ACADEMIC GROWTH
ON THE 2017-2018
ACCOUNTABILITY DETAILS REPORTS

OVERVIEW

The Academic Growth indicator appears on the Report Card (RC) Accountability Details Report by subject (i.e., English language arts and mathematics) and student group. The median growth percentile (MGP) is the Academic Growth indicator, and refers to the relative ranking of current achievement for the median (or typical) student in the student group, school, or district as compared to academic peers. Academic peers are students in the same grade who have similar prior achievement scores for the same academic subject.

INCLUSION RULES

The Academic Growth indicator includes the following students:

- Students who are enrolled at the school on the first school day in May.
- Students who are enrolled in grades 4 through 8.
- Students who are enrolled for a full academic year (FAY)[1].
- Students who have a valid test[2].
- Students who are not first-year English learners.
- Students who have regular grade sequences (i.e., no retention or acceleration).
- Students who do not take the extended assessment.
- Students who have an intact achievement score history (i.e., not missing current or prior year achievement score)

CALCULATION

The Oregon Department of Education (ODE) uses the SGP R package (version 1.8-0.0) by Betebenner, Van Iwaarden, Domingue, and Shang (2018) to estimate student growth percentiles (SGPs) (i.e., relative rankings of student level conditional achievement). The SGP R package uses quantile regression to estimate predicted achievement scores for each student at each percentile in the conditional achievement distribution[3] (e.g., a predicted score at the 1st percentile, 2nd percentile, etc.). The midpoint between the percentiles associated with the predicted achievement scores immediately above and below the current achievement score is the SGP (Shang, Van Iwaarden, & Betebenner, 2015). The median SGP for a student group, school, or district is the MGP.

A simple way to understand how the SGP R package estimates SGPs is to illustrate it using ordinary least squares (OLS) regression (see Castellano and Ho [2013] for further details). The equation below is a typical OLS regression model. It shows current achievement score (Y) as a linear combination of parameters (β_0 and β_1), prior achievement score (X), and the residual or the unexplained portion in the model (ε).

$$Y = \beta_0 + \beta_1 X + \varepsilon$$

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[1] FAY means enrollment in a school or district for more than one-half of the instructional days prior to the first school day in May.
[2] A valid test is a completed or partial test from the statewide summative assessment where a student responds to at least five computer adaptive items or one performance task item.
[3] The conditional achievement distribution is the distribution of predicted achievement scores (controlling for prior achievement).

The objective of OLS regression is to minimize the difference between Y and the predicted achievement score (which equals $\beta_0 + \beta_1 X$)[4]. Preferably, we want Y - ($\beta_0 + \beta_1 X$) = 0; yet, we know that student achievement is complex, and prior achievement is not the only predictor of current achievement. Thus, Y - ($\beta_0 + \beta_1 X$) is seldom 0, and that's why the OLS regression model includes ε. In fact, Y - ($\beta_0 + \beta_1 X$) = ε, and when we transform ε to a percentile, we have a SGP. Students will have higher SGPs if their current achievement score is larger than the predicted achievement score (i.e., larger ε). Conversely, students with current achievement scores less than the predicted achievement score (i.e., smaller ε) will have lower SGPs.

As can be seen from the calculations, the SGP is not a direct measure of achievement growth. Yet, for nearly all students[5], growth is a necessary part of the calculation. The predicted achievement score is really a growth expectation interpreted as what the achievement score should be, given prior achievement. Students will certainly have to demonstrate growth if their current achievement score is to exceed the growth expectation (i.e., ε > 0).

Example

Suppose we have three students (students A, B, and C) in the same grade with identical prior achievement scores in the same subject (i.e., 2450). These students are academic peers. Suppose that $\beta_0 = 1250$ and $\beta_1 = 0.505$. The table below displays the current achievement score, predicted achievement score, and the difference between the current and predicted achievement scores (or ε).

Student	Current Achievement Score	Predicted Achievement Score	Difference	SGP
A	2526	2487.25	38.75	77.0
B	2508	2487.25	20.75	54.0
C	2473	2487.25	-14.75	18.0

Student A will have the largest SGP among the three students due to the largest difference between the current and predicted achievement scores (2526 – 2487.25 = 38.75). On the other hand, student C will have the smallest SGP given the small (actually negative) difference (2473 – 2487.25 = -14.75).

Indicator Levels

The Academic Growth indicator consists of five rating levels. Student groups, schools, and districts earn a rating level according to the value of their applied rate. The applied rate is the higher of the current year MGP or the MGP across three years (i.e., the three-year median growth percentile).

Levels	Cuts	Interpretation
5	60	Represents schools at approximately the 90th percentile of MGPs (includes MGPs ≥ 60).
4	55	Represents schools at approximately the 75th percentile of MGPs (includes MGPs from 55 to 59.9).
3	45	Represents schools at approximately the 25th percentile of MGPs (includes MGPs from 45 to 54.9).
2	40	Represents schools at approximately the 10th percentile of MGPs (includes MGPs from 40 to 44.9).
1	< 40	Represents schools below the 10th percentile of MGPs (includes MGPs < 40).

[4] The predicted achievement score is the average value in the conditional distribution. If the distribution is normal, the average is equivalent to the median (or the 50th percentile).

[5] It is possible for a student to have a large SGP with a decline in achievement or a small SGP with an increase in achievement. The reason for this is the normative nature of the measure. Suppose that academic peers have a current achievement score that is less than the prior achievement score. The student with the smallest decline will have the largest SGP, and the student with the largest decline will have the smallest SGP.

IMPORTANT RESOURCES

- Assessment Inclusion Rules for Accountability Reporting
- Indicator Level Cuts for the 2017-18 Accountability Details Reports

FOR MORE INFORMATION

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REFERENCES

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