



# What Should You Know about PVAAS?

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## What is PVAAS?

Since 2002, PVAAS has provided Pennsylvania educators with a powerful tool to determine, grade by grade and subject by subject, whether all students have plentiful choices and increased opportunities for learning. This tool is PVAAS (Pennsylvania Value-Added Assessment System). Value-added is a statistical analysis used to measure a district's, school's or teacher's influence on the academic progress rates of groups of students from year to year.

Conceptually and as a simple explanation, a value-added growth measure is calculated in the following manner: Growth = Current Achievement compared to all prior achievement, with achievement being measured by quality assessments, such as the PSSA and Keystone exams

PVAAS is *not* another test. It provides analyses based on existing student assessment data. PVAAS measures student growth from one year to the next using state assessments, and reports whether a group of students maintained, exceeded, or fell short of their expected growth based on their prior testing history.

PVAAS uses a time-tested, externally validated approach to measuring student growth. Independent, non-partisan researchers at RAND and WestEd have named the PVAAS approach as one of the most reliable. The methodology used by PVAAS is called EVAAS. Pennsylvania's implementation of EVAAS is called the Pennsylvania Value Added Assessment System (PVAAS). The EVAAS methodology has been published since 1998 and has been nationally peer reviewed.

## Introductory Concepts

1. There is a key difference between achievement and growth.
2. Achievement (PSSA & Keystones) and growth (PVAAS) must be used together to obtain a complete picture of student learning.
3. Achievement is typically correlated with student demographic variables, such as socioeconomic status.
4. There is typically little to no relationship between growth and student demographic factors when sufficiently accounting for students' prior achievement.
5. PVAAS captures even subtle changes in performance for both high-achieving and low-achieving students. This allows schools to respond faster to students' needs in relation to the progress they are making.

6. The PVAAS Average Growth Index (AGI) is an appropriate value to consider when comparing the growth of LEAs/districts/schools. Achievement data should also be used in combination with growth data when making comparisons.
7. Low-achieving schools can meet, exceed, or fall short of the standard for PA Academic Growth, which is to at least maintain achievement from one grade/subject/course to the next.
8. High-achieving schools can also meet, exceed, or fall short of the standard for PA Academic Growth, which is to at least maintain achievement from one grade/subject/course to the next.

Achievement is about location, growth is about direction. We may know where we are with students at a given point in time (achievement results), but do we know what direction we are headed in with them in terms of academic performance (growth)? If students do not at least meet the standard for PA Academic Growth, achievement results may be impacted.

Achievement results (PSSA & Keystones) and growth results (PVAAS) must be used together to obtain a complete picture of student learning. PVAAS is another tool that provides a more complete picture of student learning.

With achievement results alone, schools do not always know if they have really made growth with different groups of students. Achievement results often compare two different groups of students. Sometimes students may not grow enough to make significant changes in their achievement results, such as going from non-proficient to proficient. However, they may have made growth.

Achievement measures a student's performance at one single point in time, and compares student performance to a standard. It is critical to a student's post-secondary opportunities. Achievement is often highly correlated with a student's demographics.

Growth measures students' academic performance across time, i.e., across years, and compares a student's performance to their own prior performance. It is critical to ensuring a student's future academic success. Growth data typically shows little to no relationship to a student's demographics when sufficiently accounting for students' prior achievement.

1. There are both high-achieving AND low-achieving schools in PA making high growth.
2. There are both high-achieving AND low-achieving schools in PA making low growth.

Value-added can remove the effects of factors not under the control of the school (McCaffrey, Lockwood, Loretz & Hamilton, 2003; Ross, Wang, Sanders, Wright & Stringfield, 1999; Wright, Horn & Sanders, 1999).

By measuring students' academic achievement AND growth, schools and districts have a more comprehensive picture of their own effectiveness in raising student achievement!

Achievement	Growth
The final result of an academic experience	Is the concept underlying value-added analysis and reporting
Highly correlated with demographic factors, such as socioeconomic status	Typically little to no correlation with demographic factors
Affected by factors outside the school	Typically dependent upon what happens as a result of schooling
Measures students' performance at a single point in time	Measures students' progress across time and years
Compares student performance to a standard	Compares student performance to his/her own prior performance
Critical to students' post-secondary opportunities	Critical to ensuring students' future academic success

## How Does PVAAS Benefit Educators?

PVAAS helps educators determine what works in their districts, schools, and classrooms. It is more than just a single number; it is a comprehensive, interactive system that provides customized reporting regarding the effectiveness of curricular and instructional practices.

Pennsylvania educators use PVAAS to improve student outcomes.

1. Kelly Byrne, in the Downingtown Area School District, said that “PVAAS reports allowed us to really look at our middle school students and their math placements. We were better able to ensure that every student had the opportunity to enroll in the appropriate math course. It also helped us look at the much larger picture of getting more students in rigorous math courses in high school.”
2. Principal Jeff Clinton of South Mountain Elementary noted, “We were already a school engaged in rich data conversations. PVAAS helped us take that conversation to the next level.”
3. Principal Paul Dougherty of West Scranton Intermediate School said that “Using PVAAS projections has streamlined and brought some authenticity to the scheduling process...more valid than [only using] teacher recommendations...”

## How Does PVAAS Benefit Students?

With PVAAS, the growth of every student matters, regardless of their achievement level and background. PVAAS reporting can help educators match students with teachers who have demonstrated success with similar students in the past, priming both the teacher and student for success.

Research by value-added experts confirms the impact that teachers make in their students' life. According to a recent Harvard study, students who have high value-added teachers, on average, increase their test scores immediately relative to the previous year as well as their college attendance and incomes, compared to students with low value-added teachers (Chetty, Raj et al. [2011] “The Long-Term Impacts of Teachers”).

## How Do Educators Use PVAAS?

PVAAS offers an objective, accurate way to measure student growth and the influence Pennsylvania's public districts, schools, and teachers have on students' educational experiences. Districts, schools, and teachers are using PVAAS (growth data), in conjunction with achievement data, to make sure students are on the path to proficiency and beyond. With the information in PVAAS, educators are better able to:

1. Monitor the growth of all groups of students from low-achieving to high-achieving, ensuring growth opportunities for all students
2. Measure changes in student achievement as a result of the impact of educational practices, classroom curricula, instructional methods, and professional development
3. Make informed, data-driven decisions about where to focus resources to help students make greater growth and perform at higher levels
4. Modify and differentiate instruction to address the needs of all students
5. Align professional development efforts in the areas of greatest need
6. Network with other districts and schools that may be yielding different growth results
7. Identify best practices and implement programs that best meet the needs of their students

PVAAS lets educators see if they are growing groups of students at ALL performance levels, both low-achieving and high-achieving students.

Growth results (PVAAS) let us see even very subtle changes that have occurred with student academic performance. Low performing students may not have yet reached proficiency, but the school may have been highly effective in making growth with those students; PVAAS will let the schools see those results. High performing students may still be at or above proficiency, but if they are not meeting the standard for PA Academic Growth their achievement levels may slip over time. PVAAS is a more sensitive indicator than we would see with achievement results, so schools can respond more quickly.

Every district, public school, and charter school has access to PVAAS as a resource for district and school continuous improvement. Pennsylvania's systems for accountability, reporting, educator effectiveness, and continuous improvement use PVAAS as one of multiple measures.

Districts and schools can access PVAAS reports with unique login credentials on the [PVAAS website](#). PVAAS also allows schools to compare the academic growth of their students with similar schools across Pennsylvania. You can do this by clicking on "Visit Public Site" on the [PVAAS website](#). Then, click on the "School Search" link under the Reports tab.

1. It is NOT appropriate to compare the "Growth Measure" values from the District and School Value-Added Reports as they do not take into account the different standard errors of each district and school.
2. The color-coding of all of the Growth Measures does in fact take into account the various standard errors.

3. The appropriate measure to compare the growth of districts and schools is through the District/School Search feature which provides the “Average Growth Index” (AGI) for each district and school.
  - a. The Average Growth Index is a value based on the average growth across grade levels and its relationship to the standard error so that comparison among districts and schools is meaningful.
  - b. If the standard error is not accounted for, users might get a skewed picture of the relative effectiveness of different districts and schools.
  - c. In general if the Average Growth Index is positive (greater than 0), this indicates that, on average, students in the district or school met or exceeded the standard for PA Academic Growth (indicating achievement was maintained or increased as the group of students moved from one grade/subject/course to the next). A large, positive Average Growth Index provides more evidence that the group of students exceeded the standard for PA Academic Growth or increased their achievement.
  - d. If the Average Growth Index is negative (less than 0), this indicates that, on average, students in the district or school achieved did not meet the standard for PA Academic Growth indicating achievement was not maintained as the group of students moved from one grade/subject/course to the next). A large, negative Average Growth Index provides more evidence that the group of students fell short of the standard for PA Academic Growth or decreased in their achievement.

### **How is PVAAS different from a state’s academic standards?**

Unlike a state’s academic standards, PVAAS is NOT a set of standards and does not require a specific set of standards to measure student growth. PVAAS uses student scores from a variety of state assessments.

### **What types of PVAAS reports are available to districts, schools, and teachers?**

In the fall of each school year, all public school districts, charter schools, cyber charter schools, and full-time career and technology centers across the Commonwealth receive web-based reporting. PVAAS is one of several tools provided to districts from the Pennsylvania Department of Education.

PVAAS provides two types of information – (1) value-added (growth) data on groups of students, and (2) projection to achievement data for individual students and groups of students.

Value-added, or growth, information analyzes available data from previous years to help districts, schools, and teachers evaluate how much groups of students have gained academically in a school year. Value-added reports help answer questions such as, “Did a group or subgroup of students maintain, increase, or fall behind in their achievement?”

Value-added reports are available in the grades and subjects/courses assessed in Pennsylvania’s statewide assessment system, beginning in grade 4. This includes reporting for Mathematics

and English Language Arts (grades 4-8), Science (grades 4 and 8), and Keystone content areas (Algebra I, Literature, and Biology).

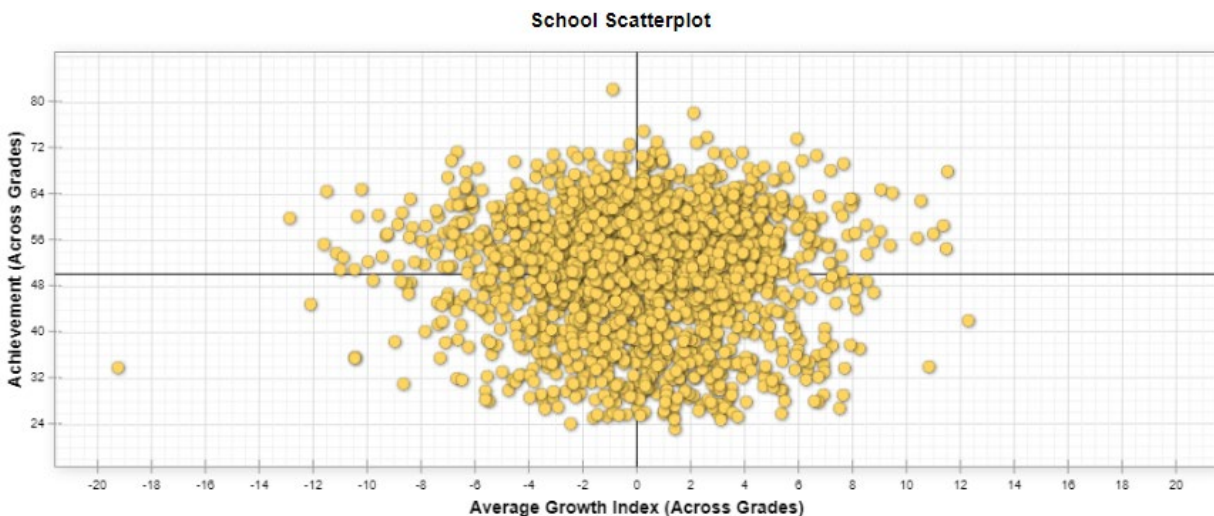
Projection to achievement information uses the data already analyzed to help schools project to the future. Projection reports help answer questions such as, “What is the likelihood of a student reaching proficiency on a future state assessment (PSSA or Keystone exam)?” and “What is the likelihood of a student reaching a specific benchmark on a college/career readiness assessment including Advanced Placement exams, PSAT, ACT and SAT?” Projection data can be used for intervention planning, enrichment planning, college/career readiness planning, course placement decisions, and resource allocation.

## Addressing Common Misconceptions about PVAAS

The PVAAS growth measures are based on a robust and reliable methodology. This approach overcomes many critical statistical issues related to using standardized tests to assess student progress and mitigates concerns about fairness. Some of the common concerns about PVAAS and its model are addressed below.

### Are PVAAS growth measures typically related to student achievement?

No! The figure below reports the actual 2017-2018 school PVAAS growth measures with the school’s achievement PSSA Math 4-8. Each yellow dot is a school in Pennsylvania. Regardless of student achievement at the school, there is a relatively even distribution of schools that make, exceed or fall short of the expected growth.



## Can even high-achieving schools make expected growth?

Yes! There are high-achieving schools in Pennsylvania with very high growth through PVAAS based on the PSSA and Keystones assessments.

Very few students make perfect scores in the same subject from year to year. Some educators are concerned about their students who make perfect scores and how that may impact progress measures. In fact, of the approximately 770,000 students assessed on the PSSA in 2018:

1. Less than 0.1% (less than 900 students statewide) score at the highest point of the Advanced range
2. Less than 0.005% (less than 30 students statewide) scored at the highest point of the Advanced range in Math two years in a row
3. 0 students scored at the highest point of the Advanced range in ELA two years in a row

For the Keystone tests administered in the 2017-2018 school year, approximately 120,000 to 150,000 test scores were included in the PVAAS model for each subject. Of these test scores:

1. Less than 0.03% (less than 10 students) scored at the highest point of the Advanced range in Algebra I
2. Less than 0.03% (less than 30 students) scored at the highest point of the Advanced range in Biology
3. Less than 0.01% (less than 10 students) scored at the highest point of the Advanced range in Literature

## Can even low-achieving schools make expected growth?

Yes! There are low-achieving schools in Pennsylvania with very high growth through PVAAS based on the PSSA or Keystones assessments.

## Is PVAAS affected if a student has a bad testing day?

PVAAS measures of growth are not about one student on one day. It is about looking at the growth of an entire group of students over time. In fact, PVAAS does not provide growth measures for individual students. It only provides a growth measure for groups of students.

PVAAS protects educators by excluding outlier test scores, providing a growth measure based on groups of students rather than individual students and using a multiple-year trend for accountability and evaluation. In other words, PVAAS looks for a pattern across multiple years of growth measures and multiple years of student test scores to see whether there is *evidence* that students, on average, made expected growth.

## Are PVAAS growth measures reliable from year to year?

Independent researchers have noted that the reliability of value-added modeling is similar to what is used elsewhere for high-stakes decision-making (Source: [Evaluating Teachers: The Important Role of Value-Added](#)). Multiyear measures from the PVAAS approach are among the most reliable, in part because the model uses so much testing history for each student and

because the model requires sufficient evidence or certainty (standard errors) to report that students made more than or less than the expected growth.

## **How can PVAAS measure growth during test transitions?**

The EVAAS approach used to generate PVAAS reporting has been in use for over twenty years, during which it has accommodated a number of test transitions. It is not required for test scores to be on the same scales in order to measure growth during a test transition. The most important factor is that the new test has a relationship to the old test. For example, an old 6<sup>th</sup> grade Math test scores are highly correlated with scores on a new 7<sup>th</sup> grade Math test. This requirement has not been a problem with PVAAS reporting.

## **Why does the PVAAS model need to be so complex?**

The concept of growth is simple, but measuring growth reliably requires sufficient statistical rigor to overcome challenges when analyzing longitudinal student data. The PVAAS approach has the following advantages:

1. Includes students with missing test scores (many models exclude students with missing test scores)
2. Uses all available testing history for each student (many models restrict prior testing history to 1-2 subjects in 1-2 years)
3. Uses all available testing history for each student, even when the historical data are not on the same scale or when tests have changed over time
4. Dampens the effects of measurement error, which is inherent in all student assessments because the tests themselves are estimates of student knowledge, not an exact measurement

Value-added experts have validated the [PVAAS approach](#). For example, researchers at RAND and WestEd recommended a modeling approach such as PVAAS as one of the least biased and most reliable.

Although the statistical approach is robust and complex, PVAAS reports in the web application are easy to understand. The reports are color-coded for easy interpretation so that educators and administrators can identify their strengths and opportunities for improvement at a glance. The reporting is interactive, so that authorized users can drill down to access diagnostic reports for students by subgroup or achievement level, individual student-level projections, and other reports. Educators have a comprehensive view of past practices, as well as tools for current and future students. Thus, educators benefit from the rigor of the PVAAS models by gaining insight in an accessible and non-technical format.

## **Where can I find additional information?**

Visit the [PVAAS website](#). Contact the PVAAS Statewide Team at [pdepvaas@iu13.org](mailto:pdepvaas@iu13.org) or (717) 606-1911.