



Ohio

Value-Added Primer

A User's Guide

PUBLIC IMPACT

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Introduction

Since the piloting of value-added progress measures by the Ohio Department of Education in 2007, we at the Thomas B. Fordham Institute have repeatedly been asked by business people, journalists, philanthropists, educators, and others to explain “value-added” and what it means for schools and children. In order to help answer this question and others—such as “How is it used?” “Should it replace standards-based assessments?” and “Is it a fairer measurer of school performance?”—we volunteered to produce a short primer to help non-specialists understand the basics of “value-added.”

This stuff can be complicated. Indeed, “value-added” analysis can be carried out in various ways and with different emphases. These approaches are much discussed and argued over by experts. Each has pros and cons, relies on certain assumptions, and is fraught with some uncertainties. Let us be clear, too, that in seeking to explain the approach that Ohio has embraced, we don’t necessarily endorse it. But it’s important to know how it works and can best be used for educational improvement.

In striving to simplify something that is inherently complex, one always runs the risk of over-simplifying or not getting something quite right. We have done our best to avoid those perils without miring the reader in gobbledy-gook. In this effort, we are indebted to many people.

First and foremost, we commend state lawmakers, the State Board of Education, the Ohio Department of Education, and Battelle for Kids for their leadership over the past five years in developing and implementing Ohio’s value-added analysis system. Ohio is one of the first states in the country to measure and report on both student achievement (do students know the expected course content?) and student progress (how much have they grown in skills and knowledge over the course of the year?). As the result of this effort, the state has developed a richer and more sophisticated way to track student and school performance. These data empower school leaders and teachers to target more accurately instruction and programs to meet the needs of their pupils while providing parents, taxpayers, voters, and policymakers with a fairer and better-informed way to hold schools and districts accountable for student performance.

In the effort to translate the complexities of value-added analysis into user-friendly language, we reached out to two people who are uncommonly adept at describing and explaining complex education issues: Bryan Hassel and Jacob Rosch of the policy and research organization Public Impact.

We also owe much gratitude to the reviewers who helped refine and improve this document: Mary Peters, Battelle for Kids; Kristina Phillips-Schwartz, Cincinnati Business Committee; Ann Bischoff and Mark Real, KidsOhio.org; and Jeremy Shorr, Mentor City Schools.

At the Fordham Institute, we thank Mike Petrilli and Amber Winkler for their invaluable feedback. We also extend thanks to former Fordham Institute staffer Quentin Suffren for his editing skills and to Jayson Kinsey of Transcend Media for his design work.

Our goal at Fordham is to improve the educational opportunities, options, and performance of this state’s students, particularly the neediest among them. Toward that end we dedicate our work and this primer.

Chester E. Finn, Jr., President

Terry Ryan, Vice President for Ohio Programs and Policy

Emmy L. Partin, Researcher

Executive Summary


With the passage of Senate Bill 1 in 2001 and in compliance with the federal No Child Left Behind act, Ohio created a standards-based academic accountability system based on student achievement on statewide assessments in grades 3 -8 as well as a high school graduation test. In 2007, Ohio piloted a “value-added” accountability component that measures student academic progress—how much students have learned over time (see more on page 3). Beginning in August 2008, value-added is fully integrated into Ohio’s academic accountability system. Its purpose is to show whether and how much knowledge and skills schools and districts are adding to their students’ learning over the course of one or more school years (see more on page 4).

Ohio’s new value-added analysis uses complex calculations (see more on page 5) to report school-wide and district-wide pupil-achievement growth in three categories: Above Expected Growth (+), Expected Growth (✓), or Below Expected Growth (-).

- **Above Expected Growth (+)** indicates that the students in a school or district made greater than expected progress. These schools and districts are “adding value.”
- **Met Expected Growth (✓)** indicates that students made the amount of expected progress in one school year. Districts and schools in this category are still adding value, but not as much as those schools rated as Above Expected Growth (+).
- **Below Expected Growth (-)** indicates that students made less progress than the state expected.

Value-added analysis can identify where students are markedly improving or consistently struggling and can suggest how well students in those schools or districts are likely to perform in the future. This information can help policymakers and system leaders identify successful schools and districts and intervene when progress lags. It can also help educators adjust curriculum and instruction and design more effective strategies to help individual students (see more on page 8).

While value-added analysis is a powerful tool that policymakers and the public can use to judge which schools and districts are making sufficient academic progress, it does not tell the whole story of academic performance. Progress measures alone cannot reveal what students actually know or whether schools and districts have reached the academic goals set for them. To understand the performance of schools and districts more fully, policymakers (and education practitioners, parents, community leaders, et al.) should consider both how much progress students are making (value-added) and what proportion of those students have mastered the state’s academic content standards (see more on page 7).



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Two Ways to Measure Learning: **Achievement and Progress**

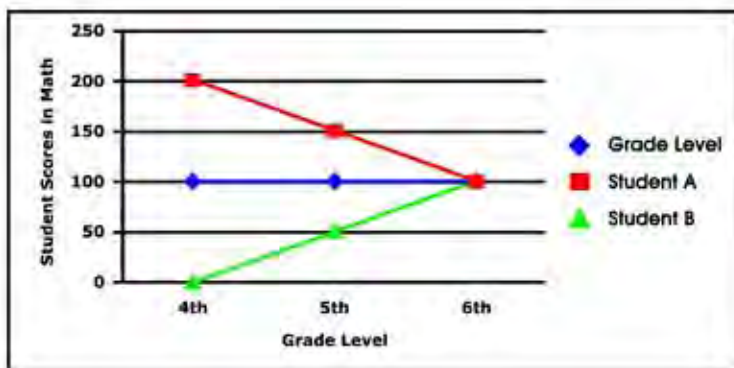
Beginning in August 2008, Ohio's academic accountability system is reporting a new component—"value-added analysis"—that measures student academic growth over time. Value-added changes how Ohio evaluates its public schools. This primer is designed to help readers better understand how value-added is calculated, what it can (and cannot) reveal, and how Ohioans can use value-added information to improve student learning outcomes.

We can assess how much students are learning in two broad ways: by measuring what students know and can do at a particular point in time (their "achievement" or "proficiency"), and by measuring how much students have improved (their "progress" or "growth") over a period of time.

A measure of achievement gives us a snapshot of what students know at the time they were tested. A measure of achievement could, for example, report whether a student was reading at grade level or what proportion of 5th grade students in a school were reading at grade level. **A measure of progress**, by contrast, tells us how much a student has learned over a designated period of time. A measure of progress might report that a student's reading score improved 100 points from 4th grade to 5th grade, or that most students in a school's kindergarten began the year far behind grade level but ended the year above grade level. Policymakers, educators, and the public can use achievement and progress measures differently to gauge how schools, districts, or the state as a whole are performing. One might find, for example, that a school has many high-achieving pupils enrolled in it but that they are not making very much progress while enrolled there. Conversely, a school may be helping its students to make great progress though their overall achievement is still not what it should be.

One advantage of achievement measures is that they hold all students and schools to the same standard of proficiency: they can tell us whether students or schools have reached goals set for them by, in this case, the state's academic standards in particular subjects and grades. Consider, for example, a student who enters kindergarten far behind the state's standards. Even if she makes a year's worth of progress each year during elementary school, she will still be far behind when she leaves 8th grade. If we only held schools accountable for progress, we would deemphasize the importance of determining what the student knows and can do—and of whether this particular student is truly prepared to succeed in high school and beyond.

Yet examining progress is also important. Consider the following example, which follows the achievement of Student A (red line) and Student B (green line):

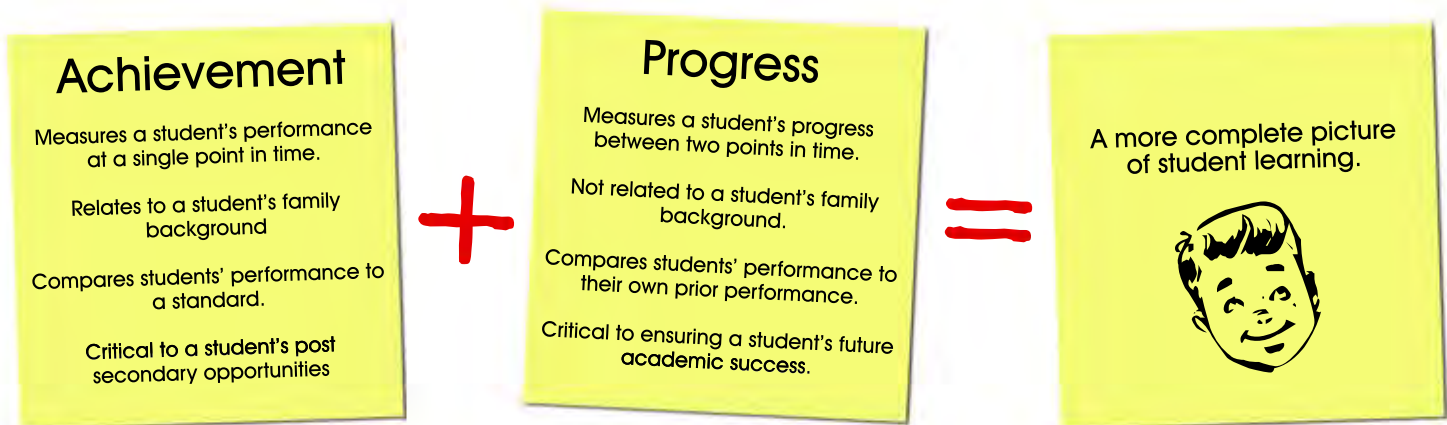


Adapted from Battelle for Kids

In 6th grade, both students are at grade level. If we only look at achievement at that point, the students appear to be identical. But Student B has improved dramatically over two years, while Student A's achievement has actually declined during that period.

Looking only at student achievement can also be misleading. Consider two schools, each with 75 percent of their students at grade level. One school, however, rose to the 75 percent marker from 47 percent two years earlier. The other's performance, by contrast, dropped from 82 to 75 percent during that same time. While a snapshot of the two schools using measures of achievement shows the same picture at one point in time, their performance trajectories are quite different.

Progress, if measured effectively, can tell us where one cohort of students is improving or consistently struggling and how well students in that school or district are likely to perform in the future. This way, curriculum can be appropriately adjusted and more effective academic interventions can take place. In short, we need both achievement and progress measures to make sense of student and school performance and to determine what to do about it.



Adapted from Battelle for Kids

What is Value-Added?

One challenge of measuring progress is that it can be quite difficult to judge the significance or magnitude of a student's gains or those of a group of students. Imagine, for example, that a student scores 75 points in one year and 82 the next. We can see that she made progress (or "a gain") of 7 points. But we don't know whether her gain was large, small, or in-between. In this example, if most children only progress by one or two points each year, the student's 7-point gain looks large. But it looks small if students typically leap ahead by 10 or 20 points during a year.

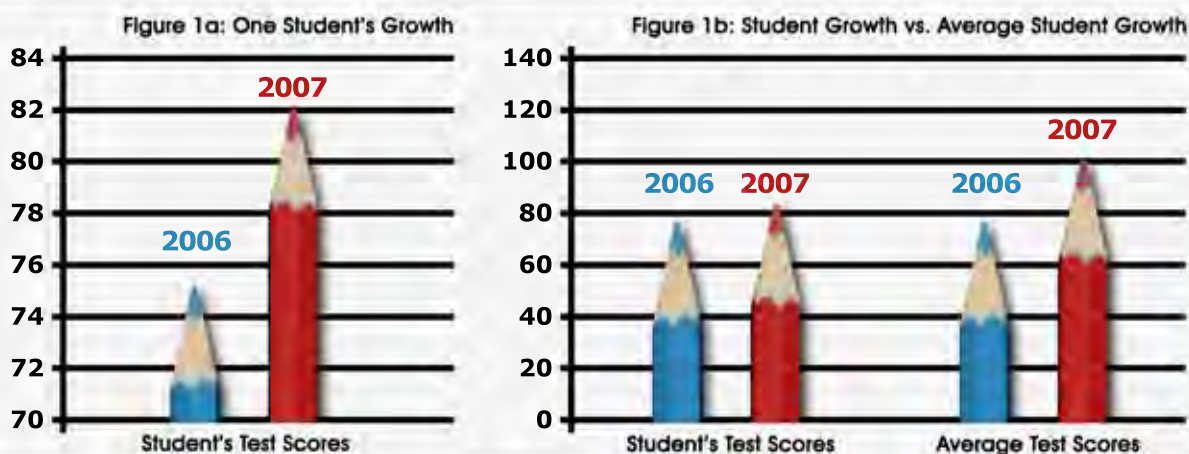
In other words, if we don't know what to expect, we can't judge the significance of a student's progress. (For more, see the box *Is Progress Significant?*)

Value-added is one way to make that kind of judgment. Value-added methods are tools that analysts have devised to help us understand the gains that students are or are not making while in school. This can be done in many ways, and different analysts and states have developed various approaches.

In Ohio, the goal was to determine whether students' gains are large, small, or in-between by comparing them to the gains we would expect similar students to make. If students in a school made better-than-expected progress, under the Ohio system we may conclude that the school "added value" to the students' learning (i.e., it helped the students learn more than was expected).

Is Progress Significant?

Figures 1a and 1b show the progress a hypothetical student made from 2006 to 2007. In Figure 1a we see only the student's progress, in Figure 1b we see that progress compared with the progress an average student makes (called "expected" progress in Ohio). Was this student's progress large, small, or in-between?



From 2006 to 2007, this student's score rose from 75 to 82, a gain of 7 points. When viewed individually, this student's progress appears large; however, when compared to the progress an average student makes (from 75 to 100, or a gain of 25 points) this gain appears small.

How Does Ohio Calculate Value-Added?

Ohio's measurement of value-added is based on the SAS Institute's Education Value-Added Assessment System (EVAAS) (<http://www.sas.com/evaas>), also known as the "Sanders model" after its inventor, William Sanders. Versions of this model are currently being used in Colorado, Iowa, New Hampshire, North Carolina, Pennsylvania, and Tennessee. EVAAS is a powerful but complicated way to determine whether students' academic progress is meeting or exceeding expectations.

To understand how it works, think about comparing anticipated and actual scores. Each year, students across the state take the Ohio Achievement Tests (OATs). The performance of individual students and cohorts of students one year can be used to predict their performance in the next year.

For instance, imagine that we know from experience that most students who score 85 points on the OAT for math in the 3rd grade will score 91 points in the 4th grade, a gain of 6 points.

If a student scored 85 points in the 3rd grade and then scored 128 points in the 4th grade, a gain of 43 points, we would say that this student has made significant progress by growing far more than expected. For more see the box Actual vs. Expected Performance.

For Ohio, EVAAS conducts a similar, though more complicated, analysis. Instead of just comparing a student's gain to the average gain, EVAAS develops a customized prediction of each student's progress based, if possible, on the student's own academic record as well as that of other students over multiple years, with statewide test performance serving as an anchor.

The Ohio Achievement Tests (OATs)

The Ohio Achievement Tests or OATs are given to all students in Ohio in grades 3-8 in reading and math, grades 5 and 8 in science and social studies, and grades 4 and 7 in writing.

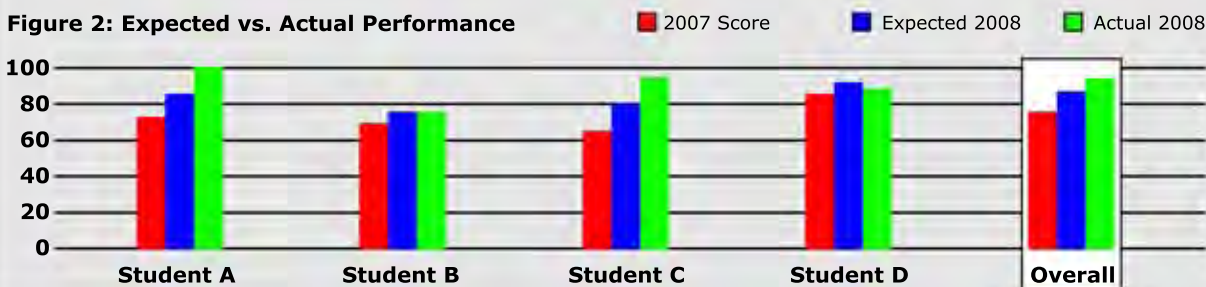
The OATs assess whether students have mastered grade-level content in each subject. High achievement on the OATs is correlated to a deep understanding of the skills and knowledge set forth in Ohio's grade-level academic standards.

At this time, value-added analysis is only used by Ohio to gauge student progress in reading and math in grades 4-8.

EVAAS calculates a number for each student in reading and math called a “value-added gain.” A value-added gain is the difference between what a student scored in a given subject and what EVAAS predicted that student would score. If a student exceeds these expectations, she will have a positive value-added gain. If she falls short of expectations, her value-added gain will be negative. And if she meets expectations, her value-added gain will be at or near 0. (For more, see the F.A.Q. section at the end.)

Actual vs. Expected Performance

Figure 2 shows a simulation of what a value-added analysis might look like. Each student receives a predicted score based on the student’s own academic record and that of other students over multiple years. This “expected score” is then compared with the student’s actual score in a given year. Student A made greater than expected growth because he scored higher than his expected score. Students B and C made expected growth because they scored at or near their expected scores, while Student D made less than expected growth because he scored below his expected score. Overall, the four students, taken as a group (a “classroom”, say) made greater than expected growth.



Reporting Value-Added

By compiling the value-added gain of every student in a school, it is possible to determine whether that school as a whole made progress that was above, at, or below expectations. In the same way, by compiling the performance of every student in every school in a district, it is possible to determine whether the district as a whole made progress that was above, at, or below expectations.

Report Cards

Ohio’s school and district report cards will report school-wide and district-wide growth in three categories:

- Above Expected Growth (+)
- Met Expected Growth (✓)
- Below Expected Growth (-)

Each school and district will receive a rating in reading and math for grades 4 through 8, as well as a composite rating.

A rating of *Above Expected Growth (+)* indicates that the students in a school or district, taken as a group, made greater than expected progress. It is possible to assume a school or district that is continually rated Above Expected Growth (+) is having a significant impact on its students’ achievement. This school or district is “adding value” to its students’ educations. It should be noted, however, that school-wide and district-wide value-added results may conceal considerable variation by student and demographic group within that school or district.

Met Expected Growth (✓) indicates that students made the amount of expected progress in one school year. Districts and schools in this category are still adding value, but not as much as those schools rated Above Expected Growth (+).

A rating of *Below Expected Growth (-)* means that students made less progress than they should have. While there are many possible reasons for this, a school or district that is repeatedly rated as Below Expected Growth (-) is clearly not accomplishing as much for its pupils’ learning as the state expects.

Value-Added and Ohio's Report Card Designations

Ohio currently uses a ratings-based accountability system to track school performance. Based on a set of standard criteria, schools and districts receive a designation that rates their performance. Through 2007, five designations were possible: Excellent, Effective, Continuous Improvement, Academic Watch, and Academic Emergency.

In the past, four criteria were used to determine a school's rating:

- State-specific Indicators, such as percent of students proficient in various subjects and grades, graduation rates, and attendance rates;
- Adequate Yearly Progress (AYP) status, the federally-mandated determination of whether enough students in each of a school's subgroups are meeting standards;
- Performance Index (PI) scores, which combine the results of all statewide tests into a single scale that runs from 0 to 120; and,
- Growth in Performance Index, to give schools credit for progress over time.

Beginning in 2008, the Growth in Performance Index is replaced by value-added as the state's measure of progress. Schools' ratings will be calculated based on their performance on the first three criteria, and then value-added results will be factored in. Schools that show Above Expected Growth for two years in a row will move up one rating. Any school that shows Below Expected Growth for three years in a row will move down one rating. Additionally, a new designation, "Excellent with Distinction," will be added to the ratings. This designation is only possible for schools rated Excellent that also show two years of Above Expected Growth.

Power User Reports

"Power User" reports also allow Ohioans to obtain more in-depth value-added data about schools and districts. These reports can be generated online at the Ohio Department of Education's website. While report cards will only show schools' and districts' value-added classifications (+, ✓, or -), Power User reports show each school's and district's specific value-added gain, value-added classification, and standard error for reading and math, overall, and within grade levels.

Value-Added Gain is a number that tells us how a school's or district's students performed in relation to the state's expectations. The larger the value, the larger the difference between the students' test scores and their expected test scores. A score of 0 would mean that students exactly met expectations.

Value-Added Classification explains the significance of a value-added gain. Note that a school or district may have a positive value-added gain but the value-added result may be classified as just meeting, rather than exceeding, expected gain. This happens when the value-added gain falls within the Value-Added Standard Error. (For more, see the box Understanding Standard Error.)

Understanding Standard Error

A student's expected score is actually an estimate. EVAAS predicts that a student's result will fall within a range, the prediction plus-or-minus some number. That plus-or-minus number is called the "standard error." Standard error is influenced by factors like sample size and how many years of data are available.

For example, Ohio might estimate that a student should gain 10 points. But because this is an estimate, Ohio also calculates the standard error to be 2.0. As a result, it predicts that the student will gain between 8 and 12 points: $10 - 2 = 8$, and $10 + 2 = 12$. For a student's gain to be deemed above or below expectations, it must fall outside this range.

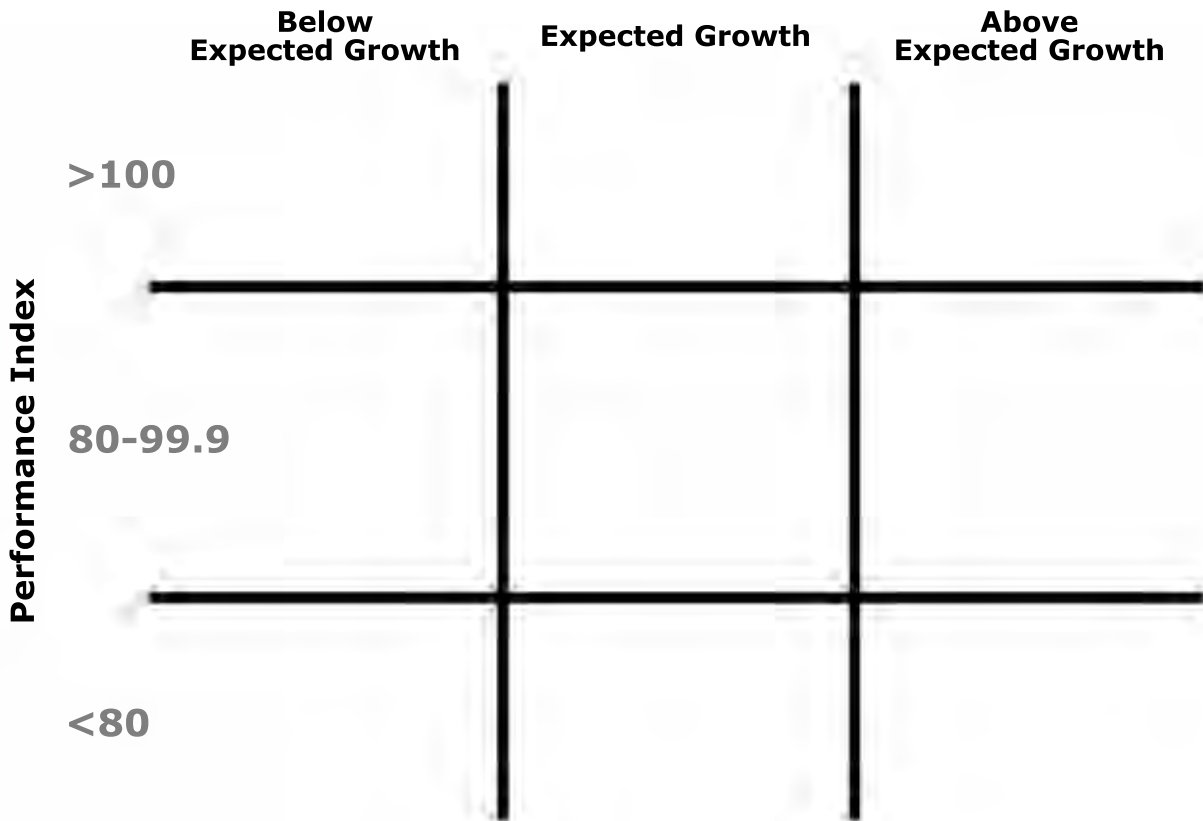
	+	14	↑	Above
		13		Expected Gain
Expected Gain →	+2	12		
	+1	11		
	0	10	→	Met Expected Gain
	-1	9		
	-2	8		
		7	↓	Below
		6		Expected Gain
		-		↓

Using Value-Added to Improve Ohio's Schools

With the addition of value-added analysis, Ohio has a new and powerful way to assess the effectiveness of its schools. With value-added data, policymakers, educators, parents, and community leaders are able to judge which schools and districts are helping students make significant academic progress.

Even though progress is important, it is crucial to remember that value-added is only one piece of the assessment puzzle. It does not reveal how much students actually know or can do. A value-added score can tell us how much progress students are making, but progress alone cannot reveal whether students are prepared for success in high school and beyond.

To assess the performance of a school or district, it is important to examine both progress and achievement. Any school or district in Ohio can be placed on the chart below based on its Performance Index (which measures achievement) and its value-added classification (which measures progress). A school with high achievement (a Performance Index score greater than 100) but low progress (a value-added rating of Below Expected Growth) would be placed in the top left cell. A school with low achievement (a Performance Index score less than 80) but high progress (a value-added rating of Above Expected Growth) would be placed in the bottom right cell. While it is possible for schools to fall into any category, ideally a school or district would have high levels of achievement and high levels of progress—represented by the upper right cell of the figure below. If used in conjunction with achievement measures, Ohio's new value-added analysis can help the state move more and more schools and districts in that direction.



Frequently Asked Questions

How can teachers, schools, and districts use value-added to improve schools?

Value-added gives educators unprecedented information about individual students' growth. With value-added information, it is possible to target teaching, curriculum, or academic interventions to specific areas where student growth is lagging. Furthermore, by giving educators valuable information about the progress that each individual student should make, from wherever he or she started, we can help focus on what really matters—student learning.

Can I see the value-added score for a particular teacher or classroom?

Your superintendent can dispense that information at his or her discretion.

Why does value-added use expected scores? Wouldn't it be easier just to look at the change in a student's scores from one year to the next?

Because students are expected to learn new material each year, their score should naturally increase each year. How much it should increase is what the expected score calculates. Value-added analysis looks at whether students progressed by more or less than expected. For more, see the box *Is Progress Significant?*, page 5.

How does EVAAS predict what a student will score?

EVAAS does not actually predict a student's raw score; instead EVAAS conducts an analysis called value-added mean gain. A student's past scores are converted to a percentile-like index score, called a normal curve equivalent (NCE). This describes where a student's scores fall in relation to his or her peers. A student is expected to at least maintain his or her position on the NCE scale from year to year. Imagine a student has an NCE of 42 in math one year and an NCE of 42 the next year. This student "met expectations" and her value-added mean gain will be 0. If the student's NCE of 42 in math fell to 35 the following year, her value-added mean gain would be -7.

Does value-added take into account students' socioeconomic status (race, ethnicity, or income)?

Because socioeconomic factors like race, ethnicity, and income should affect a student similarly from year to year, these factors do not have to be accounted for separately. Controlling for a student's past academic history should account for any socioeconomic effect. In other words, in the EVAAS model each child serves as his or her own control. This reduces the need to control for socioeconomic factors such as race, ethnicity, and income. For more information on why EVAAS does not explicitly consider demographic factors, see: <http://www.sas.com/evaas>.

If a value-added gain is negative or below expected, does that mean students' scores dropped?

Not necessarily. If a student's score increases by less than expected, her value-added gain will be negative. Even though her score improved, it did not improve enough to meet expectations. For more see the box *Actual vs. Expected Performance*, page 6.

If students, schools, or districts earned a rating of Below Expected Growth, does that mean they got worse?

Not necessarily. Below Expected Growth only means that students did not progress as much as expected. If students do not make expected growth, it is more accurate to say that students' did not meet their potential or did not accomplish what the state believes they should.

F.A.Q. Continued

How can a value-added gain be negative or positive, but still be coded Met Expected Growth? Shouldn't only value-added scores of 0 be considered expected growth?

If any value-added gain is within the standard error, then it is too small to be considered above or below expected growth. For example, with a standard error of 1, gains of both +.8 and -.6 would be considered expected growth, since they are within +1 and -1 units of 0. For more on this point, see the box Understanding Standard Error, page 7.

What if a student has changed schools or districts? How will his or her value-added be calculated?

Schools and districts are only accountable for students enrolled for a full academic year. If a student transfers to a new school within the same district, that student's value-added history will "follow" him or her. A student with missing information can still receive a value-added score as long as the child has adequate previous test data. For more information on how the EVAAS system calculates value-added when some student data is missing, see: <http://www.sas.com/evaas>.

Where can I get more information about value-added?

The Ohio Department of Education's website contains additional information about Ohio's accountability system, including value-added. From the department's homepage (<http://www.ode.state.oh.us>) type "value-added" into the search box. For more information about the SAS EVAAS model see: <http://www.sas.com/evaas>.

You may also contact your local school for information about value-added and how the school uses it to improve student learning outcomes.

How is Battelle for Kids' Project SOAR different from Ohio's new value-added analysis?

Project SOAR uses different methodology to compute value-added gains. Under the SOAR system, growth is measured in relation to the average student growth in one year. This creates a distribution where approximately half of the gains will be above expected, and half of the gains will be below expected. Under Ohio's system, the distribution of results from 2007 acts as an anchor from which to measure growth. How well students did in 2007 is measured against how well they did in 2006. This means growth may not fall into an even distribution: more than 50 percent of students can make above expected growth or more than 50 percent can make below expected growth.

For more information see the Ohio Department of Education's accountability website: <http://www.ode.state.oh.us/GD/Templates/Pages/ODE/ODEPrimary.aspx?page=2&TopicRelationID=1065>.

For information about Project SOAR, see Battelle for Kids' website: <http://www.battelleforkids.org>.

How can I access school or district value-added scores?

From the Ohio Department of Education's homepage (<http://www.ode.state.oh.us>), enter "Data Warehouse" into the search box. After accessing the Data Warehouse, you may find value-added scores for schools and districts in the "Ratings" folder.

Will high schools receive value-added results?

No. Multiple years of data are needed to produce value-added results and Ohio high school students are currently assessed only in the 10th grade.