



Center for  
Educator Compensation  
Reform

*Emerging Solutions To Improve  
Student–Teacher Linkage*

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Matthew Graham  
Westat

Jeffery Watson  
University of Wisconsin

Christopher A. Thorn  
University of Wisconsin

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Allison Henderson, Director  
Phone: 888-202-1513  
E-mail: [cecr@westat.com](mailto:cecr@westat.com)

# Emerging Solutions To Improve Student–Teacher Linkage

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## Introduction

Nationwide, states and districts are implementing programs that involve linking teachers with student data. These initiatives range from educator evaluation systems that consider student growth to data-driven professional development decisions and large-scale program evaluations. Federal programs such as Race to the Top and the Teacher Incentive Fund (TIF) accelerated this trend by encouraging states and districts to increase their use of data in many areas, including educator evaluation. Establishing accurate links is crucial in any initiative that links teachers and students, as data errors could result in inaccurate program evaluations or erroneous assessments of the role a specific teacher plays on student achievement.

This paper summarizes several emerging solutions for improving the accuracy and quality of student–teacher linkage<sup>1</sup>. The emerging solutions fall into two main categories: (1) leveraging different data sources and (2) improving data systems. Districts and states with interest in improving student–teacher linkage quality should consider the options presented in this paper.

### I. Data Sources

Districts typically did not design data systems, including student information systems (SIS) and human resource databases, to link students and teachers in the ways that new evaluation systems and rigorous analyses require. This means that many districts and states that want to create better-quality student–teacher links must find ways to link, upgrade, or redesign their existing data systems. As part of this process, districts and states should consider all possible data sources as they

conduct system reviews and user needs analyses. This section describes three possible data sources that could supplement the information harvested from SISs and human resource data systems: student learning objective processes, formative and interim assessments, and online grade books.

### *Leverage Student Learning Objective Processes*

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Districts or states that use student learning objectives (SLOs) can leverage the SLO process to improve student–teacher linkage<sup>2</sup>. SLOs are achievement or growth goals that teachers set for their students, usually as part of an educator evaluation system. The process of setting SLOs and monitoring student progress toward reaching them requires teachers and schools to develop accurate student–teacher links and to maintain those links throughout the year. This makes the SLO process a convenient time to create or verify student–teacher links. Tracking changes in SLO assignment data can also indicate student or teacher mobility, including regrouping or other in-school reorganization of instruction. Further, team teachers that jointly develop SLOs and monitor student progress could use the SLO process to divide instructional responsibility among them.

The student growth objective (SGO) component of Denver’s ProComp educator evaluation system is one example of an SLO process that districts could use to generate or improve student–teacher links<sup>3</sup>. As part of ProComp, teachers must identify all of the students in their classes and account for each student in the SGO-setting process. ProComp encourages teachers to include all of their students as part of their SGOs. If a student is not included, the system requires a link between that student and another

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1 Readers who are unfamiliar with student–teacher linkage should consider building background knowledge using the resources in the “Further Reading” section.

2 SLOs are goals set by teachers that specify what students will know, or be able to perform, after completing a quarter, semester, or school year.

3 Denver’s SGOs are SLOs that must use student growth—hence, “growth” replaces “learning” in the name.

teacher. Teachers record student progress toward SGOs throughout the school year, which requires up-to-date student–teacher links each time.

Districts or states that have an SLO process should strongly consider using these data to link students and teachers. Depending on the process, combining linkage verification with the process of setting and monitoring SLOs may be possible. SLO processes could prove especially valuable for districts or states that integrate data from multiple data systems.

### *Use Formative/Interim Assessment Data*

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Assessment technologies provide opportunities to generate and collect student–teacher linkage data. Many modern assessment systems capture which instructor assigns and/or administers a particular assessment, as well as the subject area. In some cases, this information can improve overall link data. Formative assessments can verify or bolster a number of data types, including:

- Students who are missing from class rosters or assigned to the wrong teacher;
- The subject area of a teacher’s course;
- The presence of shared instruction; and
- Whether student course assignments are correct (e.g., whether all ninth-grade students are in world history, if required).

States and districts that plan to improve student–teacher linkage should consider using formative assessment data<sup>4</sup>. Although formative assessment data may not be the best solution in all cases, they may prove very useful, especially if the data are available from online sources.

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<sup>4</sup> In this paper, “formative assessment” refers to periodic centrally administered assessments designed to help teachers track student progress or identify student needs.

There are limits to this approach. In some cases, aides or technology coordinators administer the tests, which could obscure the student–teacher link if the process does not include the course instructor. Districts whose formative assessment systems do not include the course instructor should strongly consider adding those data. There are also limits to some current online formative assessment systems. Many do not prioritize record quality, as their original intent was to provide real-time feedback rather than to accurately link teachers and students. Nevertheless, vendors can improve formative assessment systems’ support for longitudinal use of these data. Districts with appropriately designed formative assessment systems can use the data to improve student–teacher linkage.

### *Use Data From Grade Books or Other Performance Tracking/Feedback Systems*

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With growing frequency, SISs now include online grade books that link to lesson plans, homework, and other types of performance feedback. Such grade books provide an opportunity to obtain rich student–teacher link data, including detailed data on team teaching or other shared instruction. This is because such grade books often permit multiple adults to record grades or feedback about a student’s performance in each subject area. Importantly, these systems routinely track the identity of the adult assigning feedback to the individual student. When a particular teacher assigns grades to a student, a student–teacher link is implied for that course—in all likelihood, the teacher assigning the grade is the (or one of the) student’s instructor(s). Thus, grade books can provide data that reveal which

adults have shared responsibility for a particular student or set of students.

Data from grade books are often available in SIS databases, but may not transfer to data warehouses.<sup>5</sup> Linking grade books to a data warehouse allows these implied relationships to inform auto-generated student–teacher linkage data. Grade book data may be a good substitute for less reliable data such as the teacher of record. Even in cases where these data cannot definitively link students and teachers, grade books can be exploited to make student classroom assignment data more accurate, thereby reducing the burden of the verification process.<sup>6</sup>

Grade book data could even be the source of pre-populated data on the percentage of a student’s instruction claimed by team teachers. The number of assignments graded by each teacher or the percentage of a student’s grades that come from a given instructor could pre-populate the percentage of instructional time attributed to each teacher. Teachers could also enter instructional groups into the system to create either a day-by-day or week-by-week breakdown of which teacher was responsible for which students. Such systems could also allow teachers to estimate their percentage of instructional responsibility on a regular basis.

Although grade book-based solutions for allocating instructional time between team teachers have the potential to improve linkage accuracy, districts and states should be careful not to over-burden teachers. For example, it may not be feasible for teachers to record all of the different instructional groups used in their classroom. As part of the design process, leaders should integrate stakeholder feedback into their decision-making and attempt to devise solutions that work for educators. For

example, grade books could include a feature that helps teachers divide students into instructional groups, thereby eliminating the need to manually add those groups later. Such a feature could even help educators sort students into instructional groups based on student performance on particular assignments, areas of weakness, learning styles, or other data.

## II. Data Systems

Data system capabilities play a key role in the accuracy and detail level of student–teacher links. This section describes two aspects of data system design that can improve student–teacher linkage: automated error checks and centralization.

### *Develop Computerized Checks for Errors*

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Automated checks for common errors can enhance the accuracy of student–teacher links and reduce the amount of time educators spend correcting the data. Such checks flag potentially erroneous records for additional scrutiny. For example, checks could flag courses with suspiciously high or low enrollments, students who are not assigned to any courses, teachers who are assigned courses outside of their subject area, and duplicate student or teacher identification numbers. Pilot programs and annual reporting should provide a rich source of potential errors; any pattern in the data that is associated with a common error could have an automated check associated with it.

Automated checks can also be used to cross-check data from different sources. Attendance and grade book data can help determine whether or not teachers update student and course records – if

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<sup>5</sup> A data warehouse is a data storage system. District or state data warehouses often contain data from multiple sources.

<sup>6</sup> Educators should verify all student–teacher linkage data, regardless of the data source.

a student stops attending class or stops receiving grades, it is possible that the student is no longer enrolled in the course. In addition, data from other districts and schools could be cross-checked to prevent duplication of teachers and students across multiple schools or ensure that identification numbers are unique. Cross-checks of student–teacher links using sources such as formative assessments and SLOs are also possible.

### *Centralize Data Systems or Reporting Requirements*

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Student–teacher linkage projects often require connecting state data (e.g., student test scores) to school and district data (e.g., course assignments). Districts and states should ensure that they match their data correctly because inconsistencies can damage accuracy. Outdated student or employee identification numbers could result in erroneous student–teacher links. Further, differences between state and district course and subject codes can cause incorrect matches between tests and subject areas, teachers, or schools. For example, Battelle for Kids (2009) reported a case where a district’s failure to move to new state course codes caused two content areas to be labeled incorrectly. This resulted in several years of inaccurate data.

The surest way to reduce this type of error is to use a common statewide data system. A common data system can save districts and states the need to coordinate many types of data. Whenever possible, districts and states should ensure alignment among all types of teacher and student data, including:

- Student identification numbers
- Employee identification numbers and
- Course and exam subject area codes

Common statewide data systems reduce the potential for error because they use common codes that update simultaneously. For example, if a state requires an end-of-course examination in algebra, all courses that culminate in that exam could have a common code or group of codes. Including all teacher and student data in a single statewide system greatly eases the burden of connecting data between the state and district levels and substantially reduces the potential for error. Another benefit of centralized data systems is the easy transfer of student and employee data between schools.

In states without a statewide data system, other measures can help ensure alignment between district- and state-level data. Districts and states should use common course codes and personal identification numbers when possible. In addition, states should create reporting requirements, and in years where changes to codes occur, verify that districts have accurately updated their information. For example, if a state changes codes for course subject areas, it could use teacher records from one year to ensure that most teachers in each subject had the same subject the next year.

Student–teacher linkage verification processes can also help ensure alignment between the district and state levels. During verification, educators examine class rosters, course assignments, and other data to correct errors and certify the data’s accuracy<sup>7</sup>. Verification should take place for all student–teacher links, but in situations where districts and states do not have common data systems, verification becomes a particularly important tool for ensuring accurate data alignment. However, verification should not be a method for eliminating errors, but only as a final check for errors. Eliminating as many errors as possible before verification has a number of benefits, including saving educators time, reducing the risk

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<sup>7</sup> For more on verification processes for student–teacher linkage, see the “Further Reading” section.

of errors slipping through, and boosting system credibility among educators.

States that move to a statewide data system should consider the amount of flexibility needed to account for local differences. Statewide data systems should be sufficiently flexible to allow districts to use many types of formative assessments and to allow districts to enter a full range of elective courses. During the pilot and design phase of a state data system, states should draw heavily on district stakeholder feedback to avoid complications that could arise due to local differences.

Implementing a statewide data system or set of common reporting requirements does not mean that data quality will take care of itself. States still need to take the appropriate steps to ensure that districts use appropriate classifications for courses and subject areas. Although this adds to the burden of implementing a statewide system, it is even more difficult to ensure consistent classification when districts and states use separate data systems with different classifications and requirements. Statewide data systems make consistency easier, but the existence of a statewide system does not permit states or districts to be complacent.

## Conclusion

Student–teacher link accuracy and detail can be greatly enhanced using alternative data sources and data system features. This paper presented several emerging solutions for improving student–teacher link data. States and districts should consider utilizing formative assessment, SLOs, and grade book data to supplement other data systems like SISs and human resource databases. Statewide data systems and automated error checks can also boost accuracy. Districts and states seeking to improve student–teacher linkage should consider the full range of available data sources.

## Further Reading

### *Other CECR Resources*

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Watson, J.G., Kraemer, S.B., & Thorn, C.A. (2009). Data quality essentials: Guide to implementation: resources for applied practice. Center for Educator Compensation Reform. <http://cecr.ed.gov/pdfs/guide/dataQuality.pdf>

Watson, J.G., Witham, P., & St. Louis, T. (2010). Evaluating student–teacher linkage data in Teacher Incentive Fund (TIF) sites: Acquisition, verification, and system development. Center for Educator Compensation Reform. [http://cecr.ed.gov/pdfs/CECR\\_HarvestingPaper2.pdf](http://cecr.ed.gov/pdfs/CECR_HarvestingPaper2.pdf)

Kluender, R., Thorn, C.A., & Watson, J.G. (2011). Why are student–teacher linkages important? An introduction to data quality concerns and solutions in the context of classroom-level performance measures. Center for Educator Compensation Reform. [http://cecr.ed.gov/pdfs/CECR\\_HRA\\_Linkages.pdf](http://cecr.ed.gov/pdfs/CECR_HRA_Linkages.pdf)

### Other Non-CECR Resources

Battelle for Kids (2009). The importance of accurately linking instruction to students to determine teacher effectiveness. Battelle for Kids. [http://static.battelleforkids.org/images/BFK/Link\\_whitepagesApril2010web.pdf](http://static.battelleforkids.org/images/BFK/Link_whitepagesApril2010web.pdf)

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