

# Issue BRIEF

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## Measuring Teacher and School Value Added in Oklahoma, Spring 2016

### ABSTRACT

Oklahoma teachers and administrators received value-added results in spring 2016, which are based on instruction provided in the 2014–2015 school year. This is the third year in which Oklahoma’s Teacher and Leader Effectiveness Evaluation System (TLE) has provided value-added results to educators. The results are calculated using value-added models, which separate teachers’ contributions to student achievement from other factors. This issue brief provides an overview of the approach that Mathematica Policy Research applied to produce the value-added results used in the evaluation system. It also describes updates to the value-added models that were used to produce the results distributed in spring 2016.

More than

**300** Oklahoma

**educators** contributed to the design of the state’s **value-added models**



### OKLAHOMA EDUCATORS CONTRIBUTED TO DEVELOPING THE VALUE-ADDED MODEL

Three years ago, we developed value-added models on behalf of the Oklahoma State Department of Education (OSDE) to measure educators’ contributions to student achievement. We and our partners from UPD Consulting collected and incorporated input from technical experts and more than 300 Oklahoma educators as a part of this process. Since then, we have worked closely with OSDE and the TLE Commission to improve the value-added models. The improvements were designed to make the best use of the OSDE data and to respond to changes in the state, such as the statewide rollout of roster verification.

A full technical report that describes the value-added models used to produce results provided

to educators in spring 2015 is available at <http://sde.ok.gov/sde/sites/ok.gov.sde/files/2013-2014%20Measuring%20VAM%20in%20Oklahoma.pdf>.

### WHO RECEIVES VALUE-ADDED RESULTS?

Teachers must meet a set of requirements to have received value-added results in spring 2016. The most important requirement is that they must have taught content that was tested on a state assessment in 2014–2015. These assessments consist of the Oklahoma Core Curriculum Tests (OCCTs) and the End of Instruction (EOI) tests. Teachers must also have had at least 10 students who received test scores in the same content area both before and after the teacher provided instruction to them. The period before the teacher provided instruction is the baseline

The typical score is the score a student would have obtained with the average Oklahoma teacher

year, which is the 2013–2014 school year. For example, to receive a value-added result, an English III teacher must have had at least 10 students who took the English III assessment in 2014–2015 and the English II assessment in 2013–2014. Many teachers of math or reading/English language arts in grades 4 through 8, algebra I in grades 8 and 9, algebra II in grades 9 through 12, geometry in grades 8 through 12, and English III in grades 10 and 11 are eligible to receive value-added results based on these requirements.

Administrators in Oklahoma receive a value-added result that is an average of the value-added results of the teachers in the school.

### MEASURING EDUCATORS' CONTRIBUTIONS TO STUDENT ACHIEVEMENT

Value-added models compare the following two test score averages for each teacher:

- **Average actual score.** This is the average of the scores obtained by the students the teacher taught. Teachers with higher average actual scores have students who demonstrated more knowledge of the tested subject at the end of the term or school year.
- **Average typical score.** This is the average estimated score those same students would have obtained with the average Oklahoma teacher. The TLE system calls these *typical scores* because they are estimated using the typical achievement of students' most similar "peers" in the state—those who have similar scores on baseline assessments and similar other background characteristics. Teachers with higher average typical scores have students who share background characteristics with high-achieving students.

The difference between these two test score averages represents the teacher's contribution to student achievement (Figure 1). When the average actual scores of a teacher's students exceed their average typical scores, the value-added model estimates that the teacher contributed more to student achievement than the average teacher in the state.

Any teacher can be identified as a high performer



### How a Value-Added Model Works

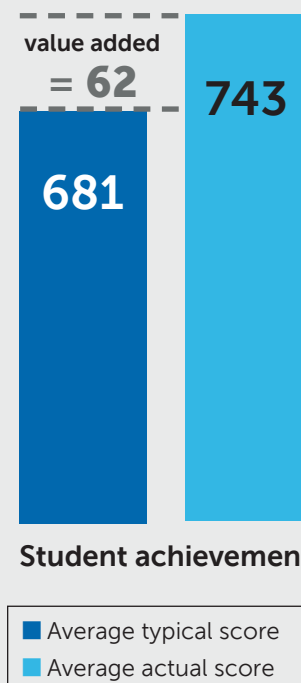


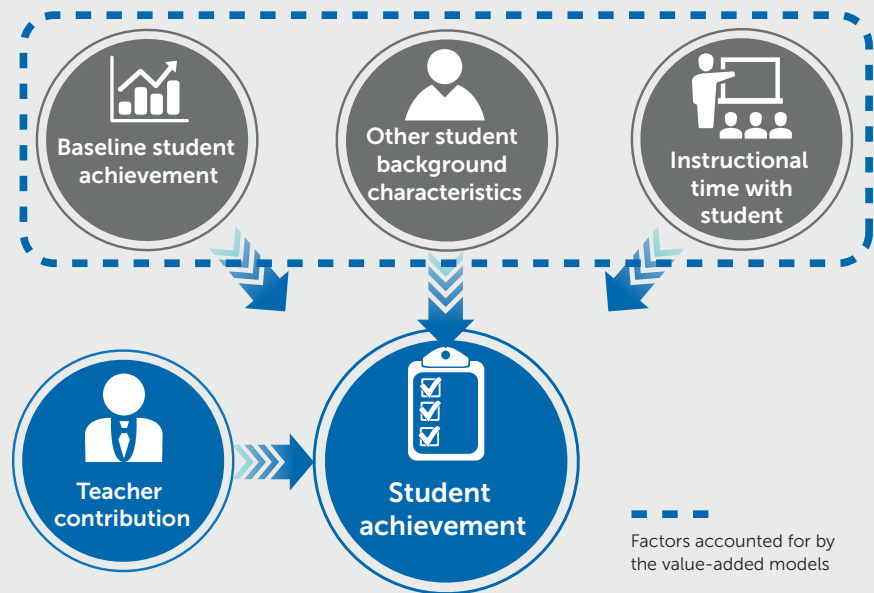
Figure 1

### VALUE-ADDED MODELS ACCOUNT FOR FACTORS ASSOCIATED WITH STUDENT ACHIEVEMENT

Typical scores adjust for factors other than the teacher that can affect student achievement. To estimate typical scores, the value-added models use administrative data collected by OSDE to account for three groups of factors that are associated with student achievement: (1) baseline student achievement, (2) other student background characteristics, and (3) instructional time with the student (Figure 2). Because value-added models compare average actual and typical scores, any teacher can be identified as a high performer, regardless of the baseline achievement levels or background characteristics of his or her students.

**Baseline student achievement.** Students who achieved high scores on tests in the baseline year also tend to achieve high scores after instruction, even if taught by a below-average

## Value-added models separate teachers' contributions to student achievement from other factors



**Figure 2**

teacher. Typical scores account for baseline test scores that measure what students knew before they entered a teacher's classroom. Among the factors used to estimate typical scores, baseline test scores are the most important because they have a strong association with student achievement after instruction. If possible, the models control for baseline test scores in multiple subject areas.

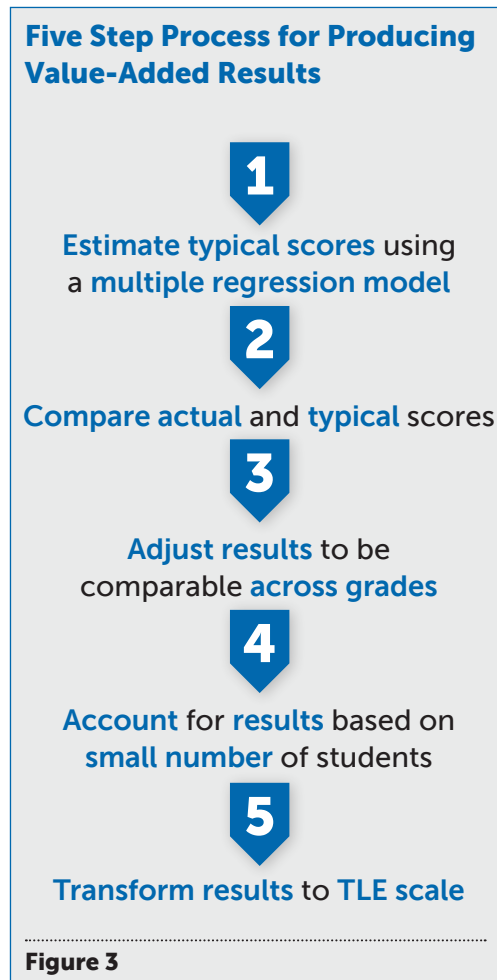
**Other student background characteristics.** Student background characteristics besides test scores can also capture factors that are associated with student achievement. Although such characteristics do not directly cause higher or lower achievement, they can reflect underlying factors that affect achievement. For example, as a group, students who are eligible for free or reduced-price lunch may have lower test scores than other students because many of them may lack access to important resources. Other

background characteristics accounted for in estimating typical scores include gender, race/ethnicity, individualized education plan status, English learner status, and whether the student transferred between schools.

**Instructional time with the student.** The amount of time a student receives instruction from a teacher may affect the student's achievement. Some students may receive less than a full year of instruction from a teacher either because they changed schools or because they received instruction from multiple teachers in the same school. When calculating a teacher's average typical score, the value-added model gives less weight to a student who received less instructional time with the teacher. The TLE system calls this instructional time *dosage* and bases it on data entered by teachers and administrators during roster verification.

## OKLAHOMA USES A FIVE-STEP PROCESS TO ESTIMATE VALUE-ADDED RESULTS

The Oklahoma value-added results were produced using the following five steps (Figure 3).



1. **Estimate typical scores using a multiple regression model.** To estimate typical scores for each student and tested subject, we used multiple regression, a statistical technique that can account for all the factors that affect student achievement mentioned above. The multiple regression technique simultaneously estimates the relationships between the test score and each background characteristic. It compares each student's achievement to the achievement of all other students in the state who share some or all of the same characteristics. Because a student's typical score is based on these statewide

relationships between background characteristics and achievement, it represents how the student would perform with an average Oklahoma teacher.

2. **Compare average actual and typical scores.** In the same model, we also estimated the value-added result for each teacher and subject by subtracting average typical scores from average actual scores. Students who had less instructional time with a teacher contributed less to the calculation of that teacher's averages.
3. **Adjust results to be comparable across grades.** For each subject, we placed all teachers on a common scale to facilitate comparing teachers across grade levels. This step addressed the fact that the OCCTs are not directly comparable across grades. We did not need this step for the EOI tests, because students take the same EOI tests regardless of their grade. Instead, we included grade as a student background characteristic in the EOI value-added models to control for differences in test performance due to students' educational experience at the time of testing.
4. **Account for results based on small number of students.** Value-added results can be misleading if they are based on few students. Some students might score well due to good luck rather than knowledge of the material. A teacher with few students is more likely to receive high or low value-added results due to luck. We made two adjustments to reduce this risk. First, we reported results only for teachers linked to at least 10 students in a given subject. Second, we adjusted the value-added model so that the results for teachers who taught fewer students rely more heavily on average effectiveness. To do this, we combined the estimate from step 3 with the average teacher's value-added result.
5. **Transform results to TLE scale.** In the final step, we transformed the value-added results into TLE scores from 1.0 to 5.0. On this scale, Oklahoma teachers with the average statewide value-added result receive a score of 3.0. Teachers whose results exceeded the average by at least two standard deviations receive a score of 5.0, and those whose results fell below the average by at least two standard deviations receive a score of 1.0.

Multiple measures  
of performance  
can address limitations  
in a single measure

## UPDATES TO THE VALUE-ADDED MODELS USED FOR THE SPRING 2016 RESULTS

The value-added models used to produce the results provided to educators in spring 2016 include three updates to those used for the results provided in spring 2015.

### **We used different EOI assessments in the value-added models to better reflect Oklahoma's course-taking patterns.**

Not all students take EOI assessments in the same sequence or in the same grades. The EOI value-added models are flexible and accommodate the most common course-taking patterns, but in some cases, too few students have the same course-taking pattern for us to estimate accurate typical scores. In the past, we have stipulated the combinations of subjects, grades, and baseline tests that the value-added models can include. For spring 2016, we changed this approach to better reflect actual course-taking patterns in the state. For example, too few students took geometry before algebra I, so we did not include these students in the value-added model for algebra I. Among tested students, at least 1,000 must have scores on the same baseline assessment for us to use their scores in the value-added model for a subject. In addition, there must be at least 250 students in a grade to include any students in that grade in the value-added model for a subject.

### **We excluded student attendance from the list of background characteristics due to concerns about its accuracy.**

In previous years, Oklahoma's value-added model accounted for student attendance in the baseline year. However, our analysis revealed that the state did not receive attendance data for 45 percent of students included in the value-added model. To account for attendance, the model used schoolwide attendance instead of these students' actual attendance, but this approach did not improve the accuracy of the results compared to simply excluding attendance from the model. Based on this information, the TLE Commission decided to exclude attendance from the value-added model until the state receives complete and appropriate data from school districts.

**We capped the dosage a student can receive from a teacher in a subject at 100 percent.** Previously, if a teacher submitted multiple rosters for the same group of students that corresponded to the same value-added model subject, we combined the instructional time for a student across the rosters. This meant that the teacher's dosage with a student could exceed 100 percent. For example, suppose a grade 4 English language arts instructor teaches spelling and reading content to the same students. Both spelling and reading instruction are eligible content for the OCCT reading value-added model, so both rosters would contribute to the teacher's value-added result. For 2016, we changed this calculation so that the dosage for a student on multiple rosters for the same teacher is the student's maximum dosage across the rosters. Using this approach, a teacher can no longer have more than 100 percent dosage for a student in a subject. Therefore, submitting multiple rosters with the same students and instructional time will not affect a teacher's value-added result.

## USING VALUE-ADDED RESULTS IN CONJUNCTION WITH OTHER PERFORMANCE MEASURES

Oklahoma currently uses value-added models to separate educators' contributions to student achievement from other factors. However, the results do have some limitations. For example, they might not measure all aspects of teachers' contributions to students' learning or to their school communities that are relevant to a comprehensive performance assessment. Value-added results measure teachers' contributions to their students' achievement on standardized test scores, but they do not directly measure any other outcomes. Accordingly, OSDE plans to provide teachers and administrators with multiple measures of performance, including value-added results when available.

**For more information about value added and TLE in Oklahoma, please call the OSDE Customer Service Desk at (405) 521-3301 or email [sdeservicedesk@sde.ok.gov](mailto:sdeservicedesk@sde.ok.gov).**

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