Curriculum Inequality: The Elephant in the Room

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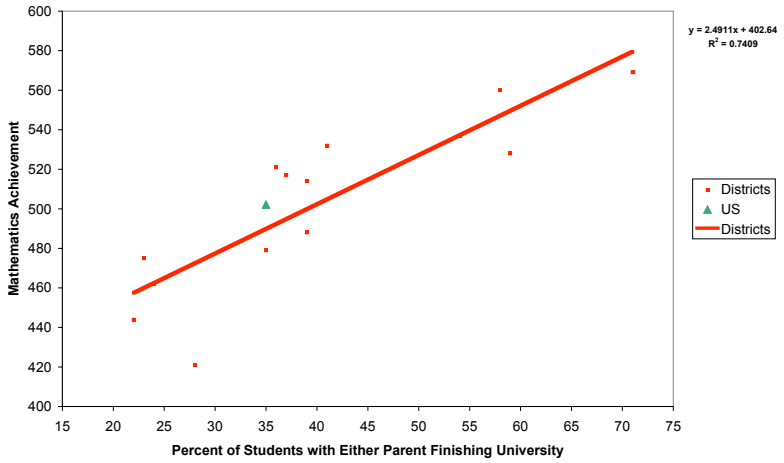
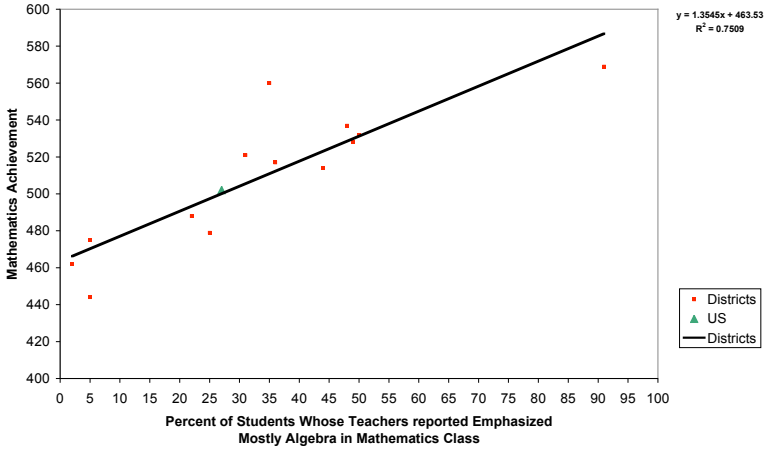
Relationship between Parents' Education and Student Achievement

1999 TIMSS-R Districts



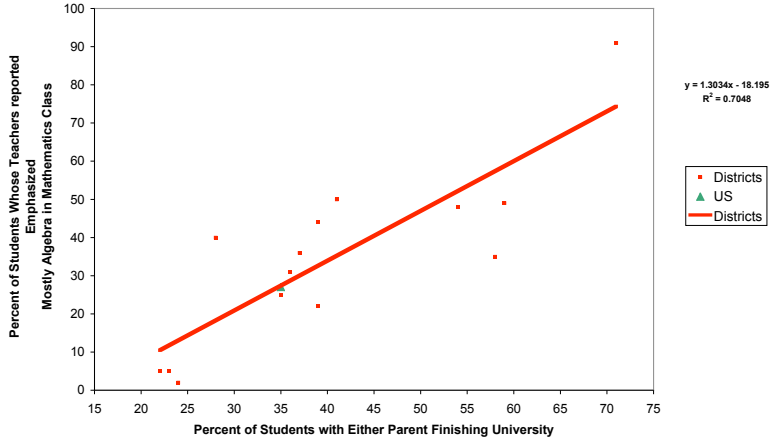
Relationship between Algebra Instruction and Student Achievement

1999 TIMSS-R Districts

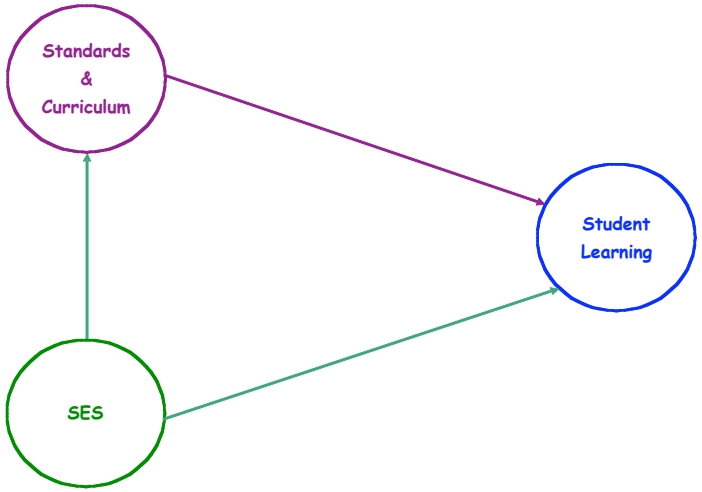


Relationship between Parents' Education and Algebra Instruction

1999 TIMSS-R Districts



Relationship between Curriculum, SES and Student Learning



Instructional Content Constructs

- **Curricular Coherence**
  - Curricular Structure
- **Curricular Focus**
  - Exposure Time (OTL)
- **Curricular Rigor**
  - Level of Cognitive Complexity

Top Achieving Countries' Mathematics Curriculum

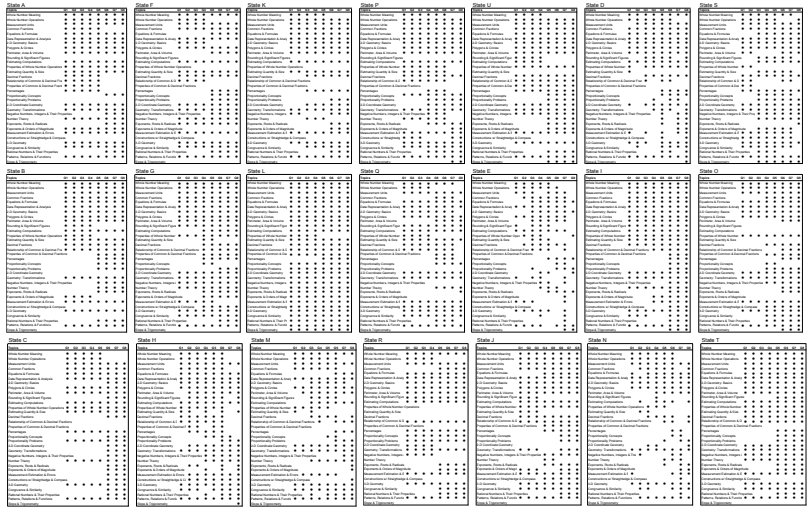
Topic	Grade 1	2	3	4	5	6	7	8
Whole Number: Meaning	■	■	■	●	●			
Whole Number: Operations	■	■	■	■	●			
Measurement Units	▲	■	■	■	■	■	●	
Common Fractions			▲	■	■	●		
Equations & Formulas			▲	●	●	●	■	■
Data Representation & Analysis			▲	▲	●	●		▲
2-D Geometry: Basics			▲	●	●	●	■	■
2-D Geometry: Polygons & Circles				▲	●	●	■	■
Measurement: Perimeter, Area & Volume				●	●	●	●	▲
Rounding & Significant Figures				●	●			
Estimating Computations				●	●	●		
Whole Numbers: Properties of Operations				●	●			
Estimating Quantity & Size				▲	▲			
Decimal Fractions				●	■	●		
Relation of Common & Decimal Fractions				▲	■	●		
Properties of Common & Decimal Fractions					●	●		
Percentages					●	●		
Proportionality Concepts					●	●	●	▲
Proportionality Problems					●	●	■	■
2-D Geometry: Coordinate Geometry					▲	▲	●	●
Geometry: Transformations						●	●	●
Negative Numbers, Integers, & Their Properties						▲	●	
Number Theory							●	▲
Exponents, Roots & Radicals							●	●
Exponents & Orders of Magnitude							▲	▲
Measurement: Estimation & Errors							▲	
Constructions Using Straightedge & Compass							■	▲
3-D Geometry							●	■
Geometry: Congruence & Similarity								■
Rational Numbers & Their Properties								▲
Patterns, Relations & Functions								▲
Proportionality: Slope & Trigonometry								▲

▲ Intended by 4 out of the 6 top-achieving countries

● Intended by all but *one* of the top-achieving countries (5 out of 6).

■ Intended by *all* of the top-achieving countries

21 States' Mathematics Standards



An Urban District Mathematics Curriculum Standards

Topic	Grade 1	2	3	4	5	6	7	8
Whole Number: Meaning	●	●	●	●	●			
Whole Number: Operations	●	●	●	●	●	●	●	
Measurement Units	●	●	●	●	●	●		
Common Fractions		●	●	●	●	●		
Equations & Formulas	●	●	●	●	●	●	●	●
Data Representation & Analysis	●	●	●	●	●	●	●	●
2-D Geometry: Basics				●	●	●		
2-D Geometry: Polygons & Circles	●	●	●	●	●	●	●	●
Measurement: Perimeter, Area & Volume		●	●	●	●	●	●	●
Rounding & Significant Figures								
Estimating Computations			●	●	●	●	●	●
Whole Numbers: Properties of Operations			●					
Estimating Quantity & Size								
Decimal Fractions					●	●		
Relation of Common & Decimal Fractions					●	●		
Properties of Common & Decimal Fractions								
Percentages						●	●	●
Proportionality Concepts					●	●	●	●
Proportionality Problems							●	●
2-D Geometry: Coordinate Geometry								
Geometry: Transformations	●		●	●	●	●	●	●
Negative Numbers, Integers, & Their Properties							●	●
Number Theory						●	●	●
Exponents, Roots & Radicals								
Exponents & Orders of Magnitude								
Measurement: Estimation & Errors	●	●	●	●				●
Constructions Using Straightedge & Compass					●	●	●	●
3-D Geometry		●	●	●	●	●	●	●
Geometry: Congruence & Similarity				●	●	●	●	●
Rational Numbers & Their Properties							●	●
Relations & Functions	●	●	●	●	●	●	●	●
Slope & Trigonometry								

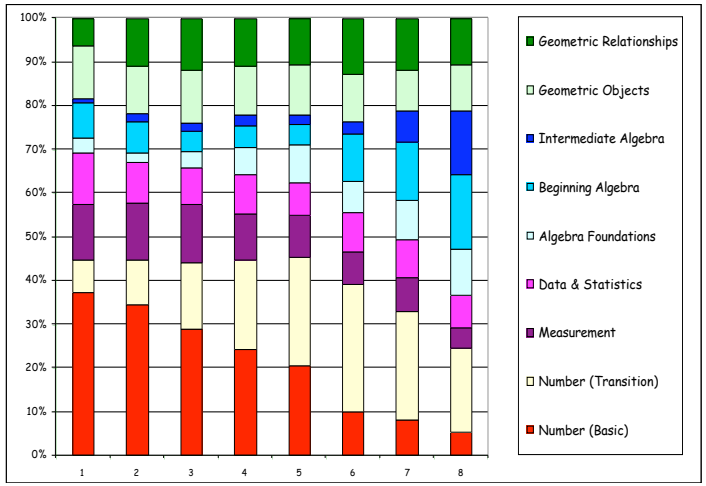
● Intended in Seattle's Content Standards

Mathematics is cumulative.

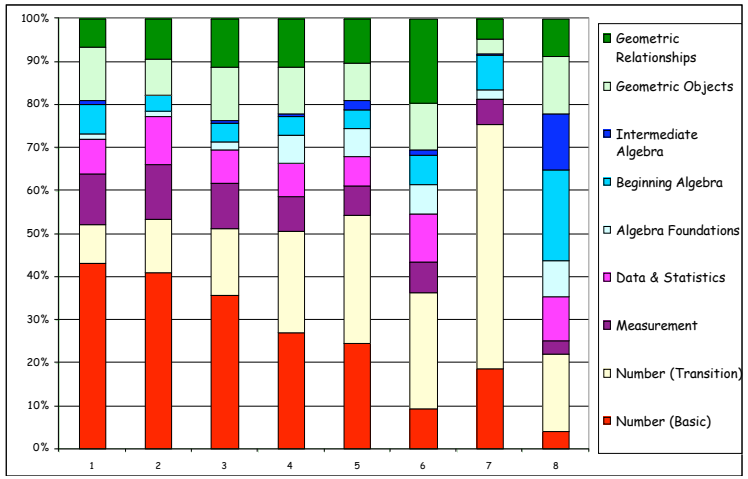
- Properly done, the topics in each year depend on the topics covered in previous years.
- When one fails to take this cumulative nature into account, the study of mathematics degenerates into a relatively meaningless list-making and memorization of unconnected factoids – something particularly damaging for weaker students.

James Milgram, Professor of Mathematics, Stanford University
MSU Education Policy Forum, Washington, DC, June, 2003

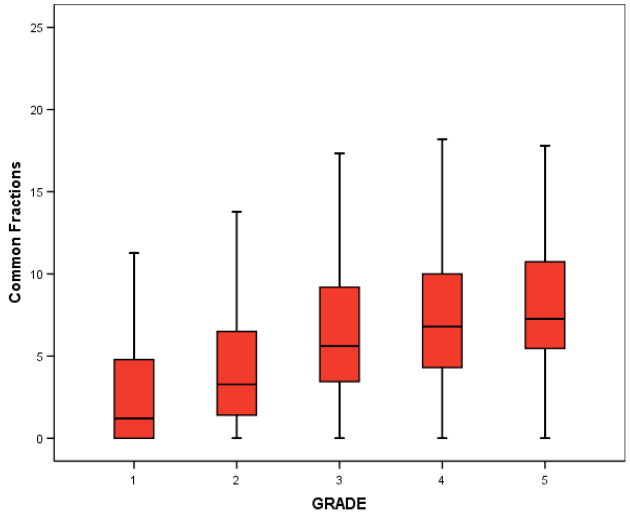
Average Percent Teaching Time in Nine Broad Mathematics Areas at Each Grade for District 1



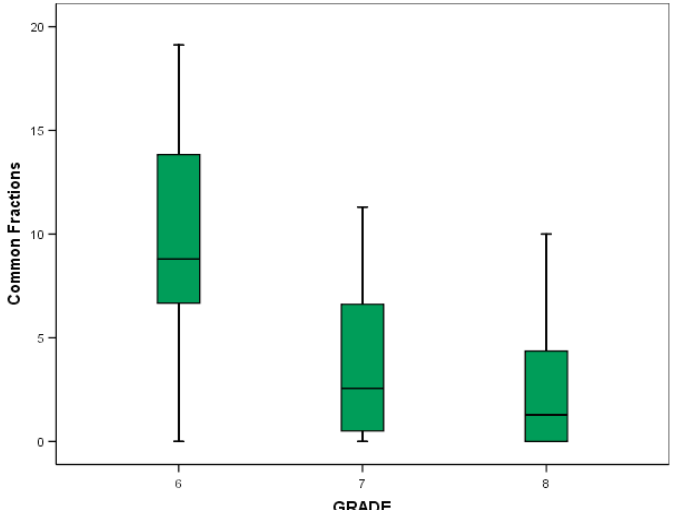
Average Percent Teaching Time in Nine Broad Mathematics Areas at Each Grade for District 2



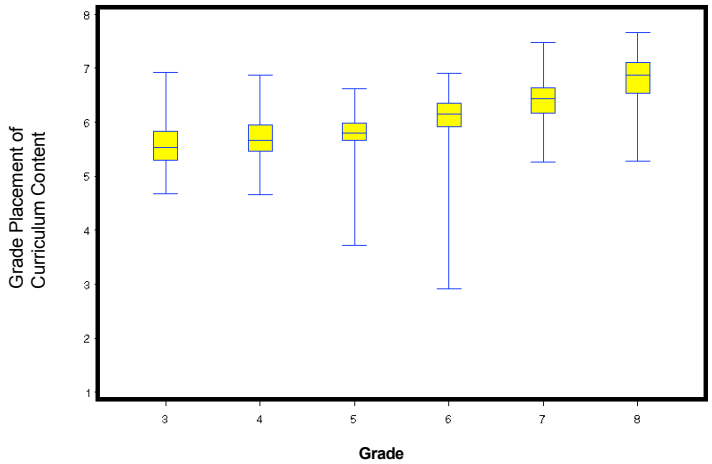
Variation in Teaching Time for Common Fractions



Variation in Teaching Time for Common Fractions



International Grade Placement of Curriculum Content Across Districts



Percent (standard error) of US eighth grade students attending schools offering each type of mathematics course

Course Type	Schools Offering Course
GEOMETRY	6 (1.9)
ALGEBRA I	66.5 (2.8)
PRE-ALGEBRA	37.1 (3.8)
ENRICHED	13.9 (2.2)
REGULAR	80.9 (3.1)
REMEDIAL	13.1 (2.3)

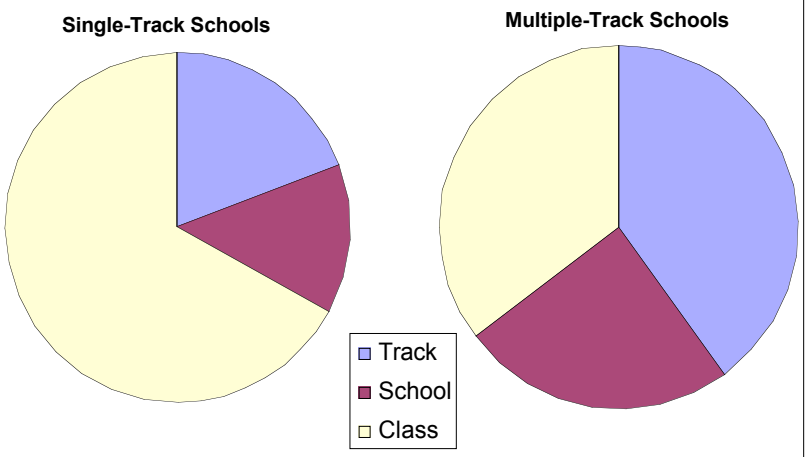
Percent (standard error) of US eighth grade students enrolled in types of mathematics courses

Course Type	Enrolled Nationally
Geometry	0.7 (0.4)
Algebra I	19.7 (2.0)
Pre-Algebra	16.7 (2.2)
Enriched	3.1 (0.8)
Regular	56.9 (3.1)
Remedial	2.8 (0.8)

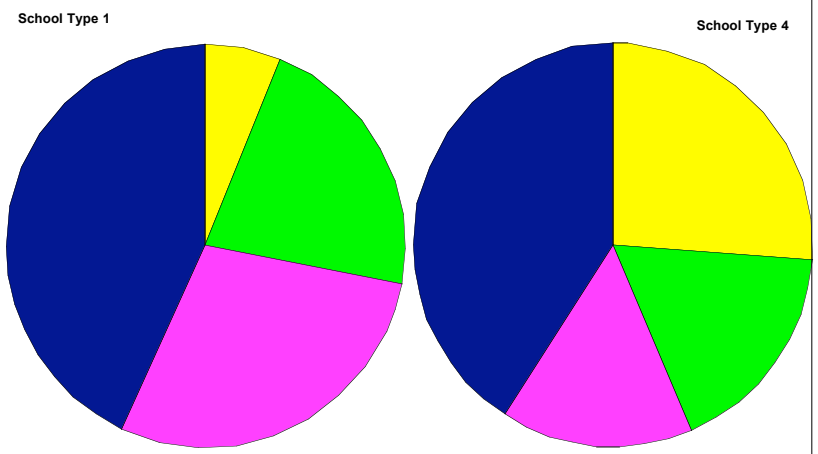
Percent of U.S. Students Enrolled in Each Type of Math Course Using Each Type of Textbook

	Textbook Type		
Course Type	Regular	Pre-Algebra	Algebra
Remedial	91 (8.5)	9.1 (8.5)	
Regular	74 (6.0)	21 (5.1)	4.5 (1.9)
Enriched	74 (15.8)	14 (8.7)	13 (3.8)
Pre-Algebra	30 (8.5)	59 (10.4)	11 (6.8)
Algebra I	25 (9.1)	5.7 (4.0)	70 (9.6)

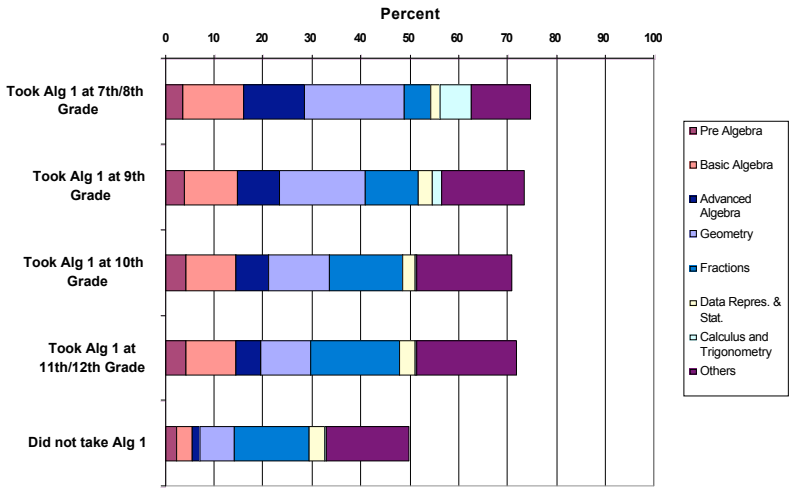
Variation in the mathematics content index (IGP) in schools having multiple tracks and schools having single tracks



Teachers Coverage of Mathematics Topics in Four Types of Schools

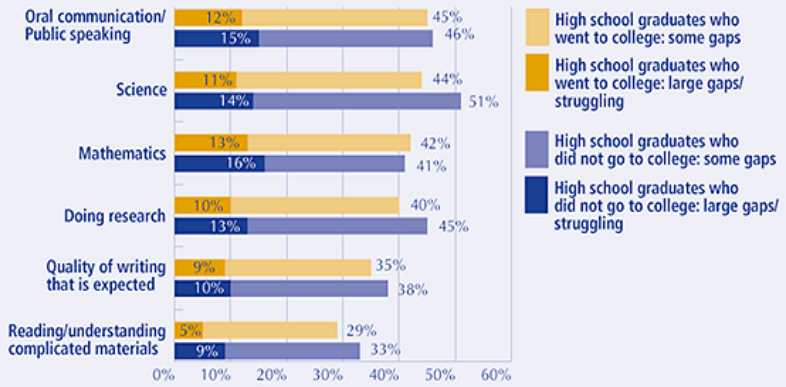


Amount of Mathematics Across Grades 7-12



Many High School Graduates Report Gaps in Their Preparation

In each area, percentage saying there are at least some gaps in their preparation



Source: Peter D. Hart Research Associates, Inc./Public Opinion Strategies, Rising to the Challenge: Are High School Graduates Prepared for College and Work? *Prepared for Achieve, Inc., 2005.*