

# Introduction to the Georgia Student Growth Model

Student Growth Percentiles



Dr. John D. Barge, State School Superintendent  
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[www.gadoe.org](http://www.gadoe.org)

# Why focus on student growth?

- A growth model will allow educators to move beyond status-based questions to ask critical growth-related questions.
  - Status
    - What percentage of students met the state standard?
    - Did more students meet the state standard this year compared to last year?
  - Growth
    - Did this student grow more or less than academically-similar students?
    - Are students growing as much in math as in reading?
    - Are students on track to reach or exceed proficiency?
- The GSGM will provide student-level diagnostic information, improve teaching and learning, enhance accountability (CCRPI), and serve as one of multiple indicators of educator effectiveness (TKES and LKES).



# Growth vs. Value-Added

- A growth model describes change in student achievement across time
- A growth model becomes *value-added* when the growth is *attributed* to an entity (a teacher, a school, etc.)
- In many models, the *value-added* is the difference between predicted performance and actual performance
  - The model uses information about a student (prior achievement, demographic information, etc.) to predict how that student will perform. The student's actual performance is compared to his predicted performance. The difference is considered *value-added*.
- The GSGM does not predict performance; it describes observed student growth.



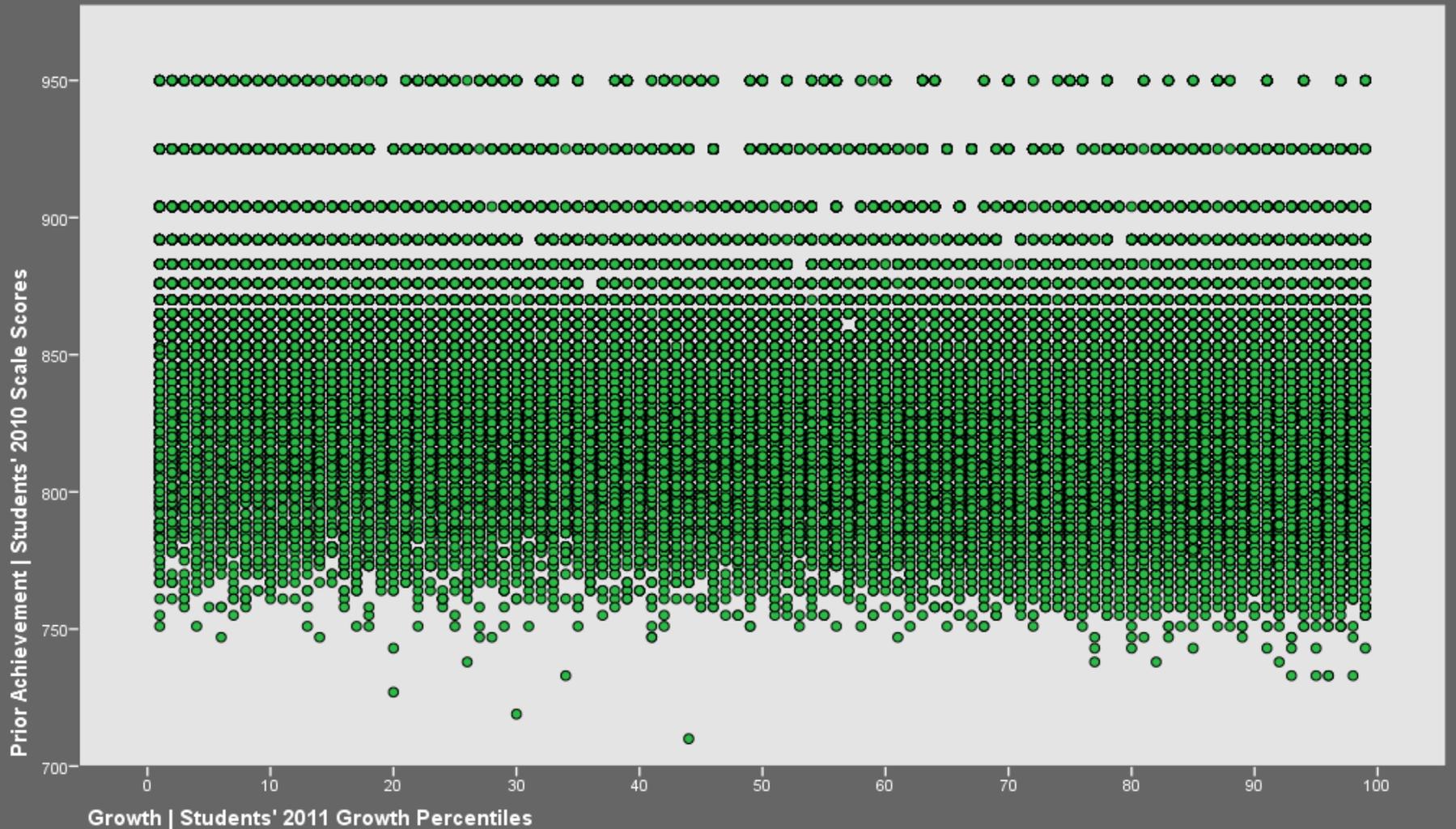
# Addressing Common Concerns

- Understandability
- Ownership of methodology and data
- Cost and operations
- Missing data
- Stability
- Growth at the extremes / floor and ceiling effects
- Outliers



# Growth and Prior Achievement

Georgia 5th Grade Students  
2011 Mathematics Performance



# What are Student Growth Percentiles?

- A student growth percentile (SGP) describes a student's growth relative to other students statewide with similar prior achievement
  - Calculations based solely on achievement
- SGPs not only show how *individual students* are progressing, but they also can be aggregated to show how *groups of students, schools, districts, and the state* are progressing

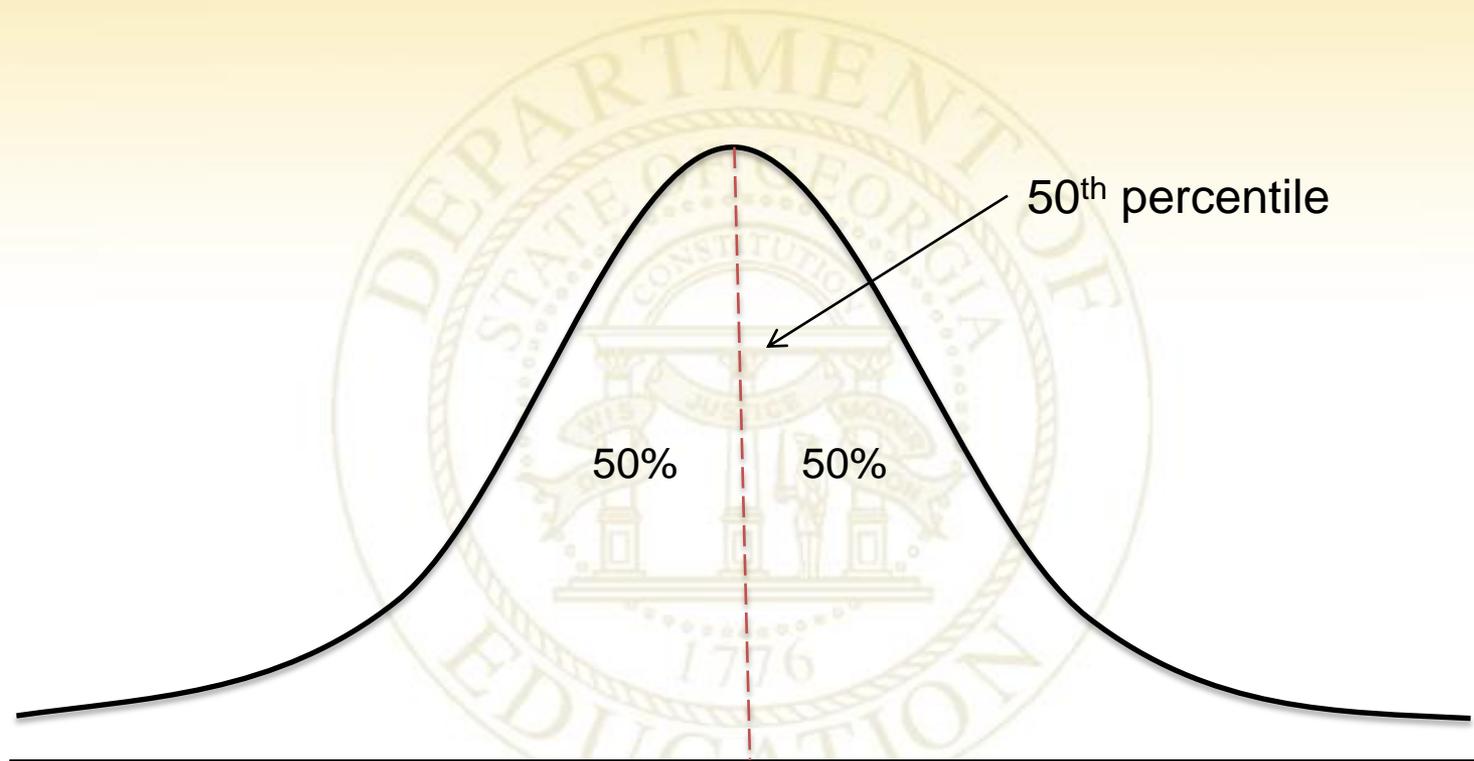


# SGPs for Individual Students

- Each student obtains a growth percentile, which indicates how his or her current achievement compares with that of his or her academic peers
  - Academic peers are other students statewide with a similar score history
  - Priors are the historical assessment scores used to model growth
- Growth percentiles range from 1 to 99
  - Lower percentiles indicate lower academic growth and higher percentiles indicate higher academic growth
- Students also receive growth projections and growth targets, which describe the amount of growth needed to reach or exceed proficiency in subsequent years



# Understanding Percentiles



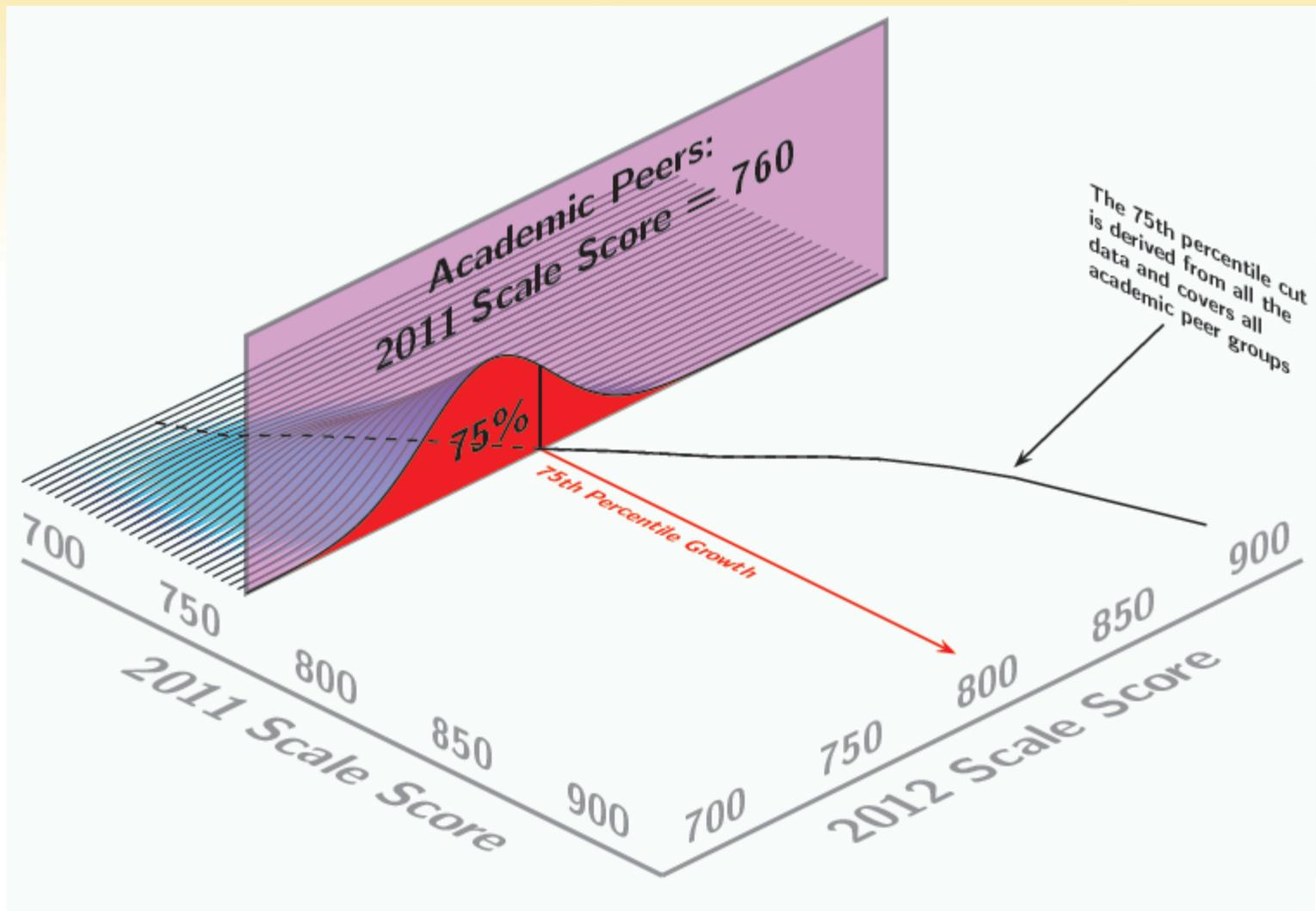
A distribution, for example, of height, weight, or academic growth

The 50<sup>th</sup> percentile is the value below which 50% of the distribution lies.



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# Understanding Academic Peers



# Aggregating SGPs

- There are multiple ways of aggregating SGPs (such as for a classroom, school, or district)
  - Median – the median growth percentile for all students
  - Growth distribution – divide the growth percentile range (1-99) into intervals and report the percentage of students demonstrating growth in each interval
  - Percentage meeting a goal – the percentage of students demonstrating at or above a specified level of growth



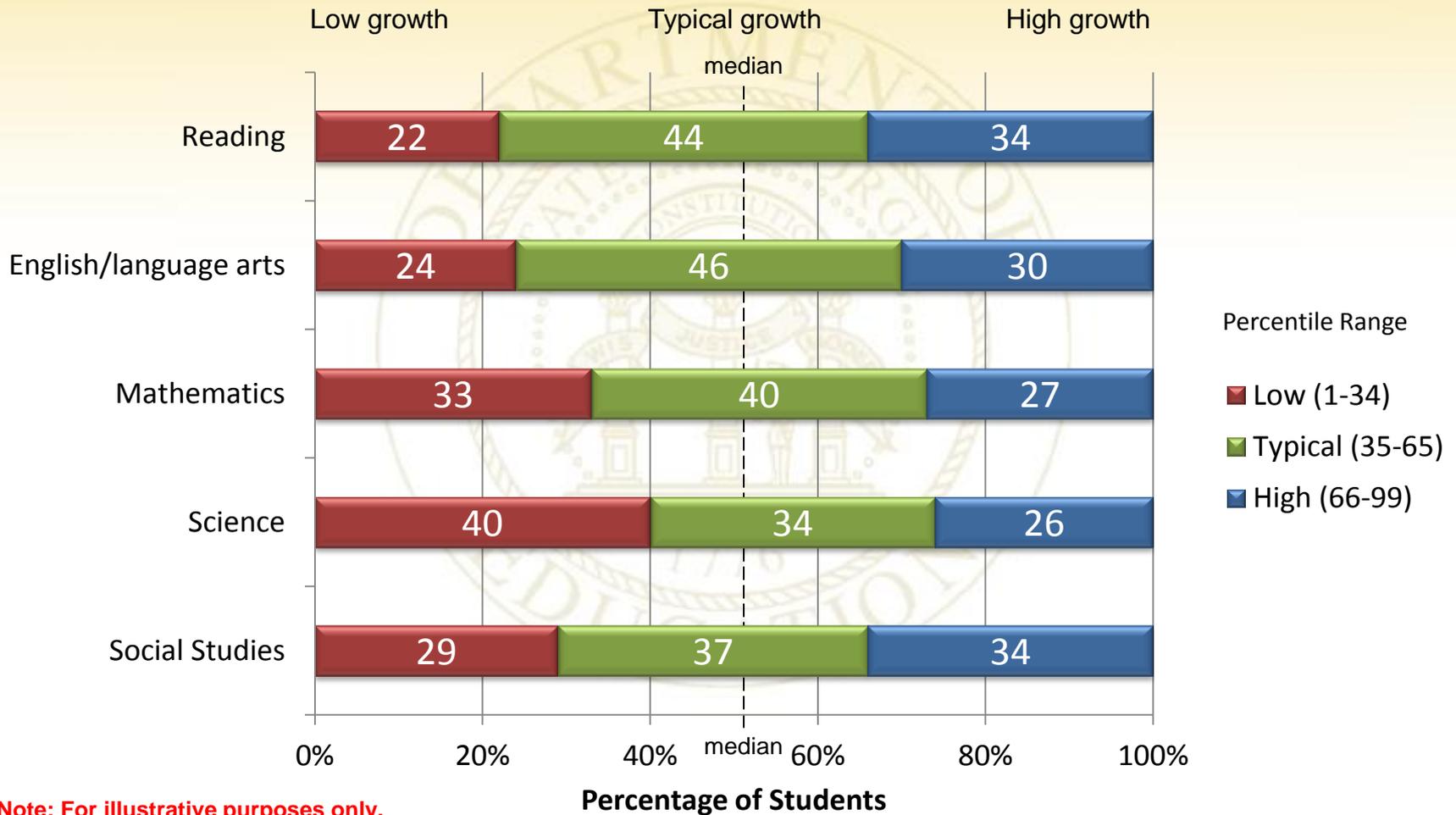
# Calculating the Median SGP

Name	SGP
Marvin M.	26
Olive O.	29
Donald D.	31
Minnie M.	33
George J.	38
Charlie B.	40
Bugs B.	46
Scooby D.	49
Fred F.	51
Betty B.	53
Elmer F.	57

- Imagine that the list of students on the left are all of the students in a 5th grade class.
- The 11 students are sorted in order of their SGP from low to high.
- The median SGP is the middle value, where 50% of students have a lower SGP and 50% have a higher SGP.



# Exploring Growth Distribution



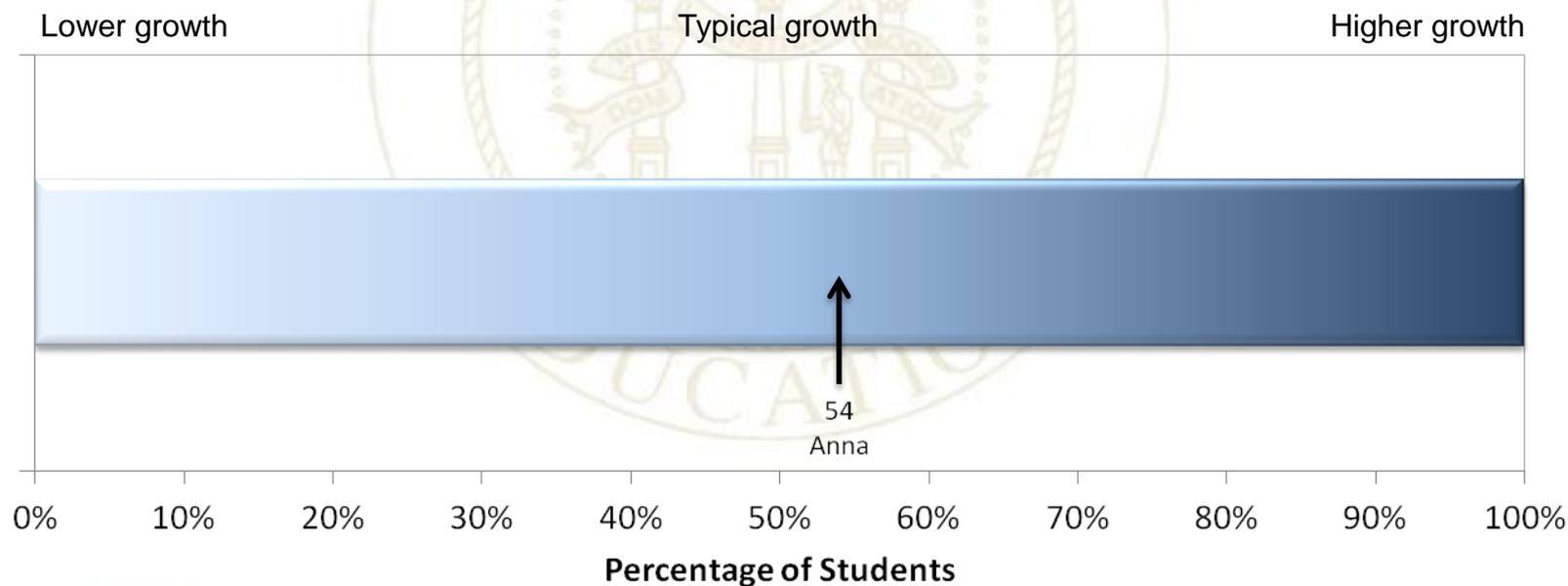
Note: For illustrative purposes only.



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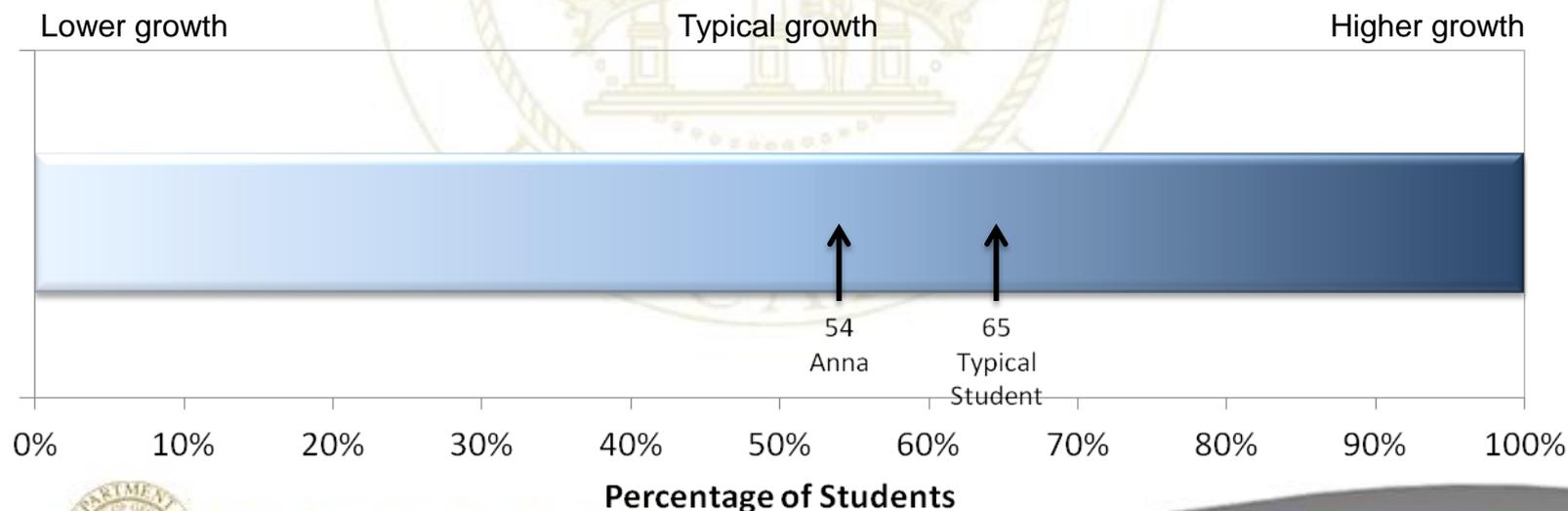
# Interpreting SGPs

- Anna's reading growth percentile is 54
  - Anna grew at a rate greater than 54% of academically-similar students in reading



# Interpreting SGPs

- The median reading growth percentile for Anna's school is 65
  - The typical student in Anna's school grew at a rate greater than 65% of academically-similar students
  - Anna grew at a lower rate in reading compared to the other students in her school on "average"



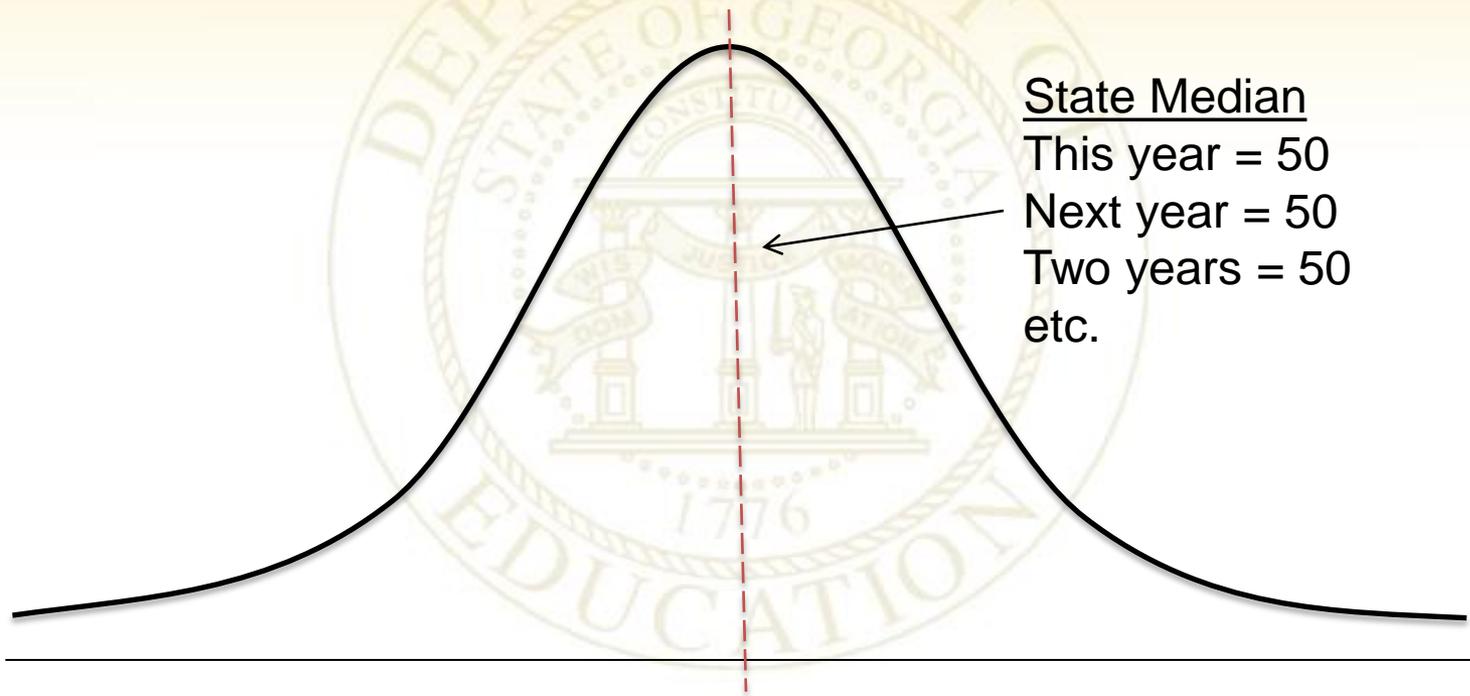
# Growth Over Time

- Because SGPs are normative, meaning growth percentiles describe a student's growth relative to other students in the state in a given year, how do we compare results over time?
  - A baseline will be used as a reference point so change in overall growth can be observed from year to year
  - Without using a baseline, the median SGP for the state would be 50 every year – absolute changes in a school's growth could not be observed since the state as a whole is moving too
  - The baseline is an average of multiple years of data in order to allow for a more stable comparison
  - A baseline has been set for CRCT reading, ELA, math, and science. Due to changes in the social studies test, the social studies baseline will be set in 2013. EOCTs are a mix of baseline- and cohort-referenced SGPs.



# Growth Over Time

Without setting a baseline...

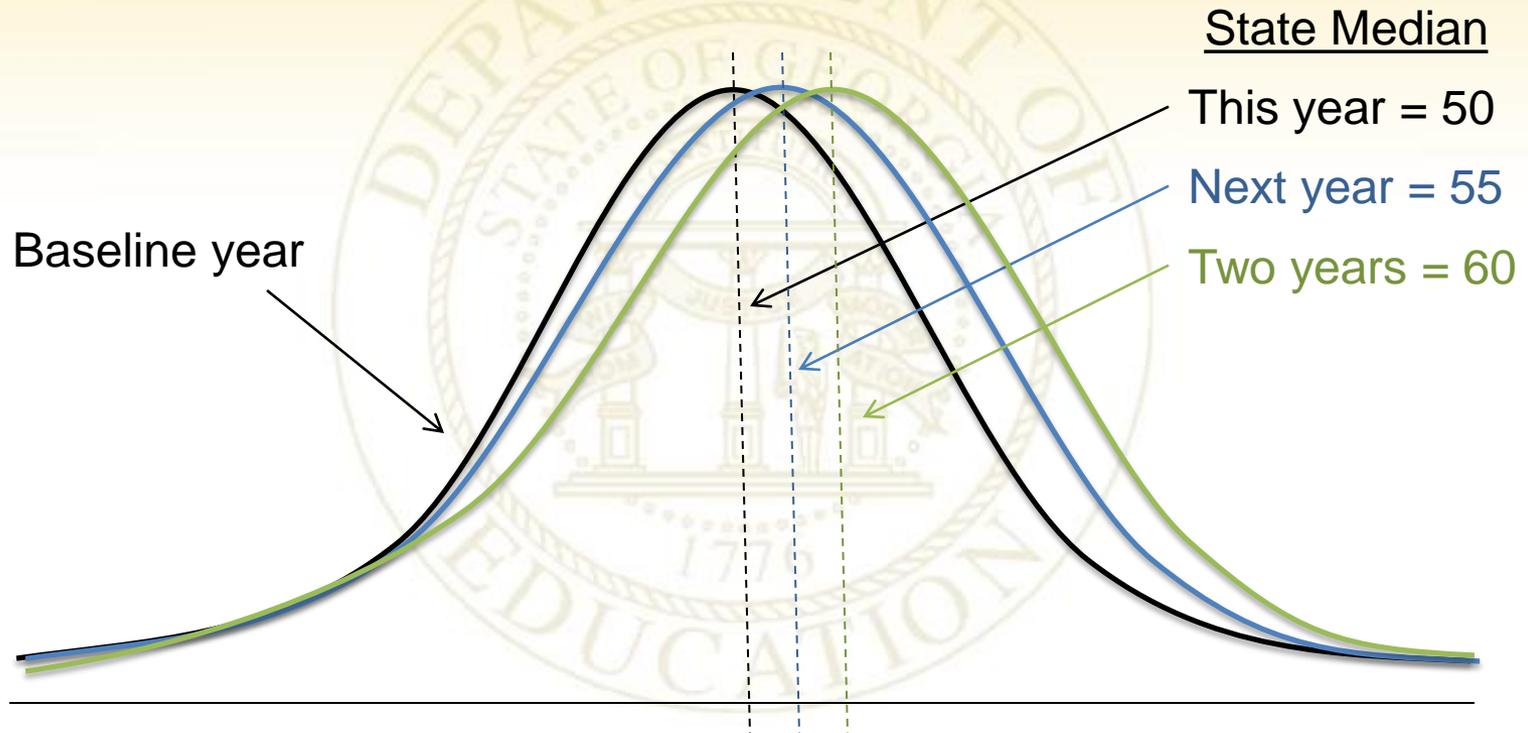


...the state median will always be 50 with half of students below 50 and half above 50



# Growth Over Time

With setting a baseline...



...the state median can change from year to year, representing statewide change in growth over time

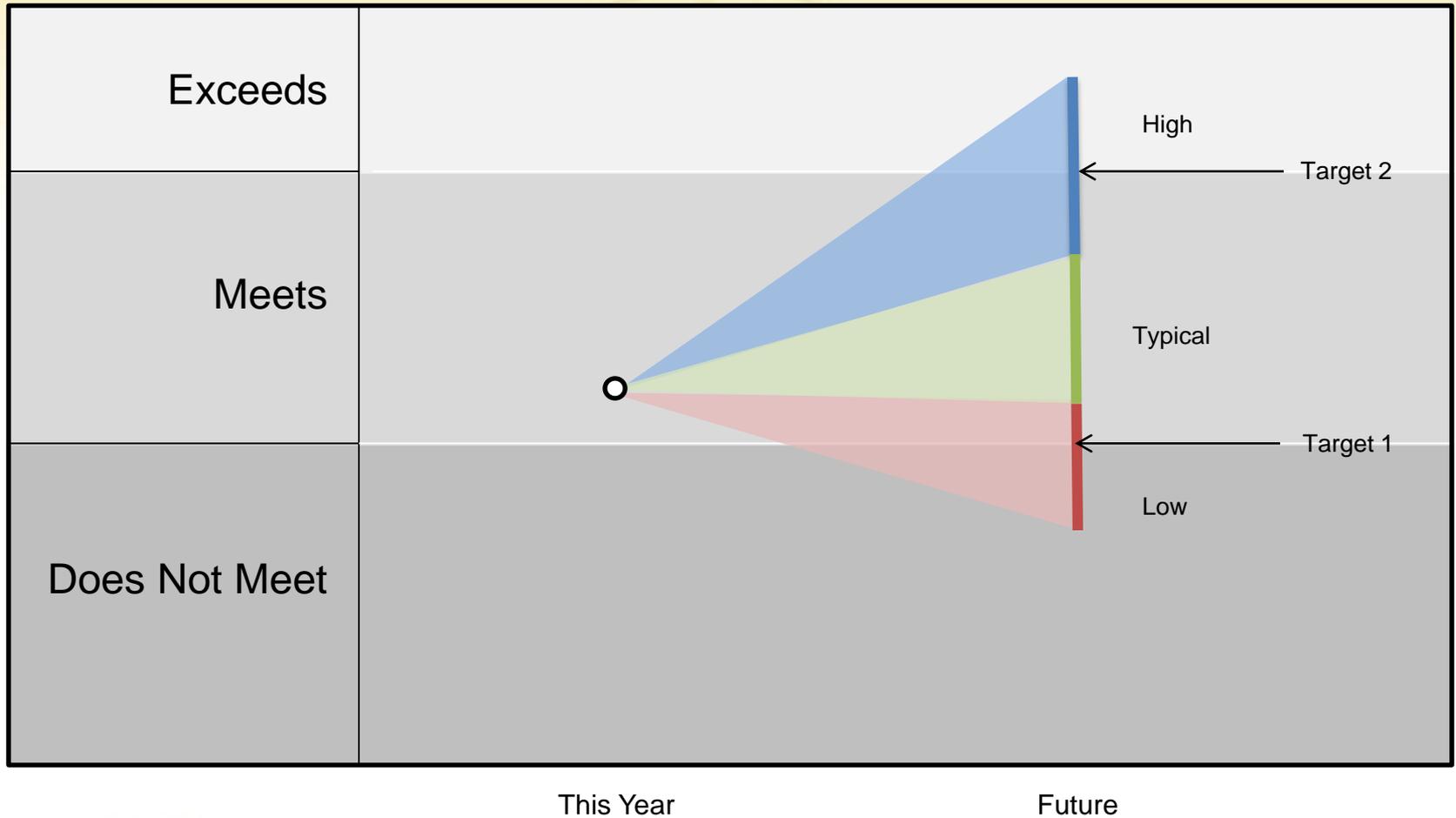


# Growth to Proficiency

- How do we know if a student's growth is enough to be on track to reach or exceed proficiency?
  - SGPs analyze historical student assessment data to model how students perform on all state assessments and the amount of growth they demonstrate in between
  - This information is used to create growth projections and growth targets for each student
  - The growth projection tells us where on the assessment scale a student may score next year for all levels of possible growth (1<sup>st</sup>-99<sup>th</sup> percentile)
  - The growth target tells us, based on where students are now, how much they need to grow to reach or exceed proficiency in three years (or by the end of the assessment system)



# Growth Projections and Targets



# Assessment Inclusion

- The CRCT and EOCT assessments will be included in the model.
- The model will transition to the use of PARCC assessments once they are implemented in Georgia.
  - While growth percentiles can be reported when PARCC is first implemented, baselines and growth projections will be delayed. Multiple years of data are necessary.
- Retests for both CRCT and EOCT (beginning in 2012) will be utilized. The higher of the main administration and retest score will be used.



# Priors

- Priors are the historical assessment scores being used to model growth
- The immediate consecutive prior is required to produce growth percentiles
  - For example, an 8th-grade student must have a 7th-grade CRCT score in order to receive a growth percentile
- Two years of priors will be used (one year will be used when two years are not available)
  - For example, growth percentiles for an 8th-grade student would have his or her 7th- and 6th-grade CRCT scores as priors



# EOCT Course Progressions

- For EOCTs, both prior achievement and course progressions (including grade level) must be considered.
- Students engaging in a common sequence will receive SGPs:
  - ELA: CRCT reading/ELA → 9<sup>th</sup> Grade Lit → American Lit
  - Math: CRCT math → Math I → Math II
  - Science: CRCT science → Physical Science/Biology → Biology/Physical Science
  - Social Studies: CRCT social studies → US History → Economics
- EOCT SGPs will be a mix of cohort- and baseline-referenced SGPs until enough years of data is available
  - Cohort: Math I, Math II, US History
  - Baseline: 9<sup>th</sup> Grade Literature, American Literature, Physical Science, Biology, Economics

# Model Features

- Conceptually easy to understand, communicate, and utilize
  - Can be communicated to educators as well as parents and other stakeholders
  - Everyone will be involved in the process and can understand, make meaning of, and utilize the data
- Does not require a vertical or developmental scale
  - We are not examining the change in scale scores, rather, we are examining student performance relative to other students
- Provides an appropriate reference point for the amount of growth a student demonstrates (the growth of academically-similar peers)
- Utilizes multiple years of prior achievement data



# Model Features

- Serves as both a norm-referenced and criterion-referenced measure of growth
- Provides information on observed and future growth (the amount of growth needed to meet state standards)
- Does not have floor or ceiling effects
  - Students can demonstrate all levels of growth regardless of achievement level
- Robust to outliers
  - Extreme observations do not drastically affect summary measures
- Methodology is freely available, enabling GaDOE to build the infrastructure to support and sustain the model
  - Have external technical support to implement and verify the model



# Demonstration of the GSGM Visualization Tool

Launch Training Site



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# Accessing GSGM Data

- Housed within the Statewide Longitudinal Data System (SLDS)
- Need district-level access to the SLDS through your district's Student Information System (SIS)
- Access provided by district SIS Administrator



# Wrap-Up and Next Steps

- Materials available soon:
  - Guide to the GSGM
  - Introduction to the GSGM PPT
  - GSGM FAQs
  - Visualization tool user manual
  - Technical materials
- Updates to visualization tool
- 2012 SGPs expected by end of 2012



# Wrap-Up and Next Steps

- October 5 – GSGM available to district-level personnel with SLDS access in RT3 districts
- October 15 – GSGM available to all with SLDS access in RT3 districts
- November 1 – GSGM available to district-level personnel with SLDS access statewide
- November 13 – GSGM available to all with SLDS access statewide



# Achievement Gap Reduction



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# What is an achievement gap?

- The difference in student performance between a focal group and a reference group
  - Focal group – the group of interest
  - Reference group – the target group
- An achievement gap reduction would be a decrease in the achievement gap from one year to the next
- The goal of measuring achievement gap reduction is to focus on increasing the achievement of the focal group – schools' lowest achieving students



# Who are we comparing?

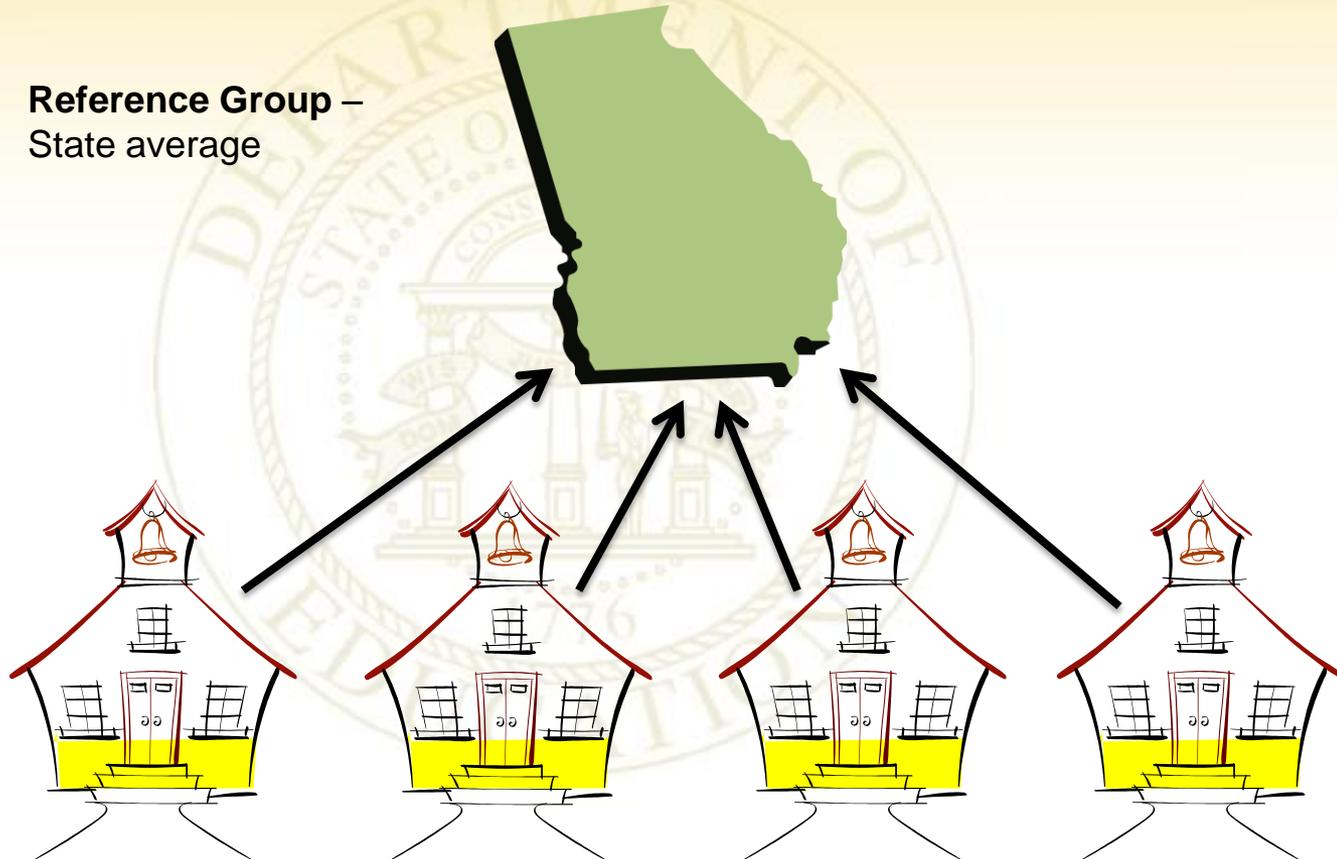
- Focal group – school’s high-need students
  - The lowest 25% of students in the score distribution
- Reference group – statewide benchmark
  - The state’s mean performance
  - Ambitious, yet attainable goal
  - Currently, only 2.5% of schools’ focal groups (across all subject areas) meet this target
  - Eliminates the ability to improve on this measure by decreasing the achievement of higher achieving students



# Focal and Reference Groups

**Reference Group –**  
State average

**Focal Group –**  
Schools' high-need students  
(lowest 25%)



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# What are we comparing?

- Standardized scale scores – z scores
  - Enables the comparison of scores across grades and subject areas
  - Includes CRCT and EOCT scores
  - Retests will be included, with the higher of the main and retest scores being utilized



# What are z scores?

- $x$  is a student's scale score and  $\mu$  and  $\sigma$  are the state mean and standard deviation, respectively, for that grade/subject/EOCT
- $z$  represents the distance between the student's score and the state mean in standardized units
- $z$  scores have a mean of 0 and a standard deviation of 1, with 99.7% of scores falling between -3 and 3



# What are z scores?

- z scores can be compared across grades and subjects
- A baseline year will be utilized
  - The state means and standard deviations from a baseline year (2011) will be used to calculate z scores for 2010, 2011, and subsequent years
  - Ensures that the scale score to z score conversions remain the same each year and are unaffected by changes in the overall score distribution
  - Ensures we do not have a moving target



# Z Score Example

Student	Assessment	Scale Score	Formula	Z Score
Fred F.	CRCT – Grade 6 SS	851	_____	0.26
Betty B.	CRCT – Grade 7 ELA	890	_____	1.68
Elmer F.	CRCT – Grade 8 Math	806	_____	-0.66
Scooby D.	EOCT – Math I	514	_____	2.77
Olive O.	EOCT – Physical Science	369	_____	-1.23



# What are the groups' scores?

- Focal group – the mean z score of the school's high-need students
- Reference group – the mean z score for the state – 0
  - 0 will be the benchmark for all subjects and for all years
  - Enables meaningful comparisons of the magnitude of gaps across subjects
  - Ensures that the gap measure will detect real changes in the academic achievement of students in the focal group in each school with respect to the statewide target (because the target isn't moving)



# What is being calculated?

- Gap size
  - State benchmark (0) – mean z score for the school's high-need students
  - Negative scores and scores close to 0 are good
    - They represent a focal group performing better than or close to the state mean
- Gap change
  - Gap size for this year – gap size for last year
  - Negative scores are good
    - They represent a reduction in the gap from last year to this year



# Gap Size

Reference Group: 0



Gap Size: 1.1



Focal Group: -1.1



# Gap Change

Reference Group: 0

Gap Change:  
 $0.6 - 1.1 = -0.5$

Last Year  
Gap Size: 1.1

This Year  
Gap Size: 0.6

Last Year  
Focal Group: -1.1



This Year  
Focal Group: -0.6



# How are points assigned?

Gap Size	Score	Gap Change	Score
1.5 or greater	1	0.05 or greater	1
1.2 – 1.49	2	-0.04 – 0.04	2
0.9 – 1.19	3	-0.15 – -0.05	3
Less than 0.9	4	Less than -0.15	4

- For each subject, schools receive a gap size and a gap change score based on the above rubrics
- The final subject score is the greater of the two scores
  - Provides an opportunity for schools to earn points by either having a small or non-existent current year gap or by decreasing the size of the gap from last year to this year
- The final overall score is the average of the subject scores



# Example

	Gap Size		Gap Change		Final Subject Score
	Magnitude	Points	Magnitude	Points	
Reading	0.91	3	-0.16	4	4
ELA	0.96	3	0.02	2	3
Math	0.73	4	-0.13	3	4
Science	0.68	4	0.01	2	4
Social Studies	0.81	4	-0.19	4	4
Final Score					3.8



# Questions?

- For questions regarding the Georgia Student Growth Model, please contact:

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