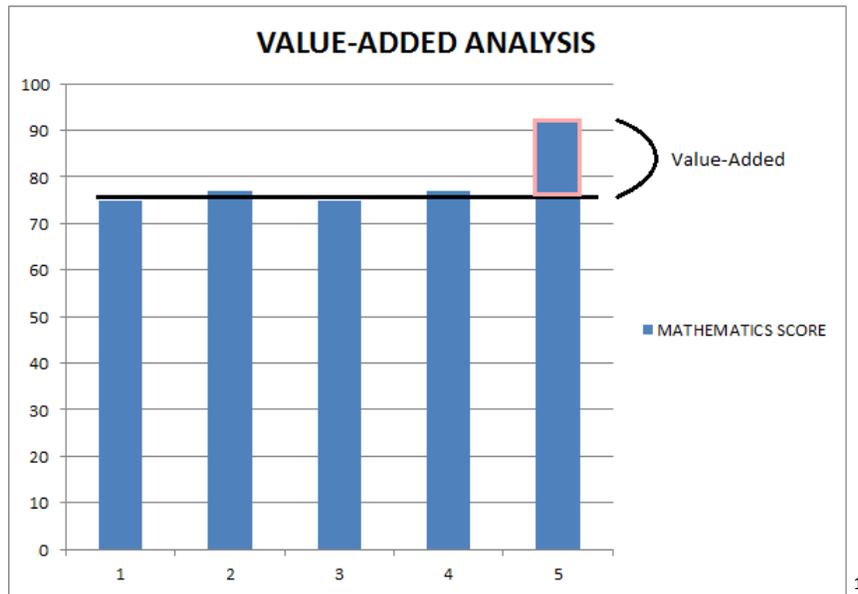# Memorandum

Date: December 18, 2013
To: Senate Committee on Early Learning and K-12 Education
From: Eric Wolf, Senate Early Learning and K-12 Education Committee Staff
Re: **Value-Added Analysis of Teacher Performance**

Overview. Value-added analysis (also known as value-added modeling or value-added assessment) is a method of teacher evaluation that seeks to measure a given teacher's contribution to the educational growth their students experience in a given year. Comparisons may then be made among teachers in terms of how much content their students learn each year, regardless of the students' individual demographics or characteristics. Thus, value-added analysis focuses on how much progress students make from one testing period to the next, rather than on how students perform on a test at a single point in time. Several large school districts and some states have experimented with value-added analysis as a way to measure teacher effectiveness, generally in combination with other measures such as peer reviews.

Value-added analysis: In the figure above, the student is projected to score roughly the same on their Year 5 mathematics assessment as they have in previous years. The amount of achievement above the predicted outcome is the Year 5 teacher's "value-added."

Value-Added Analysis. When value-added analysis is applied, current test scores of students are compared to scores those same students received in previous school years. Statistical analysis is applied to predict future test scores for a student based on the assumption that students will usually score relatively the same as they have in previous years, and the "value-added" a specific teacher brings to the classroom is determined by the amount of growth *beyond* the statistical prediction each student experiences. Because value-added analysis uses a pure growth-based model, any difference between the actual and predicted scores on standardized tests is assumed to be due to the quality of the teacher and school rather than by other factors such as socioeconomic status, natural ability, or outside tutoring.

A student's predicted score is calculated using a linear model that takes into account the student's past performance on examinations and other factors, depending on the district using the model. These factors may include the student's socioeconomic situation, ELL status, or race, the level of experience or credentialing of the classroom teacher, or the size, type and setting of the school itself.

A recent study by the Gates Foundation found that a teacher's past value-added scores are among the strongest predictors of their students' achievement gains in other classes and future years. Although an individual teacher's value-added score may fluctuate from class to class and year to year, the volatility is not so large as to undercut the usefulness of value-added analysis as an informative, if imperfect, indicator of future success. The Gates Foundation study also found that teachers who "teach to the test" are much less effective and produce significantly lower value-added scores than teachers who teach conceptual thinking skills. [2]

Implementation in Other States. Value-added analysis of teacher performance has been adopted recently by major school districts, including Chicago Public Schools,[3] the Los Angeles Unified School District,[4] the New York City Department of Education,[5] and the District of Columbia Public Schools,[6] as one method of evaluating teacher performance among other strategies, including peer-review of teacher instruction. School districts in Tennessee have used value-added analysis as a component of rating teacher effectiveness since the 1997.[7] The State of Louisiana authorized value-added analysis of teacher performance in all school districts in 2010.[8] Georgia, Florida, and Colorado have also begun to incorporate value-added analysis into teacher evaluation systems, as a result of both Race to the Top grant proposals and state legislation.[9] In November 2011, the National Governor's Association awarded grants to Colorado, Guam, Nevada and North Carolina to assist in a redesign of their teacher evaluation systems; as result of the grant, and as part of North Carolina's effort to secure Race to the Top funding, the North Carolina State Board of Education adopted a standard that teachers must be evaluated in part on how they "contribute to the academic success of students" using a value-added model.[10] Between 2011 and 2013, the Gates Foundation's Measures of Effective Teaching Project collaborated with school districts in Denver, Dallas, Memphis, Tampa, Charlotte, Pittsburgh, and New York City to assess the accuracy of value-added analysis of teacher effectiveness; all six districts have begun to implement value-added analysis in conjunction with peer reviews of teacher performance.[11]

Limitations of Methodology. The value-added of a teacher's individual performance is compared with other teachers in a chosen comparison group; for instance, the value-added scores of a given teacher are usually compared with the scores of the colleagues in the same grade level or subject area, and then teachers are ranked by their score. Although it can be determined whether the individual teacher is average, below average, or better than average in terms of value-added among the comparison group, value-added analysis does not necessarily reveal which teachers are actually yielding desirable student performance results.[12]

Value-added analysis depends heavily on statistical projections of students' future test scores, using current performance to establish a baseline for expected performance in later years. Value-added analysis is thus difficult to apply in early grade levels, especially Kindergarten and first-grade, as young students lack previous test score data upon which to establish their baseline for future achievement. Most research on value-added analysis suggests it should not be implemented before grade three, when students will have several years of past data from which accurate projections of future performance may be made.[13]

Some research has shown that value-added analysis is more sensitive to teacher effects in mathematics subjects than language arts. This is attributed to the fact that teachers have less influence over language development: students primarily learn mathematics skills in school, but learn language skills from many sources, especially their families.[14]

A teacher's value-added "score" will fluctuate for each student; the accuracy of how much value a teacher adds to the classroom becomes more accurate as more data is gathered. In the same way a baseball player's batting average can fluctuate wildly during their first few games of the season and then stabilizes as the player takes more at-bats, value-added analysis can produce inaccurate measures of the effectiveness of first-year teachers, who sometimes only teach a couple dozen students at a time. The Gates Foundation study found that the value-added analysis score of a teacher with only one classroom worth of test data correctly classifies the teacher as being effective about 65 percent of the time; when a teacher has 10 years of value-added score data, effective teachers are identified 88 percent of the time by their value-added score alone.[15]

Conclusion. Value-added analysis continues to be implemented and perfected across the country, particularly in large urban school districts. When combined with other measures of effectiveness, including peer review of teacher instruction, studies have shown that value-added analysis provides a generally reliable indicator of teacher effectiveness. However, since value-added analysis relies heavily on statistical modeling of future student performance based on their past performance, certain student populations, especially students in early grade levels, are not as easily assigned value-added scores.

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[1] Staff developed this chart as an illustrative tool.

[2] *Learning about Teaching: Initial Findings from the Measuring Effective Teaching Program*. Bill and Melinda Gates Foundation. December 2010.

[3] Chicago Public Schools. "Information on the Value-Added Metric." Sept. 20, 2013; *available at* http://www.cps.edu/Pages/valueadded.aspx

[4] "Los Angeles Teacher Ratings." *The Los Angeles Times*; *available at* http://projects.latimes.com/value-added/faq/#what_is_value_added

[5] "State and Federal Accountability." New York City Department of Education; *available at* http://schools.nyc.gov/Accountability/tools/accountability/default.htm

[6] "Value-Added Overview." District of Columbia Public Schools; *available at* http://www.dc.gov/DCPS/In+the+Classroom/Ensuring+Teacher+Success/IMPACT+(Performance+Assessment)/Value-Added

[7] Tennessee Department of Education. "About TVAAS [Tennessee Value-Added Assessment System]." 2013; *available at* http://www.tvaas.sas.com/welcome.html

[8] Louisiana

[9] Public Schools of North Carolina. "NC Teacher Evaluations and Teacher Effectiveness." August 2012; *available at* http://www.ncpublicschools.org/docs/intern-research/reports/teachereval.pdf

[10] *Id.*

[11] *Learning about Teaching: Initial Findings from the Measuring Effective Teaching Program*. Bill and Melinda Gates Foundation. December 2010.

[12] *Id.*

[13] *Id.*

[14] *Id.*

[15] Otterman, Sharon. "Hurdles Emerge in Rising Effort to Rate Teachers." *The New York Times*, Dec. 26, 2010.