

**The Teacher- Student Data Link
Project: First- Year
Implementation**

Final Report

February 4, 2013

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THE TEACHER- STUDENT DATA LINK PROJECT: FIRST- YEAR IMPLEMENTATION

In recent years, state and local education agencies have worked to create and upgrade data systems to link teacher and student data, and to connect pre-K, higher education, and K-12 data. The goal of this work has been to enable all levels of agencies to use accountability data to improve student learning.

With guidance and support from the Data Quality Campaign and the Bill & Melinda Gates Foundation, the Center for Educational Leadership and Technology (CELТ) conducts the Teacher-Student Data Link (TSDL) project. The project, launched in 2010, seeks to support states in developing a best-practices framework for a “teacher-of-record” definition and business processes for collecting and validating student and teacher-linked data at the state, district, school, and classroom levels. Five states (Arkansas, Florida, Georgia, Louisiana, and Ohio) and three pilot districts in each state participated in the TSDL project to enhance the teacher-student data links in their current education data systems.

The Bill & Melinda Gates Foundation contracted with Mathematica Policy Research to conduct a descriptive implementation study of the TSDL project. In this report, we present the findings from the TSDL project’s first year of implementation—2011. In a later report, scheduled for 2014, we will provide further implementation analysis, which will help better understand the longer-term project impacts. Information in this report is drawn from telephone interviews with CELТ staff members responsible for working directly with pilot states and districts, and with state and district officials responsible for the TSDL project in their agencies. A review of documents supplemented the research team’s understanding of the project initiatives.

We begin this report by outlining how selected states and districts determine their TSDL project initiatives. We then summarize the key factors that have shaped the development and use of the education data systems in pilot states and districts and describe the key initiatives undertaken as part of the TSDL project. In conclusion, we present the challenges faced and lessons learned during project implementation and follow with recommendations for next steps.

A. How Were Pilot States and Districts Determined? How Did Pilot States and Districts Determine TSDL Project Initiatives?

The Bill & Melinda Gates Foundation invited five states to participate in the project. Collectively, these states participated in numerous data use initiatives and grants, and all had an established data infrastructure in place when invited to join the TSDL project. Each state then selected three districts to pilot specific TSDL initiatives. States reported selecting districts based on characteristics such as district capacity to accomplish project objectives (such as central office staff skills or robustness of the technology infrastructure); quality of the data transmitted to the state; and willingness and ability to adopt innovative processes and programs.

CELТ then worked with the states and their pilot districts to translate goals into discrete project activities, called initiatives, related to data use, management, or system design. CELТ first conducted a needs assessment to establish baseline information about how states and districts collect and verify data, and to document strengths and areas for improvement related to each key TSDL initiative. Each state then received a detailed report articulating strengths, areas for improvement, and recommendations related to developing stronger teacher-student data links. States used this report

to inform project-specific initiatives, such as create or refine the roster verification system. They then summarized the process for accomplishing each initiative in a written plan, or charter. Each charter described the initiative's goals and focus areas, desired outcomes, deliverables, project organization, project risks and assumptions, and detailed scope of work with targeted completion dates. In Section C, we detail the type of initiatives each pilot state undertook.

B. What Factors Currently Shape the Development and Use of Education Data Systems?

Based on state and district respondent interviews, the evaluation team synthesized the following five key factors that shape how pilot sites develop and use education data systems:

- 1. Policymaking: Federal regulations and state policies drive decisions about the content of the data system.** For example, recent legislative mandates in two pilot states require links between students and teachers to facilitate federal reporting and value-added modeling used for measuring the contributions of teachers or schools to student achievement growth. In addition, decisions by state administrators dictate the development of data systems. In one pilot state, a committee made up of administrators, teachers, union leaders, and business leaders, with the consultation of a technical expert, decides which data elements to include in the state's value-added modeling calculation. These decisions ultimately determine future upgrades to the data system. So, if the committee decides to incorporate daily student attendance into the value-added model, the data system must be updated to account for the change.
- 2. Funding: States rely on funding beyond state resources to develop and enhance their data systems.** The primary funds to support the development of data systems have been provided by the U.S. Department of Education's State Longitudinal Data Systems (LDS) grant (in all five states) and Race to the Top funds (in four states). State respondents also reported receiving funding from other sources such as the Wallace Foundation and the Bush Institute. Funds from private sources typically aim to promote capacity for using data systems, such as leadership development and educating teachers and leaders about effective data use.
- 3. System structure and access: States use either single- or multiple-portal data systems, depending on data needs and financial resources.** Four of the five states use a single-portal structure—an overarching system that collects data from multiple sources and systems (for example, teacher credential data, financial information, and student achievement data) and stores all of the data together. Users log in to the system using a single user name and one password and can access a host of data stored in the system, based on their data permissions. One state uses a multiple-portal structure, where data is stored locally in individual school districts and the state links the local systems and runs analyses and reports across these entities.
- 4. Staff expertise: States draw primarily on the expertise of their staff to develop and maintain the data system.** Four states indicated that state and district staff have the necessary technical expertise and skills, such as systems programming, to develop and maintain technological platforms for the data systems.
- 5. Reporting: Data system reports are primarily descriptive and focus on student performance or teacher characteristics.** For example, states and districts reported running student performance reports comparing students' performance against other students across the school, district, and/or state; track students' performance and growth

from year-to-year; or examine student growth for sub-populations. Two states and participating districts also develop teacher profiles, which include demographic information, credentials and highly qualified status, professional development training, courses taught, and assigned students, to provide principals with a snapshot of each member of their staff. Other common reports generated from the data systems include those that inform supporting resource allocation decisions, such as placing stronger performing teachers in harder-to-teach classes, or those that facilitate tailoring professional development offerings to staff needs. States and district respondents also indicated plans to use the system to inform future instructional or human capital decisions, such as developing and revising school improvement plans, making resource allocations, or informing tenure or dismissal decisions.

C. What Kind of Work Have TSDL Project States and Districts Undertaken?

In partnership with CELT, each pilot state and its partnering districts began TSDL project work by establishing project goals. These goals guided the implementation of discrete activities, called initiatives, designed to enhance the teacher-student data links in current data systems.

Across the five TSDL pilot states, four types of initiatives were implemented: Developing a Teacher of Record (ToR) framework; creating or refining roster verification procedures; maintaining or upgrading the LDS; and establishing inter-agency data-sharing procedures. States implemented up to four initiatives at a time (see Table 1).¹ In this section, we describe each type of TSDL initiative, including key activities conducted as part of each initiative.

“Developing a valid and reliable TSDL system is not something that can be developed quickly, nor is it something that can be done with a select group of individuals. It is not a once-and-done process. It is a complex, collaborative process; one that will most likely be phased in and need to be consistently reviewed and revised throughout the life of the system.”
—CELT program staff respondent

Table 1. Types of Initiatives Implemented by TSDL Pilot States

	Developing a ToR Framework ^b	Creating and/or Refining Roster Verification Procedures	Maintaining or Upgrading the LDS	Establishing Inter-agency Data-Sharing Procedures
Arkansas ^a		✓	✓	✓
Florida	✓	✓		
Georgia	✓	✓	✓	
Louisiana		✓	✓	✓
Ohio	✓	✓		

^aArkansas also implemented an “Enterprise Architecture” initiative, which served as a planning and oversight project for data governance and architecture across the states’ TSDL-related projects. Other states incorporated this governance into the individual initiatives.

^bCELT encouraged all participating states to define a state-appropriate ToR at the outset of the project, using CELT’s ToR framework (see Figure 1). Three states, highlighted in this section, implemented initiatives designed to specifically develop a more comprehensive ToR framework that went beyond the framework and incorporated state-specific considerations in the ToR definition.

¹One state also implemented an “Enterprise Architecture” initiative, which served as a planning and oversight project for data governance and architecture across the states’ TSDL-related projects. Other states incorporated this governance approach into the individual initiatives.

1. **Developing a ToR framework (three states).** The ToR definition is the crux of the teacher-student data link because it explicitly defines which educators are responsible for students' particular learning activities within a given subject or course, aligned to specific performance measures. The goal of a ToR framework is to provide a structure for a common understanding and language between districts and the state, and between multiple state departments (for example, early childhood). States that implemented this initiative did so because they determined that the emphasis in their state on teacher-level value-added measurement and other evaluation metrics necessitated a more accurate attribution of instructional time to classroom teachers. Key activities undertaken to develop a ToR framework include the following:

Key ToR Framework Activities

- *Engage policy leaders in defining ToR*
- *Employ a generic framework template to facilitate discussion*
- *Develop supporting definitions to account for multiple scenarios*

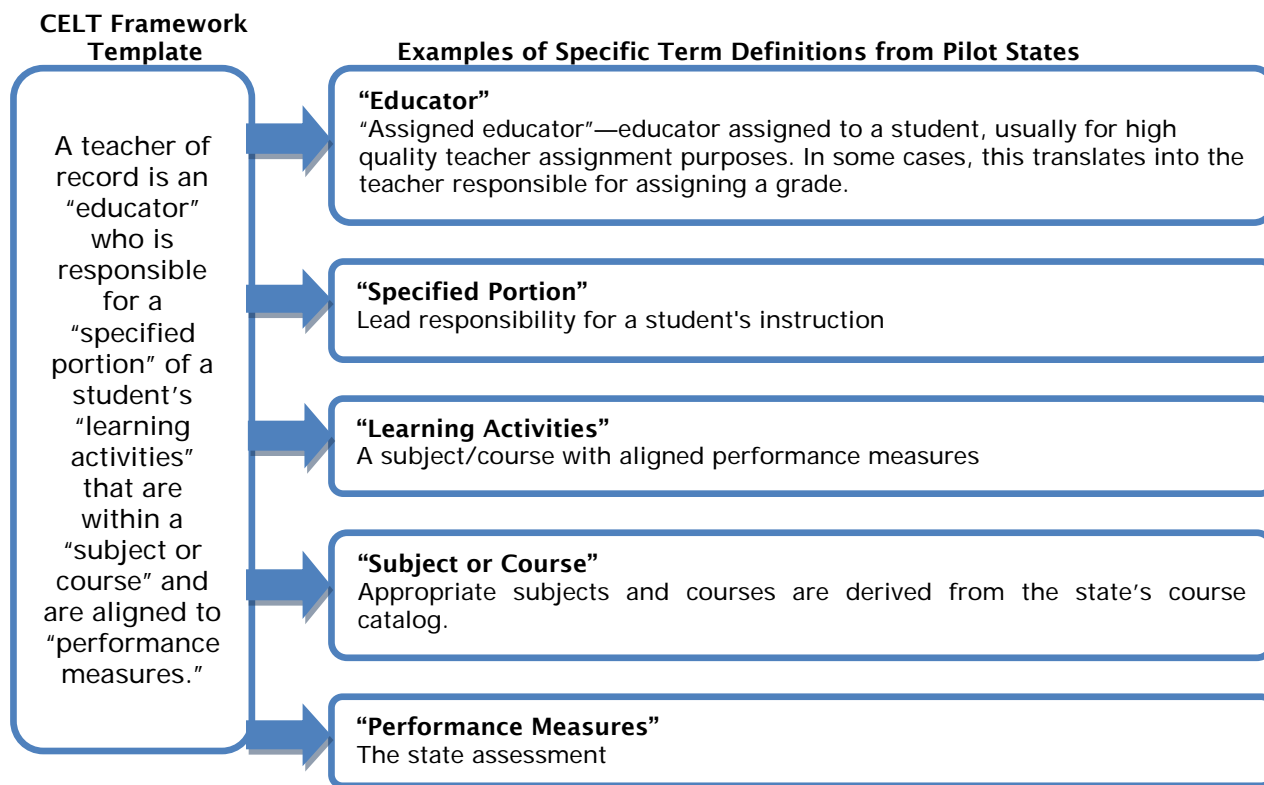
Engage policy leaders in defining ToR. States reported working with multiple stakeholders to define ToR as a way to increase the accuracy of information provided by districts and schools and to ensure that all users are “on the same page.” CELT respondents reported that many state and district policy leaders did not fully comprehend the complexities of the data system, and struggled to understand why information systems and technical staff could not simply implement a system that would meet state reporting needs. CELT staff explained that by engaging policy leaders in the project, they better understood their role in designing the data system by providing the policy rules and regulations that impact data collection, maintenance, and reporting.

Employ a generic ToR framework template to facilitate discussion. CELT provided states with a generic ToR framework template that allows for customizing the ToR definition. By defining specific terms within the framework, such as “performance measures,” states create an agreed-upon definition for each term to account for specific state and district policies and priorities. In Figure 1, we display the CELT framework template and provide examples of how states defined specific terms within the framework.

Develop supporting definitions to account for multiple scenarios. One pilot state paid particular attention to the attribution of instructional time within the ToR definition because it fed directly into the state’s teacher evaluation metric. As a result, the state expanded the ToR definition of “educator” to include the following:

- Assigned educator—The educator assigned to a student, usually for highly qualified teacher-assignment purposes. In some cases, this translates to the teacher responsible for assigning a grade to the student.
- Teacher of Record—An educator who is responsible for a significant portion of a student’s instructional time based on enrollment within a given subject or course that is aligned to a state assessment. This definition enables a teacher who is entirely responsible for teaching a particular student to account for 100 percent of the teaching situation, while a co-teaching situation could result in a 50/50 split between teachers.
- Contributing professional—A person who has responsibility for a student and should be specifically linked with relevant students. This definition enables the state to account for work done by guidance counselors, librarians, or principals.

Figure 1. Examples of How States Operationalized the ToR Framework to Account for State- Specific Policies and Priorities: Examples from Pilot States



2. **Developing or refining roster verification procedures (five states).** The primary link between student and teacher data is a course or classroom assignment list, often called a class roster. The class roster must be verified so that the teacher and student data links derived from the rosters are as accurate as possible. The verification process should account for substitutes, co-teaching arrangements, or student teaching assignments that might impact a student’s learning. All five states sought to improve their roster verification procedures. Key activities for developing and refining the roster verification process include the following:

Key Roster Verification Activities

- *Ensure the roster verification system reflects the ToR definition*
- *Develop and pilot web-based application for roster verification*
- *Provide training for accurate roster verification*

Ensure the roster verification system reflects the ToR definition. State and district respondents reported working together to agree upon the unique teaching situations, such as co-teaching arrangements, that impact the specified portion of instruction time as defined in the ToR definition. States then checked that the roster verification process accounted for these situations so that the information gathered from the rosters accurately feeds into the teacher accountability and student outcome metrics. One state worked with an external vendor to modify its existing roster verification system so that it better matched the state’s ToR definition.

Develop and pilot web-based application for roster verification process. A web-based application allows teachers or other designees to view and correct data and confirm any corrected revisions in real time.² In one state, two districts piloted this type of application and provided feedback to inform changes and improvements made by the state. Another state built a smart phone application, with assistance from CELT's programmers, for teachers to log in and verify their rosters.

Provide training for accurate roster verification. Three states developed in-person trainings, webinars, or online training modules to explain the roster verification systems and teach educators to use the system correctly. According to state respondents, the trainings helped build educators' familiarity with the system and expedited the adoption of the new technology. One state extended the trainings to include a professional development session on value-added modeling so that the teachers who participated in the roster verification process better understood how the verified data would be used.

3. **Maintaining or upgrading the LDS (three states).**

As the single repository to retain student and education-related data over time, agencies must consider a number of factors to develop a strong LDS. For example, the data system must be governed by clearly articulated guidelines such as which data elements are included in the system; definitions for each data element; how the data will be stored, shared, and analyzed; and who has access to and the responsibility for inputting or analyzing the data. Key activities undertaken to implement this initiative include the following:

Key LDS Activities

- *Articulate practices for collecting, cleaning, and managing data*
- *Enable real-time data collection and single-portal sign-on use*

Articulate practices for collecting, cleaning, and managing data. Processes that describe the collection, cleaning, processing, storing, use, and deletion of data, as well as rules for data quality and management, identifying data stewards, and methods for data management, are sometimes referred to as data governance. CELT and state respondents reported the belief that policy, not information technology, should drive data governance decisions and the development of the data system. States worked to write down governance policies and share the policies among all stakeholders involved with the LDS so that the policies can guide the development, implementation, and maintenance of the system. CELT and state respondents reported that multiple stakeholders such as representatives from K-12, higher education, and data quality and information systems agencies, worked together to articulate the goals of the LDS and develop policies to ensure the system functions effectively and yields the desired results.

Enable real-time data collection and single-portal sign-on use. Receiving real-time or near real-time data from districts enables more accurate data collection and reporting. Real-time data collection means that data is transferred from the district-level data system to the state-level data system on a daily or weekly basis. Additionally, a single-portal sign-on can ease the burden on data entry and analysis staff. One pilot state developed a system for the LDS where district users can now sign on to their district data system and gain access to the state data system without additional steps, user names, or passwords. This seamless system enables users to access more data within a

² For example, guidance counselors might use the system if a given school assigns the task of roster correction to the guidance counselor.

single system, as well as provide near real-time electronic transfer of students' academic records to the state. Real-time data collection is not yet a standard practice between states and districts, however.

4. **Establishing inter-agency data-sharing procedures (two states).**

Inter-agency data-sharing agreements enable districts to share student-level data with the state education agency or enable agencies within the state to share data with each other (for example, for the department of children and families to share data with the department of education). Establishing procedures to share data develops critical links in the data, and offers opportunities to conduct analyses or develop reports designed to improve programming or budgeting across multiple agencies. Key activities for establishing inter-agency data sharing procedures include the following:

Key Inter-agency Data-Sharing Procedure Activities

- *Agree on constant, unique state-level identifiers for students and educators*
- *Store highly confidential data separately from research data*

Agree on constant, unique state-level identifiers for students and educators. Unique student and educator identifiers enable tracking over time, linking student and educator data, and following students or educators who change districts within the state. State and district respondents reported that states currently have unique student and educator identifiers in place, but that the process of assigning unique identifiers to educators was completed more recently. Unique, consistent identifiers enable data to be linked in both the state and district LDS. Consequently, states and districts can work together to conduct analyses and develop reports designed to improve education planning, management, reporting, instruction, and evaluation.

Store highly confidential data separately from research data. State data sharing and confidentiality regulations can limit the ability to share data between states and districts or among state agencies. For example, district agencies in one pilot state are not able to share personally identifiable student information with the state agency because of data-sharing restrictions. In another pilot state, data regulations and restrictions make cross-agency data sharing challenging. To overcome this challenge, the state established cross-agency data-sharing agreements among three state agencies. As part of the initiative, the state works with an external vendor to employ a “dual-database” architecture in which highly confidential, personally identifiable information is kept in a separate system from that where de-identified research data is housed. The state education research center then acts as a service bureau to agencies involved in the data-sharing agreement by maintaining a knowledge base of information that allows for a high match rate for individuals, even if the name or identifier changes over time or between agencies. The state can create research data sets using a temporary crosswalk between agencies, destroying the crosswalk after the creation of the data set. This project allows the state to longitudinally track teachers and students across various agencies, track teacher preparation, salary, and work information, and follow student trajectories from preschool to college.

D. What Challenges Have States Encountered and What Lessons Can Be Learned?

Although pilot states and districts have made good progress implementing improvements in teacher-student data links, all experienced challenges and reported learning important lessons. In this section, we describe major challenges encountered to date and document the key lessons learned.

1. Challenges

The following main challenges emerged from the states' implementation of the TSDL initiatives:

- **Infrequent collection of student-level data that feeds into the roster verification process.** Most districts provide student-level information to the state two or three times per year. State and district respondents reported that when states seek to verify class rosters, oftentimes the data is already outdated.

“A two-point data collection process (where data is shared between the districts and states twice per year) was a limitation and weakness for the system.”

—District program staff respondent

- **Complex and time-consuming data-sharing agreements.** Strict rules and regulations often govern the process for sharing individually identifiable data between state agencies. Data-sharing agreements need to explicitly state the amount and types of data shared, the planned use of data, and data security and destruction procedures, all of which requires lengthy negotiation between agencies. Without cross-agency data, the information presented in data reports is limited and potentially less useful. For example, a state education agency that does not have data-sharing agreements with the state higher education agency is unable to track student trajectories from preschool to college, and therefore less able to rely on data to make policy decisions related to school or college readiness programs.

“The strict rules regarding data sharing within state agencies mean that these state systems cannot talk to each other, so the state is unable to follow a student from a state high school to a state college.”

—State program staff respondent

- **Roster verification systems do not account for unique teaching situations.** While the state teacher of record definition often includes unique teaching situations such as co-teaching arrangements, the state's roster verification process may not account for these situations. Because the roster information typically feeds into teacher evaluation and accountability metrics, the system must be able to account for these situations so that the teacher and student data links derived from the rosters are as accurate as possible.

“The system doesn't account for team teaching situations, and that's a problem when you want to attribute teaching time to individual teachers.”

—State program staff respondent

- **Limited editing features of roster verification systems.** When an error is found in the roster verification system, users may not always be able to correct the data directly in the system. Instead, they must manually submit changes to a system administrator or call a help line. Additionally, one state noted that its data systems are not yet fully integrated, so changes to roster verification data are not automatically translated to the larger LDS.

“Currently, the tool only lets teachers make suggested changes, and those changes have to be approved by the school or district administrator before it will be taken into consideration.”

—District program staff respondent

2. Lessons learned

State and district respondents pointed to a number of lessons learned during the first year of the TSDL project, including the following:

- **Bring stakeholders together.** Respondents from pilot states and districts, as well as CELT, discussed the importance of engaging a number of different stakeholders (for example, representatives from K-12 and higher education, districts, and data quality and information systems) to agree on common terms and definitions that impact both the data system and processes. Respondents said that these discussions should occur from the outset of the process, and that it is particularly important that state and district administrators work well together. When there is good group consensus about the data system, processes, definitions, and goals, state and district respondents said they experienced less push-back about using the data for analysis.

“If you don’t have the right people at the table, it makes it very, very difficult to implement an effective system.”

—State program staff respondent

- **Invite districts to participate in pilot activities.** District staff reported appreciation for being involved in pilot activities for the TSDL project because it gave them an opportunity to engage with state administrators to provide feedback and suggest revisions to data system tools. One state noted that having a designated representative for pilot activities was helpful during the work.

“Our biggest accomplishment has been the feedback we were able to give the state as to what our concerns were. We developed strong communication links between the district administrators and schools to determine what improvements could be made and then shared those suggestions with the state.”

—District program staff respondent

- **Define data governance and data terms early in the process.** Multiple state respondents reported that working with stakeholders early to articulate the goals of the system, define the framework for terms, and develop policies to ensure the system functions effectively and yields the desired results was critical. State respondents explained that such discussions enabled all stakeholders to have access to the same information from the outset and guided the direction of data systems and data-related policies at all levels.

“A significant amount of time must be spent defining the goals of the system ahead of time in order for the system to be successful.”

—State program staff respondent

- **Cross-site meetings help state and district administrators learn about promising practices and challenges.** The annual meeting, organized by CELT, enables pilot project states and districts to discuss successes and challenges related to those initiatives. State and district respondents called these gatherings “invaluable,” as attendees were able to learn about others’ strategies, success, and failures.

“We sure did learn a whole lot about other people’s successes and failures along the way and didn’t make those ourselves.”

—District program staff respondent

E. What Are the Next Steps for Supporting Work on Improving Teacher-Student Data Links?

State and district respondents' reports about challenges and lessons learned can inform the next steps for CELT and states and districts to develop, implement, and enhance the TSDL project. In Table 2, we present the four recommended next steps and suggest who might best address them (that is, CELT, states, and/or districts). Further detail about each recommended next step follows the table.

Table 2. Recommended Next Steps and Implementation Level

	CELT	States	Districts
Continue encouraging thoughtful discussion and agreement among multiple stakeholders about ToR definitions	✓	✓	✓
Continue providing cross-site collaborative opportunities	✓	✓	
Refine roster verification procedures to be as close to real time as possible	✓	✓	✓
Train staff to effectively input data into the system		✓	✓

1. **Continue encouraging thoughtful discussion and agreement among multiple stakeholders about ToR definitions.** All respondents repeatedly emphasized the need to bring multiple stakeholders (for example, representatives from K-12, higher education, and data quality and information systems agencies) to the table early and throughout this process. Future TSDL work should set this effort as a central goal and ongoing activity.
2. **Continue providing cross-site collaborative opportunities.** State and district administrators praised the CELT meetings for providing them with opportunities to discuss TSDL initiatives, understand the successes and challenges related to implementing those initiatives, and collaborate on potential best practices. These types of meetings rarely occur otherwise. CELT could also consider ways to encourage cross-site collaboration beyond the meetings, perhaps through a website dedicated to sharing successes, challenges, and lessons learned throughout the development and implementation of TSDL initiatives at state and district levels.
3. **Refine roster verification procedures to be as close to real time as possible.** Educators and district administrators in all states mentioned the considerable amount of time it takes to correct out-of-date rosters, particularly when the roster information was collected at the beginning of the school year and the verification is done at the end of the school year. Enabling more real-time data collection to feed the roster verification will save time by providing more accurate information.
4. **Train staff to effectively input data into the system.** The accuracy of data included in data systems depends primarily on how well users correctly input the data. State and district staff should train users to help build familiarity with the data system and encourage the adoption of new technology and tools. States and districts should also develop implementation manuals applicable to the specific user for future reference (for example, separate district, school, and teacher user guides). Trainings can also address why the system was developed, how it is used, and what the resulting data analysis informs. For example, a professional development session on value-added modeling might be offered so that teachers who participate in the roster verification process can better understand the importance of the process and how the verified data informs teacher evaluation measures.

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