

Creating **Growth Trajectories** with **SMI Quantile Measures**

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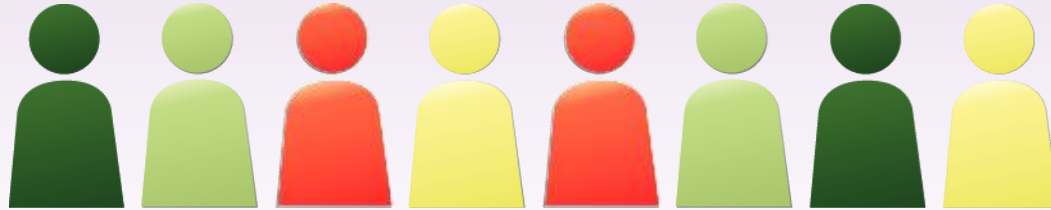
NCTM Regional Conference
Houston, TX
November 20, 2014

Session Goals

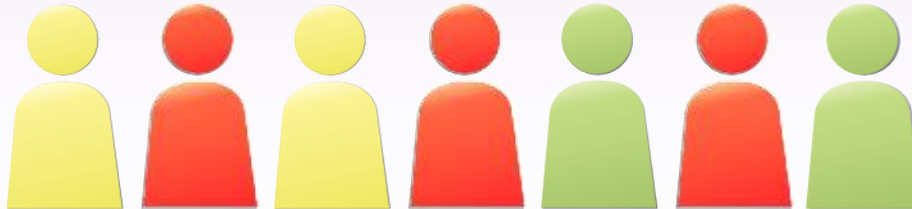
- Using SMI and the Quantile Scale to measure student math knowledge and skills.
- Creating growth curves to generate growth expectations and predict score on related assessments (local, state, or national).

Mixed Ability Classrooms

700Q



275Q



580Q



350Q

The Quantile Scale

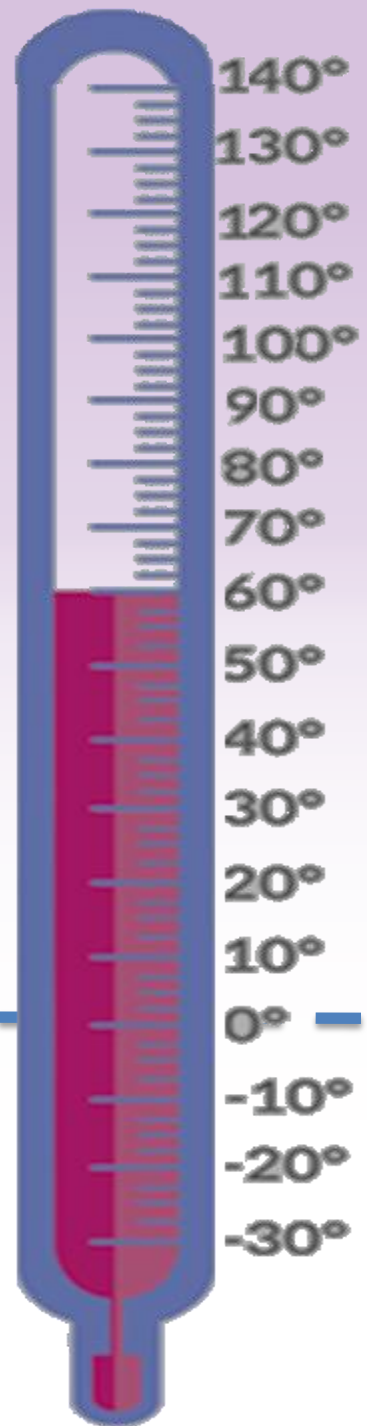
- It measures many concepts and skills needed to learn math in school – about 500!
- Each of these concepts or skills has a measure.
- The measure is indicated by a number and the letter Q.
- Each measure shows how **difficult** one skill or concept is in relation to the others.

The Quantile Scale Algebra Readiness



8 1030Q–1255Q
7 950Q–1175Q
6 870Q–1125Q
5 820Q–1020Q
4 715Q–950Q
3 625Q–850Q
2 405Q–600Q
1 260Q–450Q
K 10Q–175Q

Pre-K Skills



The Quantile Skill and Concept (QSC)

- The description of a skill and its Quantile measure is called a *Quantile Skill and Concept (QSC)*.
- The table on the next slide shows a few of these skills and their measures.
- As **difficulty**, or demand, of the skill increases, so does the Quantile measure.

Examples of Quantile Measures and QSCs

6.RP.1: Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.

Quantile Range for Grade 6: 645Q to 895Q

Description	Quantile Measure
Represent fractions concretely and symbolically, including representing whole numbers as fractions.	190Q – Prerequisite – Below Quantile range
Write a ratio or rate to compare two quantities. .	210Q – Focus – Below Quantile range
Describe the probability of a chance event using a fraction or ratio.	440Q – Supporting – Below Quantile range
Model the concept of percent and relate to the value in decimal or fractional form.	400Q – Supporting – Below Quantile range
Write a proportion to model a word problem; solve proportions. (720Q).	720Q – Impending – Within Quantile range
Recognize and extend arithmetic sequences and geometric sequences. Identify the common difference or common ratio.	1250Q – Impending – Above Quantile range

Use scale factors to reduce and enlarge drawings on grids. 990Q

Use dimensional analysis to rename quantities or rates. 950Q

Impending Skills (higher Q measures)

Knowledge Cluster for *Unit Rate*

Calculate unit rates to make comparisons. 830Q

Focus Skill

Convert measures of length, area, capacity, weight, and time expressed in a given unit to other units in the same measurement system. 820Q

Determine the ratio or rate of change of a relation given a table or graph. 810Q

Supplemental Skills (similar Q measures)

Supplemental Skills (similar Q measures)

Use proportional reasoning to solve problems. 530Q

Write a ratio to compare two quantities. 210Q

Identify equivalent decimals and fractions at the symbolic level, including simplifying fractions. Explain the equivalence. 710Q

Pre-requisite Skills (lower Q measures)

Creating Growth Trajectories

- **SMI growth curves** can be created for a given **class** or **grade level** and the degree of variation among individual students can be assessed.
- SMI growth curves can be used to generate **growth expectations**, and SMI scores could also be used to **predict** scores on **local and state assessments** if these data were available.

I am a 4th grader with a 715Q.
I am on grade level and I'm
ready to learn!



Example from School District “A” *

Demographics for SD “A” and all U.S. public schools, SY 2010-11^a %

School District	African Amer.	Hispanic	White	Asian	Other Ethnicity	F/R Lunch	ELL/LEP	ESE	Total Enroll.
SD “A”	18	5	68	3	6	27	1	13	38,224
U.S Public Schools	16	23	53	5	3	48	6	13	9,177,617

^a All values were obtained from NCES: <http://ces.ed.gov/ccd/bat/>

* For illustration purposes only – study conducted with prior version of SMI

Example from School District “A” *

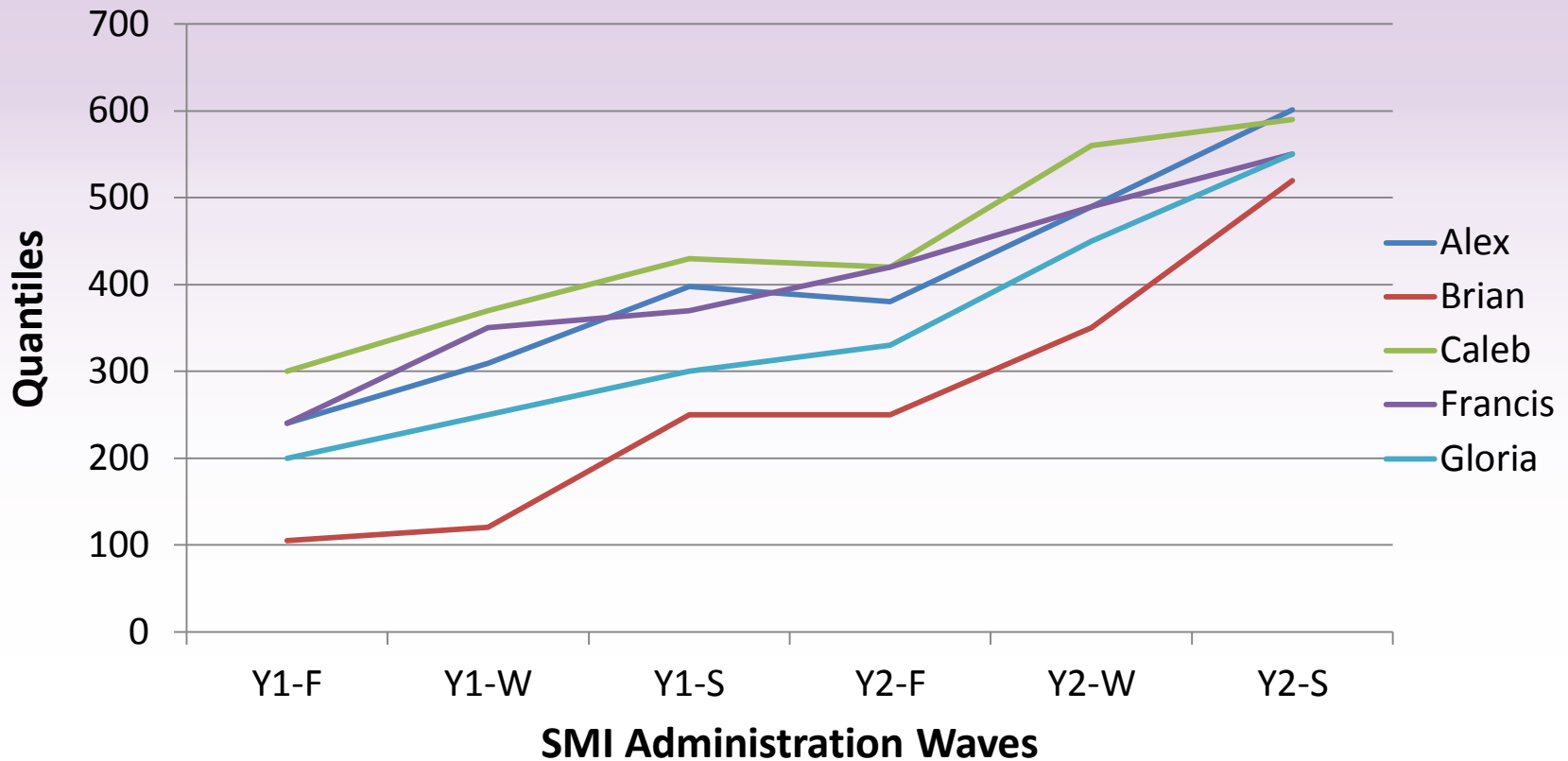
Mean SMI Scores in Quantiles, Segregated by Grade (SD in red)

Grade at Year 1	Range of n	Year 1			Year 2		
		Fall	Winter	Spring	Fall	Winter	Spring
2	2230-2306	239.7	308.6	397.6	380.0	489.7	601.0
		137.3	153.7	180.6	169.0	187.1	201.9
3	2342-2402	381.0	505.1	602.4	549.8	625.4	703.6
		148.1	186.7	208.2	184.5	172.1	169.6
7	1157-2400	805.9	854.5	887.5	883.6	941.8	925.9
		184.5	196.4	220.9	214.6	215.4	227.4

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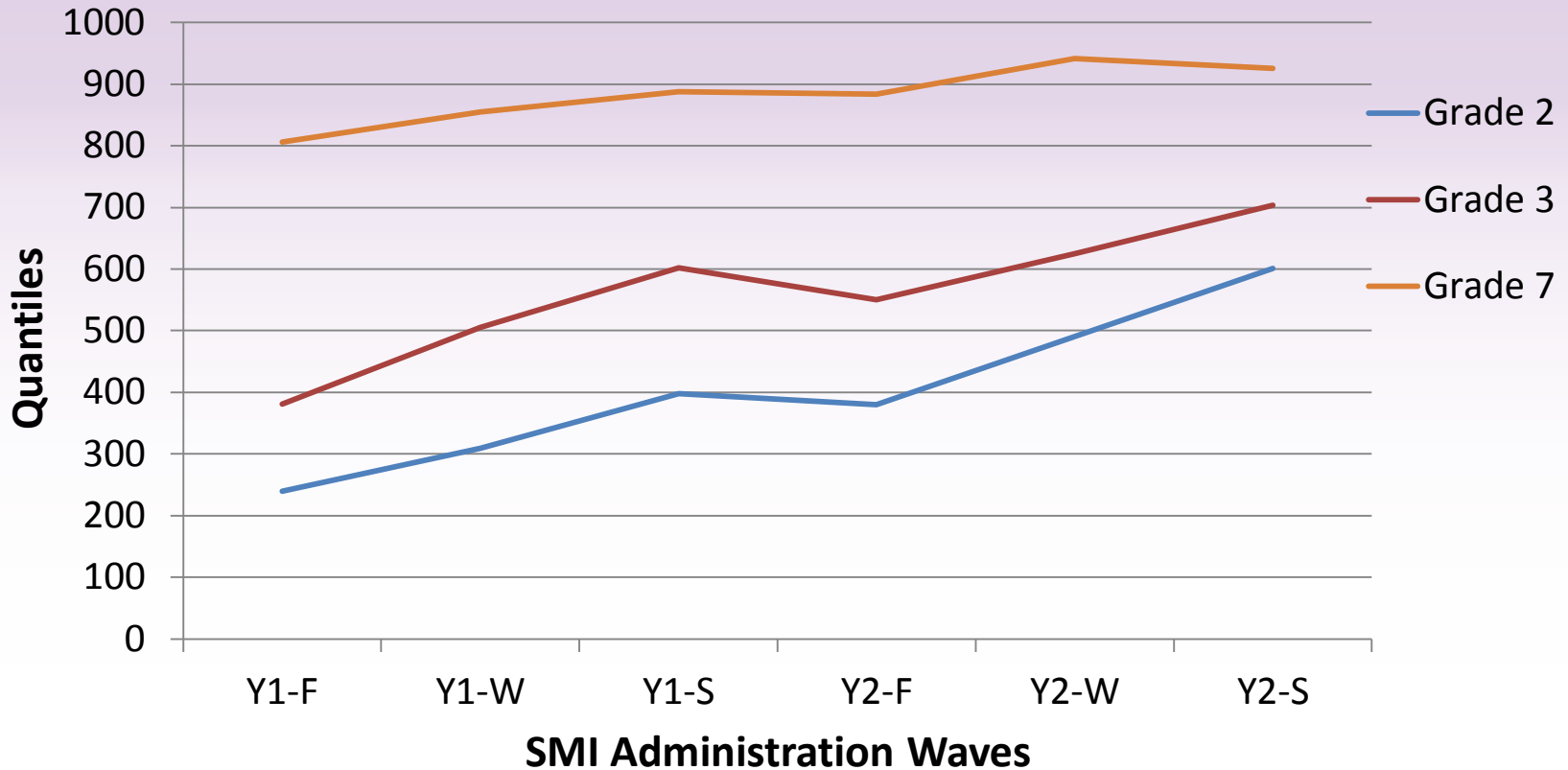
Example from School District "A"

Ms. B's Class



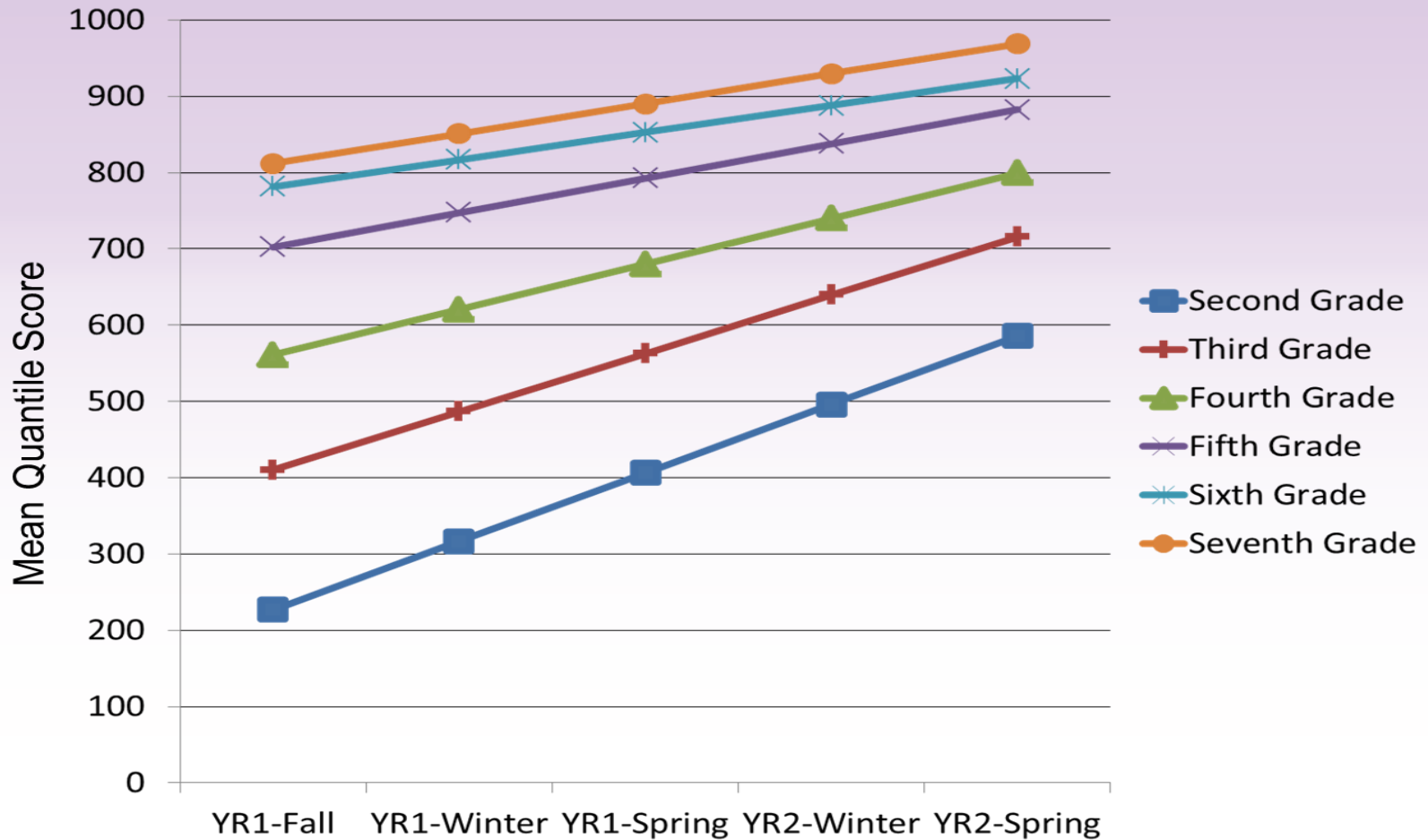
Example from School District “A”

Mean SMI Scores



Example from School District “A” *

Mean Estimated Linear Growth in Quantile Performance.



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Average SMI growth by grade and proficiency level within the academic year

	Below Basic	Basic	Proficient	Advanced
Grade 2nd	260	200	180	150
Grade 3rd	260	230	180	100
Grade 4th	260	210	120	60
Grade 5th	200	130	90	50
Grade 6th	150	90	50	50
Grade 7th	150	60	50	50
Grade 8th	150	60	50	50

SMI & SRI Validation Study

- Who: Scholastic + research firm + SDs
- When: SY 2014-2015 (fall, winter, spring)
- Sample: 6000+ students in grades K-12, (500+ students per grade level)
- Only grades with 50 students+
- Results will be shared with the SDs
- Incentives: Bookflix, FasttMath, SRI, or SMI site licenses
- Other requirements: SDs must administer a statewide test in order to correlate results with SRI/SMI, share student demographic and testing data, participate in technical audit.

References

- **Scholastic SMI**

<http://teacher.scholastic.com/math-assessment/scholastic-math-inventory/index.asp>

- **MetaMetrics**

www.quantiles.com/

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