Keep It Simple:
Explaining PVAAS in Everyday Language

Just as you do not need to be a mechanic to drive a car, you don't need to be a statistician to use PVAAS! This document provides clear and brief explanations of statistical terms and concepts to increase your confidence and understanding as you examine, discuss, and use PVAAS data.

CONCEPT: | **IN OTHER WORDS:**

PVAAS Growth Color Indicators

PVAAS growth colors help us interpret a PVAAS growth, or value-added, measure – in other words, did the student group *maintain*, *gain*, or *fall behind* in terms of their achievement?

DARK BLUE ⟰ ↗ *Gained***
LIGHT BLUE ⌃ ↗ *Gained**
GREEN ✓ → *Maintained*
YELLOW ⌄ ↘ *Fell Behind** *Moderate evidence
RED ⟱ ↘ *Fell Behind*** **Significant evidence

The colors help us know if our schools and our academic programs are making an impact on students that we teach, to ensure we meet the needs at all levels of acheivement. The five PVAAS growth color indicators are the same at the LEA/district, school, and teacher levels.

Growth Standard Methodology
versus
Predictive Methodology

In Pennsylvania, growth is measured in two ways:

GROWTH STANDARD METHODOLOGY is used when we assess students every year, e.g., PSSA ELA and PSSA Math in grades 4-8.

PREDICTIVE METHODOLOGY is used for subjects and grades when we don't assess students every year, e.g., PSSA Science and Keystones.

Both processes of measuring growth are conceptually similar:

- Both entering achievement and exiting achievement calculations for a group of students are made using the student group's entire achievement history, across grades and subjects.

- Using both the entering achievement and exiting achievement for the student group, we can calculate a growth, or value-added, measure for that student group.

- PVAAS growth colors help us interpret the growth, or value-added measure – did the student group maintain, gain, or fall behind in terms of their achievement?

DARK BLUE ⟰ ↗ *Gained***
LIGHT BLUE ⌃ ↗ *Gained**
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Quintiles
(found on PVAAS Diagnostic reports)

In PVAAS, **quintiles** represent achievement groups. All students statewide are ordered from lowest to highest in terms of achievement, then divided into five equal groups, called quintiles, with 20% of students in each of the five quintiles. Group 1 is the lowest-achieving 20% of students in the state, and group 5 is the highest-achieving 20% of students in the state.

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
	Lowest-Achieving 20% (1-20)	Next-to-Lowest 20% (21-40)	Mid-Achieving 20% (41-60)	Next-to-Highest 20% (61-80)	Highest-Achieving 20% (81-100)

In simplistic terms, we can think of these five quintile achievement groups as:

Group 1	Group 2	Group 3	Group 4	Group 5
Well below average achievement	Below average achievement	Average achievement	Above average achievement	Well above average achievement

Consider the table section of the Diagnostic reports, below the graph:

The table columns represent the five quintile achievement groups for *your* LEA/district or school.

2022 PSSA Math 5th Grade

Growth	State Achievement Group				
	1 Lowest	2 Low-Mid	3 Middle	4 Mid-High	5 Highest
Average	-2.24	-0.76	0.09	-0.23	2.68
Standard Error	1.47	1.19	1.76	0.95	1.46
Student Count	18	14	8	10	11
Percentage of Students	29.5	23.0	13.1	16.4	18.0

The color of the ***Average Growth*** row tells you about the growth that group of students demonstrated, with **BLUE** indicating that students gained, **GREEN** indicating that students maintained their achievement, and **YELLOW** indicating that students fell behind.

Note: A white (or blank) cell indicates that there were less than 5 students in that achievement group, which is too few students to measure growth in PVAAS.

The last two rows provide the number and proportion of students in *your* school or LEA/district in that achievement group.

Normal Curve Equivalents (NCEs)

NCEs allow for comparison between tests that do not use the same scales for scores.

- PSSA tests do NOT have the same scale across years, grades, and subjects – for example, a 1300 on a PSSA Grade 4 Math test does not mean the same thing as a 1300 on a PSSA Grade 5 Math test. This is not wrong; it is simply the way the assessments are scaled.

- You cannot do mathematical calculations with scale scores or percentiles; in other words, it is not appropriate to subtract or calculate an average of scale scores or percentiles.

- You can do math appropriately with NCEs; in other words, it is appropriate to subtract NCEs and calculate an average of NCEs.

- You can measure growth using differences in NCEs but cannot measure growth using differences in percentiles or scale scores.

Percentiles and scale scores are not equivalent and cannot be compared across years or assessments.
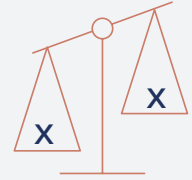
NCEs are equivalent and can be compared across years or assessments accurately with mathematical calculations.
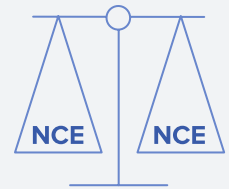
Standard Errors

When we measure anything in the real world, there will always be some kind of natural "error" around that measure – this is called **the standard error**. When we measure student achievement, this same thing happens. Natural error exists around any student assessment that measures achievement.

Take the example of **weighing yourself on a bathroom scale.** Depending on the clothes you're wearing, the time of day, or even where your feet are placed on the scale, your weight could differ slightly with each measurement. Each of these weights would be a good estimate of your actual weight, and would give you a good indicator of what you weigh right now. Yet, there could be several ounces in either direction for each of the measurements you take. Those several ounces are called **the standard error.**

As an educator, you probably notice this when receiving PSSA and Keystone reports on a student. A **range** is provided, indicating what the student might receive if the student took an equivalent version of the test (in other words, if they took a test that covered exactly the same content, but included a different set of questions). It indicates that the score could go up or down by a certain amount – the standard error.

All PVAAS growth measures also have standard errors. We assume in PVAAS that all student groups will maintain their achievement (i.e., GREEN in PVAAS), unless we have enough data or evidence to say that the group gained or fell behind. We use the standard error to help us determine if we have enough data or evidence to say the student group did not maintain their achievement. In other words, we use the standard error in determining the PVAAS growth color indicator.

Average Growth Index

The Average Growth Index (AGI) is a reliable measure of growth that tells us whether a group of students maintained, gained, or fell behind in terms of their achievement.

- The AGI is calculated by taking a PVAAS growth measure and dividing by its standard error.

- The AGI is a growth value that accounts for the amount of growth a student group made, as well as the amount of data or evidence we have in calculating growth for that group of students.

- While a PVAAS growth measure *cannot* be compared across LEAs/districts, schools, teachers, grades, subjects, or years, the Average Growth Index (or, AGI) *can* be compared across LEAs/districts, schools, teachers, grades, subjects, and years.

Predicted Scores
versus
Student Projections

These two terms are similar and are often mistakenly used for one another. However, in PVAAS, they are calculated differently and have different purposes.

Predicted Scores are used in generating a growth measure for a group of students.

- These are based on students' own testing history and on the average performance of students in the same cohort of students in the same testing year.

- These represent what each student is expected, or predicted, to score based on their own achievement and students who took the assessment in the most recent school year.

- Because predicted scores of students are based on the performance of other students who took the assessment in the same year, it is NOT possible to calculate the predicted score for a student prior to them taking the assessment.

Student Projections are calculated for individual students and are used to project the probability of a student reaching a specific benchmark on a future assessment.

- These are based on students' own testing history and on the performance of students in earlier cohorts in prior years.

- These represent how a student is likely to score if the student makes the amount of growth that was typical for students who took the assessment in the most recent year.