

Education, Human Development, and the Workforce

# Using Student Learning Objectives in PerformanceBased Compensation Systems:

A Guide for Successful Implementation

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With the introduction of new federal and state initiatives such as the Teacher Incentive Fund (TIF), Race to the Top, and School Improvement Grants (SIG), focus has been increasingly on determining teacher effectiveness and linking those ratings to compensation decisions. One challenge states and local education agencies (LEAs) across the country regularly face is

identifying measures of student growth that are rigorous and comparable for all teachers, especially those in nontested grades and subjects. Student Learning Objectives (SLOs) have recently come to the forefront as a potential solution for measuring student growth, particularly for educators in subjects or grades not covered by a state standardized assessment (Prince et al, 2009). When states and LEAs use measures of student growth to inform evaluation and compensation decisions, ensuring that the measures are fair, rigorous, and comparable is important. This paper discusses the steps for using SLOs as a measure of growth and identifies key considerations for successful implementation. In addition to this overview, the paper highlights two districts that have successfully integrated SLOs into their performance-based compensation programs.

# Districts Using SLOs in Performance-Based Compensation Programs:

- Austin, Texas
- Charlotte-Mecklenburg, North Carolina
- Denver, Colorado
- Henrico County, Virginia
- Northern Humboldt Union High School District, California
- Ohio Teacher Incentive Fund

### **Introduction to SLOs**

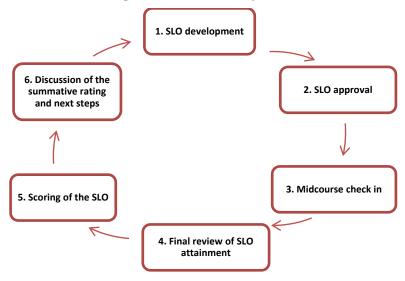
SLOs are a set of teacher-developed goals that measure a teachers' progress in achieving student growth targets over a specific period of time (Lachlan-Hache, Cushing, & Bivona, 2012; Community Training and Assistance Center, 2012). SLOs can be developed by a single teacher or a team of teachers. The process generally includes reviewing student baseline data, setting a growth target based on the available data, identifying the time frame within which the growth will occur, and determining if the target was met at the end of the time frame (Ohio Department of Education, 2012; Community Training and Assistance Center, 2012). In addition to the role of the teacher(s), SLOs also require evaluators<sup>2</sup> to be active in the process. Within this role, evaluators are often encouraged to assist in setting, approving, and scoring the SLO (Ohio Department of Education, 2012).

To ensure that all readers have a basic understanding of how SLOs fit into the larger evaluation and compensation discussion, it is important to first discuss the Ohio SLO cycle. The SLO cycle articulates a sequence of events from the development of the SLO to the final review and scoring of the SLO. Figure 1 synthesizes the common main steps in the SLO Cycle (Ohio Department of Education, 2012).

<sup>&</sup>lt;sup>1</sup> Rigorous refers to SLOs that are challenging but achievable, while comparable ensures that all SLOs are equally rigorous.

<sup>&</sup>lt;sup>2</sup> Evaluators refer to both principals and any other trained evaluators.

Figure 1. The SLO Cycle



An integral step at the LEA level is Step 1, or the SLO development. Within the development process are often a set of required elements that all SLO(s) must include, such as:

- Baseline student data identifies trends in student performance.
- The student population is addressed by the SLO.
- The interval of instruction within which the SLO will be completed is specified.
- The SLO addresses the main content and standards.
- The assessment(s) that will be used to determine if the growth target was met and progress are specified.
- The growth target for the students is identified in the SLO.
- An explanation is given for the growth target.

The SLO cycle begins with the development of the SLOs by the teacher(s). Once the SLOs are established, the designated evaluator must approve the SLO using a rubric. During the year, the evaluator and educator should meet for a midcourse check-in. At this meeting, they can discuss the teacher's progress toward meeting the growth targets and reflect on necessary instruction adjustments. In the rare case that one or more of the SLOs needs to be modified, that modification would occur at this step. At the end of the course, the evaluator reviews the SLOs and assigns an overall rating. The SLO rating is then combined with other performance measures to determine an overall summative evaluation rating. After determining the summative rating, the teacher and evaluator discuss the rating and identify appropriate next steps. The summative rating and discussion of next steps should be used to help inform the SLO development process in the next year.

# **Implementing SLOs With Rigor and Comparability**

Implementing SLOs is not without challenges. One common criticism of using SLOs as a measure of student growth, especially for teachers in nontested grades and subjects, is that SLOs are considered less rigorous than a value-added or growth model. These models use standardized assessments and a fixed calculation to determine individual teachers' contribution to student learning. Often, with SLOs, no standardized assessments are used, and the SLO approval and scoring process relies on individual evaluators. When these challenges are coupled with high-stakes decisions such as compensation, implementing SLOs rigorously and comparably across all LEAs, schools, and teachers is important.

Ensuring rigorous and comparable SLOs, however, can be difficult. The common challenges associated with SLO rigor and comparability include:

- Identifying or developing high-quality assessments for all grades and subjects
- Creating appropriate growth targets for classrooms that contain students who start at different achievement levels
- Setting rigorous but realistic targets, including identifying the proper grain size of an objective (most learning versus most important learning)
- Addressing the school and district culture change that will result from implementing SLOs
- Preventing unintended consequences that could arise from using SLOs
- Helping educators and administrators find time to implement the SLO process.

While these challenges are common across states and districts using SLOs as a measure of student growth, rigorous research on a single, preferred SLO implementation process is lacking. This dearth of research on SLOs to date has required researchers and technical assistance providers to look at different sites using SLOs and learn from their practices. States and LEAs can consider several areas in addressing some of the challenges. The following list can support the rigor, comparability, and sustainability of the SLO process (Lachlan-Hache, Cushing, & Bivona, 2012b).

- **Provide supporting materials and staff.** Effectively implementing the SLO process requires resources that promote rigor, consistency, and clarity across schools and districts. These materials can help develop teacher confidence in the SLO process and create a shared understanding of the value of the SLO process.
- Offer training and rater calibration. The use of SLOs as a valid and reliable measure of student growth requires training on multiple topics, ranging from how to write an SLO to how to select assessments. Trainings should provide teachers, evaluators, and district staff with the information they need to implement SLOs and provide follow-up activities to ensure the SLO process is consistently implemented after initial training.
- Provide guidance on scoring. An effective SLO process fosters consistent and fair ratings across teachers and evaluators. Guidance on scoring can help evaluators produce consistent ratings across LEAs.

• Monitor and evaluate SLO implementation. Monitoring and evaluating the success of the SLO process can promote rigor, discussion, and reflection that can inform a continuous revision process to help improve teacher practice and student learning.

# **Using SLOs in Performance-Based Compensation Programs**

When using evaluation data to inform compensation decisions, it can be beneficial to draw from the experiences of other districts. The final section of this paper explores two sites that use SLOs in performance-based compensation systems. Both Denver, Colorado, and Austin, Texas, use SLOs<sup>3</sup> as an integral part of their performance-based compensation system and, over the years, have refined their processes to ensure rigor and comparability.

## Denver, Colorado

#### Introduction

Denver has a long history of connecting compensation with student learning and educator performance. Beginning in 1999, Denver piloted a pay-for-performance program that used teacher-developed goals to inform compensation decisions. During the pilot period, the Community Technical Assistance Center (CTAC) conducted a research study to determine the effect of SGOs on improving student learning. The research study looked at the 16 pilot schools participating in the pay-for-performance program and collected interview data, classroom observations, student records, teacher demographic data, teacher objectives, school documents, and human resource data. At the conclusion of the study, the CTAC researchers found that across all three levels—elementary, middle, and high school—rigorous SGOs had a direct correlation to higher student achievement (Community Technical Assistance Center, 2004).

#### **Using SGOs in Compensation Decisions**

Building on these initial findings, Denver continued the implementation of SGOs. In 2004, Denver Public Schools and the Denver Classroom Teachers Association collaboratively initiated the Professional Compensation Systems for Teachers (ProComp) (Denver Public Schools, 2008). The ProComp system pays teachers based on four areas:

- Improving student growth annually
- Acquiring and demonstrating new knowledge and skills
- Evaluating classroom practice
- Teaching in a hard-to-staff school or subject

In order to measure student growth, ProComp requires that all school staff, including noninstructional staff such as nurses and administrative assistants, create two SGOs every year. At the end of the year, successful completion of the objectives are factored into compensation awards. Staff can earn \$376 per met objective. In addition to this bonus, staff members who meet both of their objectives can have the bonus added to their base-pay. The awards are either paid

<sup>&</sup>lt;sup>3</sup> Denver refers to SLOs as student growth objectives (SGOs) (Denver Public Schools, 2008).

out in a lump sum if one objective was met or in two monthly installments if both objectives were met (Denver Public Schools, 2010).

The SGOs are intended to encourage ongoing conversations between the teacher and administrator about student learning throughout the school year. In order to facilitate this ongoing dialogue, Denver has established a student growth cycle that spans the entire academic year. These seven steps outline the major activities that teachers and administrators must carry out as part of ProComp (Denver Public Schools, 2008).

#### **Denver's Evaluation Cycle**

- **Step 1: Set School Priorities.** Administrators and instructional leaders meet at the beginning of the school year to set school priorities for the rest of the year. To set these priorities, this group creates a school improvement plan, reviews student achievement data, and reviews district programs.
- **Step 2: Review Schoolwide Objective-Setting Procedures.** Principals and the building support team review the school priorities and develop a timeline for setting growth objectives and the evaluation process. This conversation occurs within the first two weeks of the school year.
- **Step 3: Collect Baseline Data.** In the first month of the school year, all faculty members collect and review student data that will serve as the baseline for the SGO.
- **Step 4: Faculty Members Write Their Objectives.** This initial draft of the SGOs is completed by staff within the first quarter of the school year. Denver has developed a Checklist for Setting Objectives that guides staff through the objective-setting process. The checklist can be found in Appendix B of this document.
- **Step 5: Reach Consensus on the Objectives.** Because the objective-setting process is a collaboration between the staff and administrator, everyone involved must agree on the objectives. This step must also be completed by the end of the first quarter of the school year. Denver has an online portal that collects all of the district's objectives, and finalized objectives are entered into the portal.
- **Step 6: Check Progress on the Objectives.** Denver requires that faculty and administrators meet at least once during the school year to check in on how the objectives are going. During this meeting, the staff or administrator (or both) might decide that the objective should be amended to reflect changes in the classroom. If the objective is amended, both the staff member and the administrator have to approve the objective again.
- **Step 7: Assess the Objectives.** At the end of the school year, faculty and administrators are required to meet and discuss whether the objective has been met. For this meeting, the school staff are responsible for collecting the appropriate student data and bringing it to their end-of-year conference.

#### **Building Rigor and Comparability**

In an effort to maintain rigorous SGOs that are comparable across all school staff, Denver has addressed several of the areas of consideration previously identified. The following sections provide concrete examples of how Denver has and continues to support the implementation of SGOs in its compensation system.

#### Supporting Materials

The SGO Handbooks are the main resource that contains all information related to SGOs. Denver has developed two distinct handbooks for school staff, one for classroom teachers and another for school support personnel. Within the handbooks is information crucial to understanding and developing rigorous SGOs. The handbooks begin with an overview of SGOs and their role and importance in evaluation, and then describe the overall SGO setting, approval, and scoring process for a given school year.

#### **Training Resources**

To promote a common understanding of how to develop SGOs, Denver provides school staff with multiple examples of approved SGOs. The list of examples does not just include examples of general classroom teachers but also includes examples of art, music, and drama teachers; facilitators; speech pathologist; and specialists such as nurses, psychologists, and social workers.

Another resource that Denver offers to school staff is a series of online videos that walk staff through important components of the SGO process. The short videos provide information for teachers, service providers, and managers on setting and approving SGOs. The videos also walk staff through the online portal that is used to collect all SGOs at the beginning of the year and to track completion of the SGOs at the end of the year.

#### Guidance on Scoring

Denver has developed a checklist for school staff that identifies all of the information that is required for each of the SGO elements. The checklist also includes guidance for evaluators on how to rate the SGOs (Denver Public Schools, 2012).

#### Monitoring

As previously mentioned, Denver is committed to infusing research into the SGO and evaluation process. By commissioning an evaluation of how SGOs, teacher practice, and student learning interact, Denver highlights the importance of monitoring and reflecting on the SGO process and outcomes.

#### Austin, Texas

#### Introduction

In 2007–08, Austin Independent School District (AISD) implemented the REACH program, a performance-based compensation system comprised of five components: student growth, professional growth, leadership pathways, observation, hard-to-staff recruitment and retention (AISD, 2012). Within the student growth component, AISD uses two types of SLOs for teachers

(individual and team). In addition to SLOs, teachers and administrators receive additional compensation for campus sites that meet outstanding student achievement on the state assessment (AISD, 2009).

#### **Using Student Growth Scores in Compensation Decisions**

For the SLO growth measure within REACH, teachers and administrators are required to implement two SLOs every year. The incentive award is dependent on whether the SLO is a team (\$2,000) or individual (\$1,500) SLO. Individual SLOs are developed by teachers in collaboration with their campus administrator and focus on a teacher's individual classroom growth targets. Team SLOs allow a group of teachers to write a common SLO for all students in a course. The team SLOs use a common assessment and require core teachers to be part of the group SLO. Similar to the individual SLO, the teachers in a team SLO are required to work closely with their administrator to identify the SLO focus area. For administrators, a campus SLO must be based on four measures: (1) a value-added score; (2) either the Texas Assessment of Knowledge and Skills (TAKS) or State of Texas Assessments of Academic Readiness (STAAR), which is determined by the campus; (3) a college-readiness measure (determined by the campus); and (4) a campus-choice measure. The stipend award for superintendents is dependent on the number of measures the administrator's SLO meets (\$3,000 for three measures and \$4,000 for all measures). Austin has outlined several steps for the SLO setting, reviewing, monitoring, and scoring process that all teachers follow during the school year (AISD, 2011).

#### **Austin's Evaluation Cycle**

- **Step 1: Complete the Needs Assessment.** Teachers begin the school year by completing a needs assessment on the current year's students in order to determine students' areas of need. Teachers are expected to explain the data used to identify the area(s) of need when they develop their SLO.
- **Step 2: Determine the Type of SLO.** Teachers must create one team SLO and one individual SLO. (In some cases, teachers are permitted to create two individual SLOs with permission from the principal.) Team SLOs must address all students, but individual SLOs can either address all students or a target group.
- **Step 3: Align the SLO to Standards.** All SLOs must be aligned to the Texas Essential Knowledge and Skills (TEKS) standard and the teacher's Campus Improvement Plan (CIP).
- **Step 4: Set the Growth Target.** To set the growth targets, teachers must first identify the preassessment they will use to get a baseline score. AISD provides guidance on how to select or develop assessments for this step. Once the baseline data are collected, teachers then set a growth target.
- **Step 5: Submit the SLO.** Once the previous four steps have been completed, teachers then submit their SLOs for review. The SLOs must be submitted by October 26 into the online database. In addition to submitting the SLO, all required attachments must also be included in the database. These required attachments include a blank test with the answer key, an Excel list of the students in the class, student preassessment scores (including a copy of their assessments), and the teacher's growth targets.

**Step 6: Monitor the SLO.** Throughout the year, teachers are expected to monitor their students' progress towards meeting their SLOs. This includes using formative assessments to gauge where students are throughout the year.

**Step 7: Score the SLO.** Between April and May, teachers administer their postassessment to their students. Once the scores have been received, the teacher calculates and documents the final student performance on the SLO. AISD provides guidance to teachers to determine which students should "count" in the class roster, including all students that have a pre-and postassessment score. AISD also provides directions on calculating the final SLO score.

#### **Building Rigor and Comparability**

AISD recognizes that in order for campus faculty to view the REACH program as an appropriate and fair way to inform compensation decisions, teachers and administrators must view SLOs as an accurate reflection of their impact on student growth. To support the quality of teacher- and administrator-developed SLOs, AISD has provided several supports and resources to address some of the main areas of consideration for quality SLO implementation.

#### Supporting Materials

The AISD manual is a comprehensive document that outlines all of the necessary information for developing and implementing SLOs. The manual includes answers to common questions, templates and criteria for developing SLOs, individual and team SLO examples, the SLO timeline for the entire school year, and general information on SLOs. The manual is updated every year and also includes contact information for the different district sites.

Additional resources that have been developed and deployed to teachers and administrators include narrated PowerPoints, needs assessment guidance and directions, an online SLO database, and important contact information.

#### Training Materials and SLO Facilitators

All campuses are required to nominate two faculty members to serve as SLO facilitators. SLO facilitators attend a training provided by the district and serve as the liaison between school staff and the district on the SLO process. All SLO facilitators receive additional compensation for their role and have access to a paid substitute in order to provide assistance to teachers in their campus during the school year. In addition to SLO facilitators, the district has dedicated members who provide direct support to campus staff. The district team visits each campus twice a year for SLO training sessions for teachers and administrators. In addition to the training sessions, the district team is available for one-on-one meetings with teachers and administrators before and after school (AISD, 2011).

AISD also recognizes the importance of choosing rigorous assessments for measuring student growth throughout the school year. High-quality and accurate assessments are crucial to the SLO process; in order to develop comparable SLOs, AISD provides a list of approved, but not required, assessments. Teachers have the option to use assessments from the list; however, they can create their own assessment as long as they follow the assessment guidelines. The assessment guidelines are designed to build assessment literacy by teachers and administrators. The district has hosted workshops and has convened a working group to create about 120

assessments for use. These assessments are currently being vetted and will be ready for use during the 2012–13 school year.

#### **SLO Scoring Guidance**

Another resource available to staff are guidance documents for setting SLOs. These documents identify the necessary criteria that all teachers and administrators need to know for using SLOs, including how to develop them, available assessments, and how to score the SLOs. The SLO guidance includes a checklist of information that all SLOs must include in order to be considered for approval (AISD, 2011). Another area of guidance that AISD provides teachers and administrators is around scoring SLOs at the end of the school year. For SLOs that use assessments based on a 100- point rating scale, the district has developed an Excel spreadsheet that automatically sets the growth target based on the preassessment score. For SLOs that use a rubric to measure student growth, the district has developed tiered targets for scoring.

#### Monitoring SLOs

At the beginning of the REACH program implementation, the district had two central staff members review each SLO. As teachers and administrators became more comfortable and consistent with writing and approving SLOs, the program shifted to having only one central staff member review the SLOs. Similar to the initial review process, if any SLO is deemed incomplete or unacceptable, the SLO is returned to the teacher or administrator for revision. If central staff recognize a trend in SLO development, additional training may be required for staff. Finally, the district conducts an annual random audit of SLOs at the end of the year to verify results.

### **Conclusion**

This paper is intended to provide a general overview of the components and common implementation challenges associated with implementing SLOs as a measure of student growth. As states and LEAs move towards using SLOs as a measure in compensation decisions, ensuring that SLOs are both rigorous and comparable can be a challenge. In order increase rigor and comparability it is important that districts establish an SLO development process, set requirements and expectations to help standardize the SLO process, create a system for monitoring the implementation of SLOs (auditing and reviews) and provide supports to teachers and evaluators. Other LEAs using SLOs, including Denver and Austin, can provide resources and guidance for LEAs continuing in the field of connecting SLOs with compensation decisions.

#### References

- Austin Independent School District. (2009). Strategic compensation initiative REACH pilot 2007–2008 evaluation report. Retrieved from <a href="http://archive.austinisd.org/inside/docs/ope\_07-86\_Strategic\_Compensation\_Initiative\_Evaluation\_Report.pdf">http://archive.austinisd.org/inside/docs/ope\_07-86\_Strategic\_Compensation\_Initiative\_Evaluation\_Report.pdf</a>
- Austin Independent School District. (2011). *SLO manual*. Retrieved from <a href="http://archive.austinisd.org/inside/initiatives/compensation/docs/SCI\_SLO\_Manual.pdf">http://archive.austinisd.org/inside/initiatives/compensation/docs/SCI\_SLO\_Manual.pdf</a>
- Austin Independent School District. (2012). *AISD REACH program overview—TEACHERS*. Retrieved from <a href="http://archive.austinisd.org/inside/initiatives/compensation/docs/SCI\_Reach\_Overview\_2">http://archive.austinisd.org/inside/initiatives/compensation/docs/SCI\_Reach\_Overview\_2</a> <a href="http://archive.austinisd.org/inside/initiatives/compensation/docs/SCI\_Reach\_Overview\_2">http://archive.austinisd.org/inside/initiatives/compensation/docs/SCI\_Reach\_Overview\_2</a> <a href="http://archive.austinisd.org/inside/initiatives/compensation/docs/SCI\_Reach\_Overview\_2">http://archive.austinisd.org/inside/initiatives/compensation/docs/SCI\_Reach\_Overview\_2</a> <a href="http://archive.austinisd.org/inside/initiatives/compensation/docs/SCI\_Reach\_Overview\_2">http://archive.austinisd.org/inside/initiatives/compensation/docs/SCI\_Reach\_Overview\_2</a>
- Community Training and Assistance Center. (2004). Catalyst for change: Pay for performance in Denver, final report. Retrieved from <a href="http://www.ctacusa.com/PDFs/Rpt-CatalystChangeFull-2004.pdf">http://www.ctacusa.com/PDFs/Rpt-CatalystChangeFull-2004.pdf</a>
- Community Training and Assistance Center. (2012). *What are SLOs?* Retrieved from <a href="http://www.ctacusa.com/SLOCenter-what.html">http://www.ctacusa.com/SLOCenter-what.html</a>
- Denver Public Schools. (2008). Student growth objective and monitoring process. Elementary/ECE—Grade 8/Secondary. Retrieved from http://static.dpsk12.org/gems/sgo/SGOMASTERTeacher200809.pdf.
- Denver Public Schools. (2010). *Incentive pay chart*. Retrieved from <a href="http://static.dpsk12.org/gems/newprocomp/ProCompPaymentTable201020112010Dec8.xls">http://static.dpsk12.org/gems/newprocomp/ProCompPaymentTable201020112010Dec8.xls</a>
- Denver Public Schools. (2012). *SGO rubric with ratings*. http://static.dpsk12.org/gems/sgo/EmbeddedRubricFOR2012TO2013.xlsxColor.xlsx
- Lachlan-Hache, L., Cushing, E., & Bivona, L. (2012a). Student Learning Objectives (SLOs) as a measure of educator effectiveness: The basics. Washington, DC: American Institutes for Research.
- Lachlan-Hache, L., Cushing, E., & Bivona, L. (2012b). *Implementing Student Learning Objectives: Core elements for sustainability*. Washington, DC: American Institutes for Research.
- Ohio Department of Education. (2012). A guide to using student learning objectives as a locally determined measure of student growth. Retrieved from <a href="http://education.ohio.gov/GD/DocumentManagement/DocumentDownload.aspx?DocumentID=1">http://education.ohio.gov/GD/DocumentManagement/DocumentDownload.aspx?DocumentID=1</a>
  31877
- Prince, et al (2009). The other 69 percent: Fairly rewarding the performance of educators of nontested subjects and grades. Washington, D.C.: The Center for Educator Compensation. Retrieved November 17, 2011, from <a href="http://cecr.ed.gov/pdfs/guide/other69Percent.pdf">http://cecr.ed.gov/pdfs/guide/other69Percent.pdf</a>

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