and using student attendance data to improve performance. It includes a standard set of codes to make attendance data comparable across districts and states. The publication includes real-life examples of how attendance information has been used by school districts.

NCES Handbooks and NCES Handbooks Online

http://www.nces.ed.gov/programs/handbook

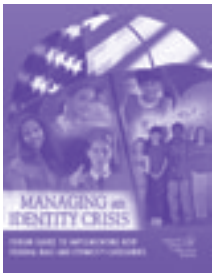
The NCES *Handbooks* are a valuable source of metadata for organizations and individuals interested in education data. These print and online resources define standard education terms for students, staff, schools, local education agencies (LEA), intermediate education agencies, and state education agencies (SEA). The Handbooks are intended as reference documents for public and private organizations, including education institutions and early childhood centers; as well as education researchers and other users of education data. In order to improve access to this valuable resource, NCES has also developed the NCES *Handbooks Online,* a web-based tool that allows users to view and download information via an electronic table of contents, a drill-down finder, element name and first letter searches, and advanced query options.

National Education Data Model

http://nces.ed.gov/forum/datamodel/index.aspx

The National Education Data Model (NEDM) is the first non-proprietary, national education data model developed to help schools, LEAs, and states design or guide the selection of systems for instructional delivery, data-driven decisionmaking, data collection, operations, and reporting. The model provides a national blueprint to help schools evaluate and improve instructional tools; communicate needs to their umbrella agency or to vendors; enhance the movement of student information from one LEA to another; and, in the end, have better tools to inform instruction. NEDM can be used by educators, vendors, and researchers to understand the information required for teaching, learning, and administrative systems.

Managing an Identity Crisis: Forum Guide to Implementing New Federal Race and Ethnicity Categories (NFES 2008–802)



http://nces.ed.gov/forum/pub_2008802.asp

This best-practice guide was developed to help state and local education agencies implement the new federal race and ethnicity categories, thereby reducing redundant efforts within and across states, improving data comparability, and minimizing reporting burden. Users may select and adopt strategies that will help them quickly begin the process of implementation in their agencies.

Forum Guide to Core Finance Data Elements (NFES 2007–801)

http://nces.ed.gov/forum/pub_2007801.asp

This publication establishes current and consistent terms and definitions for maintaining, collecting, reporting, and exchanging comparable information related to education finances. It is designed to accompany Financial Accounting for Local and State School Systems: 2003 Edition by identifying common reporting requirements and defining frequently used indicators and calculations that use data elements from accounting and other data systems.

Forum Curriculum for Improving Education Data: A Resource for Local Education Agencies (NFES 2007–808)

http://nces.ed.gov/forum/pub_2007808.asp

This resource supports efforts to improve the quality of education data by serving as training materials for K–12 school and district staff. It provides lesson plans, instructional handouts, and other resources; and presents concepts necessary to help schools develop a culture for improving data quality.

Forum Guide to Decision Support Systems: A Resource for Educators (NFES 2006–807)

http://nces.ed.gov/forum/pub_2006807.asp

This Forum guide was developed to help the education community better understand what decision support systems are, how they are configured, how they operate, and how they might be developed and implemented in an education setting.

Forum Guide to Virtual Education (NFES 2006-803)

http://nces.ed.gov/forum/pub_2006803.asp

This publication offers recommendations for collecting accurate, comparable, and useful data about virtual education in elementary and secondary education settings. It highlights policy questions and data elements critical to meeting the information needs of policymakers, administrators, instructors, and parents of students involved in virtual education.

Forum Guide to the Privacy of Student Information: A Resource for Schools (NFES 2006–805)

http://nces.ed.gov/forum/pub_2006805.asp

This publication was written to help school and local education agency staff better understand and apply the Family Educational Rights and Privacy Act (FERPA), a federal law that protects the privacy interests of parents and students with respect to information maintained in student education records. It defines terms such as "education records" and "directory information," and offers guidance for developing appropriate privacy policies and information disclosure procedures related to military recruiting, parental rights and annual notification, videotaping, online information, media releases, surveillance cameras, and health-related information.

Accounting for Every Student: A Taxonomy for Standard Student Exit Codes (NFES 2006–804)

http://nces.ed.gov/forum/pub_2006804.asp

This publication was developed to help education agencies develop effective information systems for tracking students' enrollment status. It presents a student-level exit code taxonomy for states and districts that accounts for 100 percent (not 90 or 110 percent) of all students. It also offers "best practice" advice regarding tracking students, collecting exit codes data, and distinguishing among high school completion credentials.

Forum Guide to Education Indicators (NFES 2005–802)

http://nces.ed.gov/forum/pub_2005802.asp

This publication provides encyclopedia-type entries for 44 commonly used education indicators. Each indicator entry includes a definition, recommended uses, caveats and cautions, related policy questions, data element components, a formula, commonly reported subgroups, and display suggestions. The document will help readers better understand how to appropriately develop, apply, and interpret commonly used education indicators.

Forum Guide to Building a Culture of Quality Data (NFES 2005–801)

http://nces.ed.gov/forum/pub_2005801.asp

This publication focuses on data entry: getting things done right at the source. It recommends a practical process for developing a "Culture of Quality Data" based around individual tip sheets for individuals involved in providing data, including principals, teachers, office staff, school board members, superintendents, data stewards, and technology staff.

Forum Unified Education Technology Suite (2005)

http://nces.ed.gov/forum/pub_tech_suite.asp

This publication presents a practical, comprehensive, and tested approach to assessing, acquiring, instituting, managing, securing, and using technology in education settings. It is written for individuals without extensive experience with technology who have been tasked with leading technology initiatives in a school or district setting,.

Forum Guide to Protecting the Privacy of Student Information: State and Local Education Agencies (NCES 2004–330)

http://nces.ed.gov/forum/pub_2004330.asp

This publication presents a general overview of privacy laws and professional practices that apply to information collected for, and maintained in, student records. The guide provides an overview of key principles and concepts governing student privacy; summarizes federal privacy laws; identifies issues concerning the release of information to both parents and external organizations; and suggests good data management practices for schools, districts, and state education agencies.

Facilities Information Management: A Guide for State and Local Education Agencies (NCES 2003–400)

http://nces.ed.gov/forum/pub_2003400.asp

This publication provides a framework for identifying a basic set of school facilities data elements and definitions that will meet the information needs of school and community decisionmakers, school facility managers, and the general public. It presents recommendations for designing and maintaining an information system that addresses the condition, design, use, management, and financing of elementary and secondary education facilities. Commonly used measures, data elements, and additional resources for the practitioner are also included.

Planning Guide for Maintaining School Facilities (NCES 2003–347)

http://nces.ed.gov/forum/pub_2003347.asp

This publication is intended to help school facilities managers plan for efficient and effective operations. It provides practical advice on a range of topics, including how to conduct a facilities audit, plan for maintenance to ensure smooth operations and avoid costly surprises, manage staff and contractors, and evaluate maintenance efforts.