2008 K- 8 Mathematics Instructional Materials Review and Recommendations

Presentation to State Board of Education

September 24, 2008

Office of Superintendent of Public Instruction

Agenda

- Recommendations
- Background/Schedule
- Process
- Results
- Next Steps

RECOMMENDATIONS

K-5 Recommendations

- Math Connects
- Bridges in Mathematics

- *Rationale:*
  - *Most closely aligned with state standards*
  - *Math Connects fully available online*
  - *Highest scoring programs overall*
  - *Both exceeded the minimum content threshold*

6-8 Recommendations

- Holt Mathematics
- Math Connects

- *Rationale*
  - *Holt is clear leader, based on analysis*
  - *Selection of Math Connects from pool of tied programs gives districts a K-8 system*
  - *Both programs are fully available online*

Mathematics Key Dates

Core Curricula Recommendations and Instructional Materials Reviews

	K-8 Review and Recommendations	9-12 Review and Recommendations
Core/Comprehensive Review	**Publisher Notice:** May 19, 2008 **Review Week:** June 22 – 27	**Publisher Notice:** Late September **Review Week:** November 9-15, 2008
OSPI shares Preliminary Results with SBE Math Panel & seeks input from interested parties	August 14, 2008 –September 15, 2008	To Be Determined
OSPI Presents Core Recommendations to SBE	September 24/25, 2008	To Be Determined
SBE presents official comment to OSPI on recommendations	November 5/6, 2008	To Be Determined
OSPI Finalizes Core/ Comprehensive Curricula Recommendations	Mid-November 2008	To Be Determined

K-8 Core Preliminary Report Includes…

- Description of the process prior to, during and following the instructional materials review

- Rank order listing of the programs reviewed related to their degree of alignment to the new K-8 mathematics standards and their alignment to several Other Factors categories

- Statistical analyses, graphs and charts that show how each program performed, down to specific performance elements for each grade

Instructional Materials Review Process Overview

1. Develop Review Instrument and Process
2. Solicit Publisher Involvement
3. Select IMR Committee
4. Review Instructional Materials
5. Analyze Data and Develop/Share Draft Preliminary Results

Instructional Materials Review Process Overview, cont.

6. Seek SBE Math Panel Input on Preliminary Results

7. SBE Contractor Reviews and Comments on Review Results

8. Identify Final Recommendations

9. Provide Supports to Districts

Phase 1: Develop Review Instrument and Process

- Sought input from multiple stakeholder groups, including IMR Advisory Group and SBE Math Panel
    - Iterative development process with two full cycles of feedback
- Research-based foundational resource materials included 2008 Washington Revised Math Standards, National Mathematics Advisory Panel Foundations for Success (NMAP), and NCTM Curriculum Focal Points
- Used process feedback from other states which have successfully completed curriculum reviews to design instrument and review process.
- Outcomes included:
  - Two review instruments (Content/Standards Alignment and Other Factors)
  - Proposed threshold process for deriving final recommendations
- Proposed weighting for instrument scales

Phase 2: Solicit Publisher Involvement

- All publishers invited to submit materials
- Publisher's conference held to address questions and clarify submission process
- Question and Answer document disseminated widely and updated throughout period prior to the review
- Publishers provided alignment worksheet to show where their materials aligned to revised state standards
- Publishers submitted multiple sets of materials for review week

Phase 3: Select IMR Committee

- Application materials widely distributed statewide to school districts and education stakeholder groups, including math educators, curriculum specialists, advocacy groups
- Objective review and scoring of each application by two independent reviewers using a common review instrument
- Selections based upon score and having sufficient variation in expertise among reviewers (for example: K-2 educators, 6-8 educators, mathematicians, community representatives, curriculum specialists, administrators, parents, etc.)

Phase 4: Review Instructional Materials

- Rigorous process for controlling inventory, during publisher check-in, reviewer check-in/out, and publisher check-out
- Reviewers received full-day training in K-8 standards
- Trained reviewers in how to use the scoring instruments
- Performed real-time data entry
- Performed variance checks and corrective training to reduce variance and increase inter-rater reliability
- Independent reviews of materials
- Four or more reads on 98% of submitted material
- Random assignment of materials to reviewers
- Twice-daily progress monitoring
- Process improvement checks daily

Materials Review Week – the library

Phase 5: Analyze Data and Share Preliminary Results

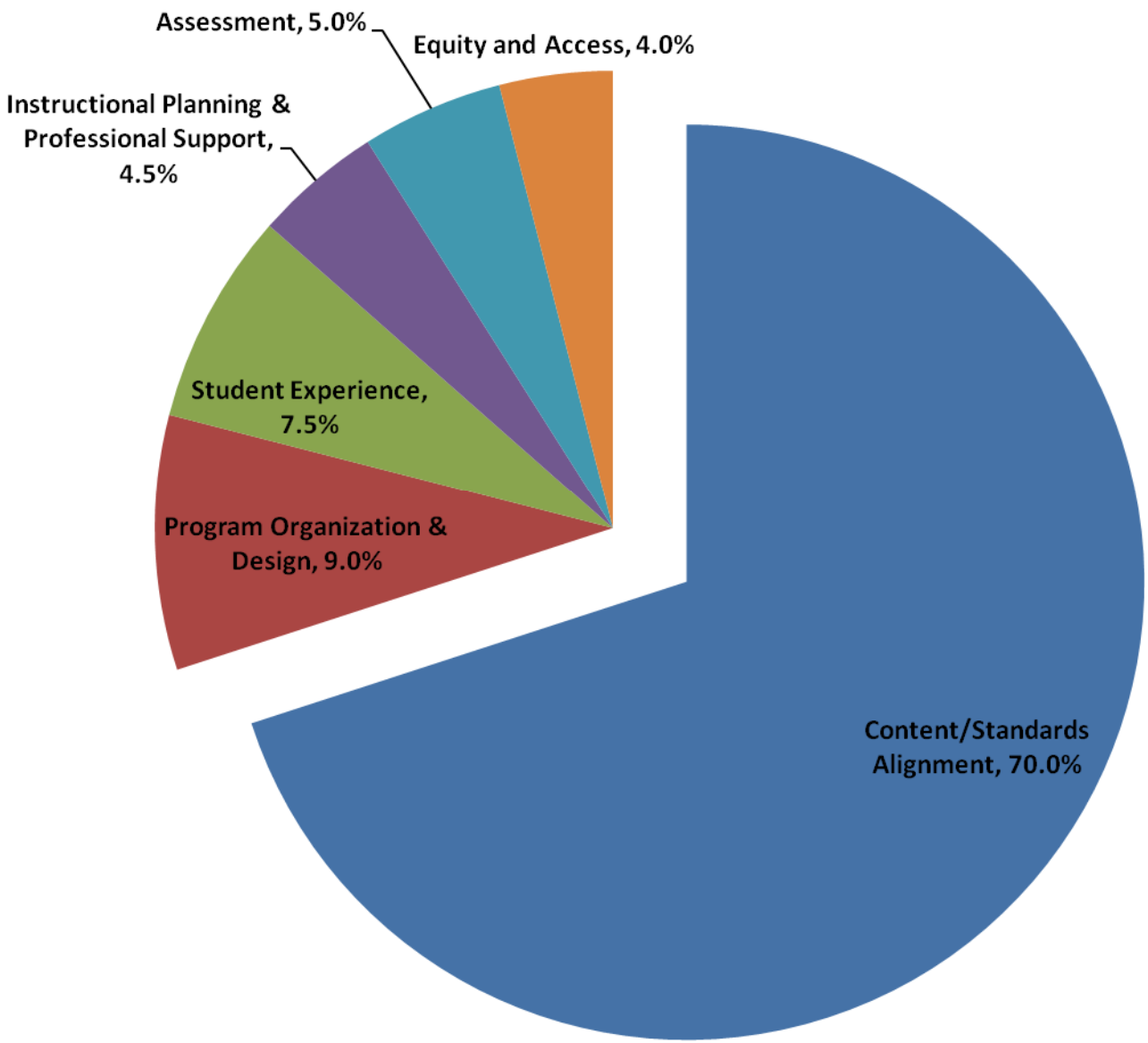
Data Analysis:

- Exploratory data analysis by two independent statisticians
- Quality control checks comparing random 10% of score sheets to electronic data to ensure accuracy of data entry and extract processes
- Rigorous design of statistical tests, validated by expert statistician
- Presentation of results in easy to read tabular and graphical format

Sharing Results:

- Followed legislatively mandated protocol and timeline
- Presented preliminary results to State Board of Education Math Panel
    - Sought advice from SBE Math Panel on the analysis, recommendations and process
- Presented preliminary results to legislators, districts, publishers, review participants, and public

Category Weights



Category	Description
Content/Standards Alignment	The Content/Standards Alignment (Part 1 of the review process) determined to what degree the mathematical concepts, skills and processes were in alignment with revised state mathematics standards. The materials reviewed were accurate, with no errors of fact or interpretation. Adherence to standards implies quality and rigor. It is a fundamental assumption that if the program matches a standard well, the math is accurate, rigorous, and high quality.
Program Organization and Design	Overall program and design. Includes scope and sequence, appropriate use of technology. Content is presented in strands, with definitive beginnings and endings. The program grounds ideas in a bigger framework. The material is logically organized, and includes text-based tools like tables of contents and indexes.
Balance of Student Experience	Tasks lead to the development of core content and process understanding. They present opportunities for students to think about their thinking, develop both skills and understanding, and apply multiple strategies to solve real world problems. Tasks will provide a balance of activities to develop computational fluency and number sense, problem solving skills and conceptual understanding.

Category	Description
Assessment	Tools for teachers and students to formally and informally evaluate learning and guide instruction.
Instructional Planning and Professional Support	Support for teachers that is embedded in the instructional materials to assist them in teaching the content and standards. Instructional materials provide suggestions for teachers in initiating and orchestrating mathematical discourse. Includes key information about content knowledge to help teachers understand the underlying mathematics. Materials help surface typical student misconceptions and provide ideas for helping address them.
Equity and Access	Support for ELL, unbiased materials, support for gifted and talented students, support for students with disabilities, differentiated instruction, diversity of role models, parent involvement, intervention strategies, quality website, and community involvement ideas.

Grade 6		Date:	
Program:		Reviewer #:	

(Rate each item on the scale 0-not met, 1-partial met, 2-fully met)

	6.1. Multiplication & division of fractions and decimals (Numbers, Operations, Algebra)	0	1	2	Evidence
6.1.A	Compare and order non-negative fractions, decimals, and integers using the number line, lists, and the symbols <, >, or =.	O	O	O	
6.1.B	Represent multiplication and division of non-negative fractions and decimals using area models and the number line, and connect each representation to the related equation.	O	O	O	
6.1.C	Estimate products and quotients of fractions and decimals.	O	O	O	
6.1.D	Fluently and accurately multiply and divide non-negative fractions and explain the inverse relationship between multiplication and division with fractions.	O	O	O	
6.1.E	Multiply and divide whole numbers and decimals by 1000, 100, 10, 1, 0.1, 0.01, and 0.001.	O	O	O	
6.1.F	Fluently and accurately multiply and divide *non-negative decimals*.	O	O	O	
6.1.G	Describe the effect of multiplying or dividing a number by one, by zero, by a number between zero and one, and by a number greater than one.	O	O	O	
6.1.H	Solve single- and multi-step word problems involving operations with fractions and decimals and verify the solutions.	O	O	O	

	6.2. Mathematical expressions and equations (Operations, Algebra)	0	1	2	Evidence
6.2.A	Write a mathematical expression or equation with variables to represent information in a table or given situation.	O	O	O	
6.2.B	Draw a first-quadrant graph in the coordinate plane to represent information in a table or given situation.	O	O	O	
6.2.C	Evaluate mathematical expressions when the value for each variable is given.	O	O	O	
6.2.D	Apply the commutative, associative, and distributive properties, and use the order of operations to evaluate mathematical expressions.	O	O	O	
6.2.E	Solve one-step equations and verify solutions.	O	O	O	
6.2.F	Solve word problems using mathematical expressions and equations and verify solutions.	O	O	O	

	6.3. Ratios, rates, and percents (Nums., Opers., Geom./Measurement, Algebra, Data/Statistics/Prob.)	0	1	2	Evidence
6.3.A	Identify and write ratios as comparisons of part-to-part and part-to-whole relationships.	O	O	O	
6.3.B	Write ratios to represent a variety of rates.	O	O	O	
6.3.C	Represent percents visually and numerically, and convert between the fractional, decimal, and percent representations of a number.	O	O	O	
6.3.D	Solve single- and multi-step word problems involving ratios, rates, and percents, and verify the solutions.	O	O	O	
6.3.E	Identify the ratio of the circumference to the diameter of a circle as the constant π, and recognize 22/7 and 3.14 as common approximations of π.	O	O	O	
6.3.F	Determine the experimental probability of a simple event using data collected in an experiment.	O	O	O	
6.3.G	Determine the theoretical probability of an event and its complement and represent the probability as a fraction or decimal from 0 to 1 or as a percent from 0 to 100.	O	O	O	

Not Met	Partially Met	Fully Met
• The standard is not covered at grade level or +/- one grade level. • The standard is briefly mentioned, but a typical student would not be able to achieve mastery with the available content. • The standard is partially met at +/- one grade level.	• The standard is fully developed at +/- one grade level from the expected grade. • 50% or more of the standard is met at grade level, but some aspect of the standard is not present. The standard is fully developed, but limited in practice or reinforcement.	• The standard is fully developed at the expected grade level. A typical student would be able to achieve mastery with the available content.

Math Instructional Materials Evaluation – Other Factors

(Rate each item on the scale of 1-Strongly disagree, 2.-Disagree, 3-Agree, 4-Strongly agree)

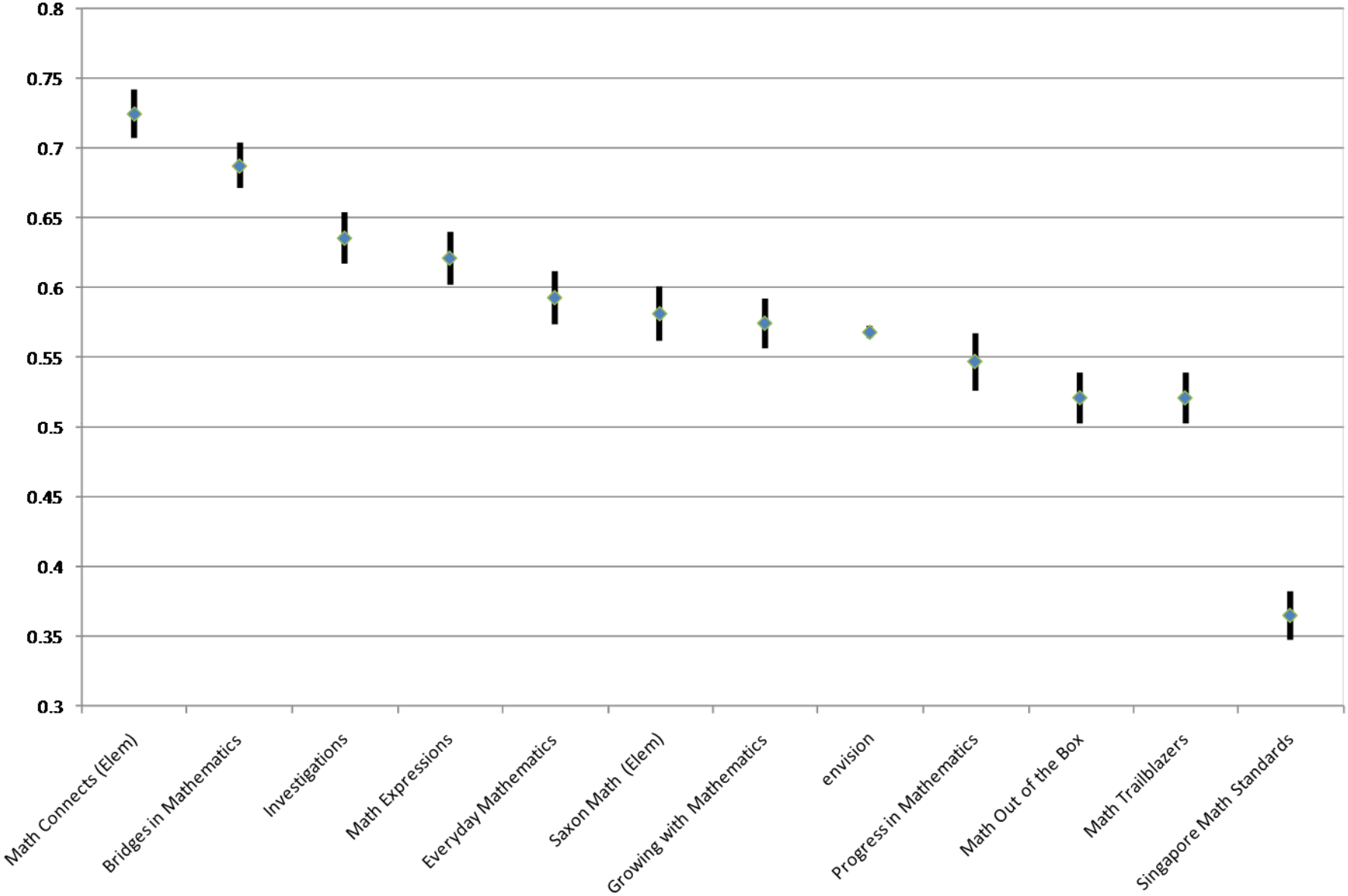
Grade:		Date:	
Program:		Reviewer #:	

	Program Organization and Design	Strongly disagree	disagree	agree	Strongly agree
1.	The content has a coherent and well-developed sequence (organized to promote student learning, links facts and concepts in a way that supports retrieval, builds from & extends concepts previously developed, strongly connects concepts to overarching framework)	O	O	O	O
2.	Program includes a balance of skill-building, conceptual understanding, and application	O	O	O	O
3.	Tasks are varied: some have one correct and verifiable answer; some are of an open nature with multiple solutions	O	O	O	O
4.	The materials help promote classroom discourse	O	O	O	O
5.	The program is organized into units, modules or other structure so that students have sufficient time to develop in-depth major mathematical ideas	O	O	O	O
6.	The instructional materials provide for the use of technology which reflects 21st century ideals for a future-ready student	O	O	O	O
7.	Instructional materials include mathematically accurate and complete indexes and tables of contents to locate specific topics or lessons	O	O	O	O
8.	The materials have pictures that match the text in close proximity, with few unrelated images	O	O	O	O
9.	Materials are concise and balance contextual learning with brevity	O	O	O	O
10.	Content is developed for conceptual understanding: (limited number of key concepts, in-depth development at appropriate age level)	O	O	O	O

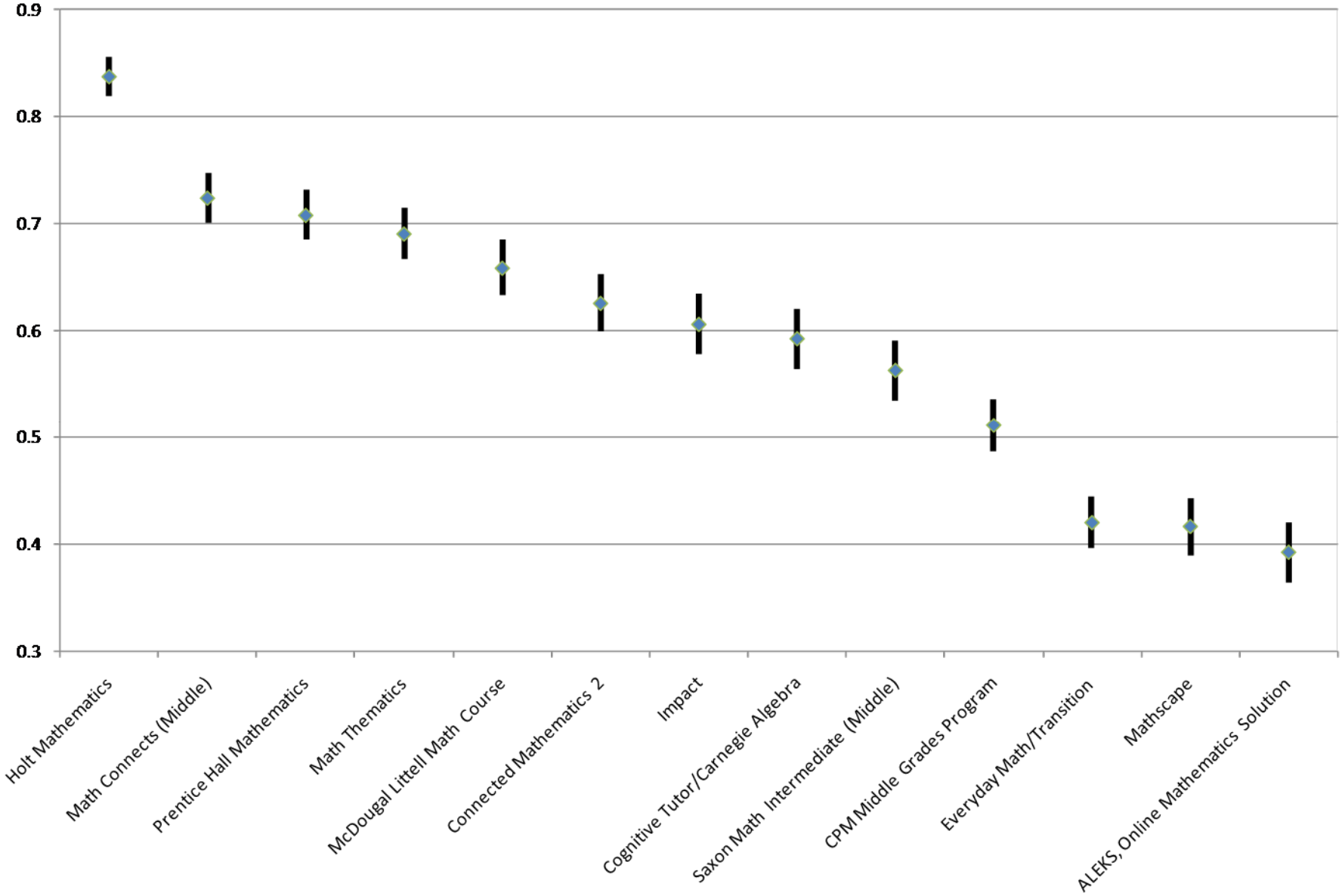
	Student Learning	1	2	3	4
1.	Tasks lead to conceptual development of core content, procedural fluency, and core processes abilities including solving non-routine problems	O	O	O	O
2.	Tasks build upon prior knowledge	O	O	O	O
3.	Tasks lead to problem solving for abstract, real-world and non-routine problems	O	O	O	O
4.	Tasks encourage students to think about their own thinking	O	O	O	O
5.	The program provides opportunities to develop students' computational fluency using brain power without use of calculators	O	O	O	O
6.	Tasks occasionally use technology to deal with messier numbers or help the students see the math with graphical displays	O	O	O	O
7.	The program promotes understanding and fluency in number sense and operations	O	O	O	O
8.	The program leads students to mastery of rigorous multiple-step word problems	O	O	O	O
9.	The materials develop students' use of standard mathematics terminology/vocabulary	O	O	O	O
10.	Objectives are written for students	O	O	O	O

RESULTS

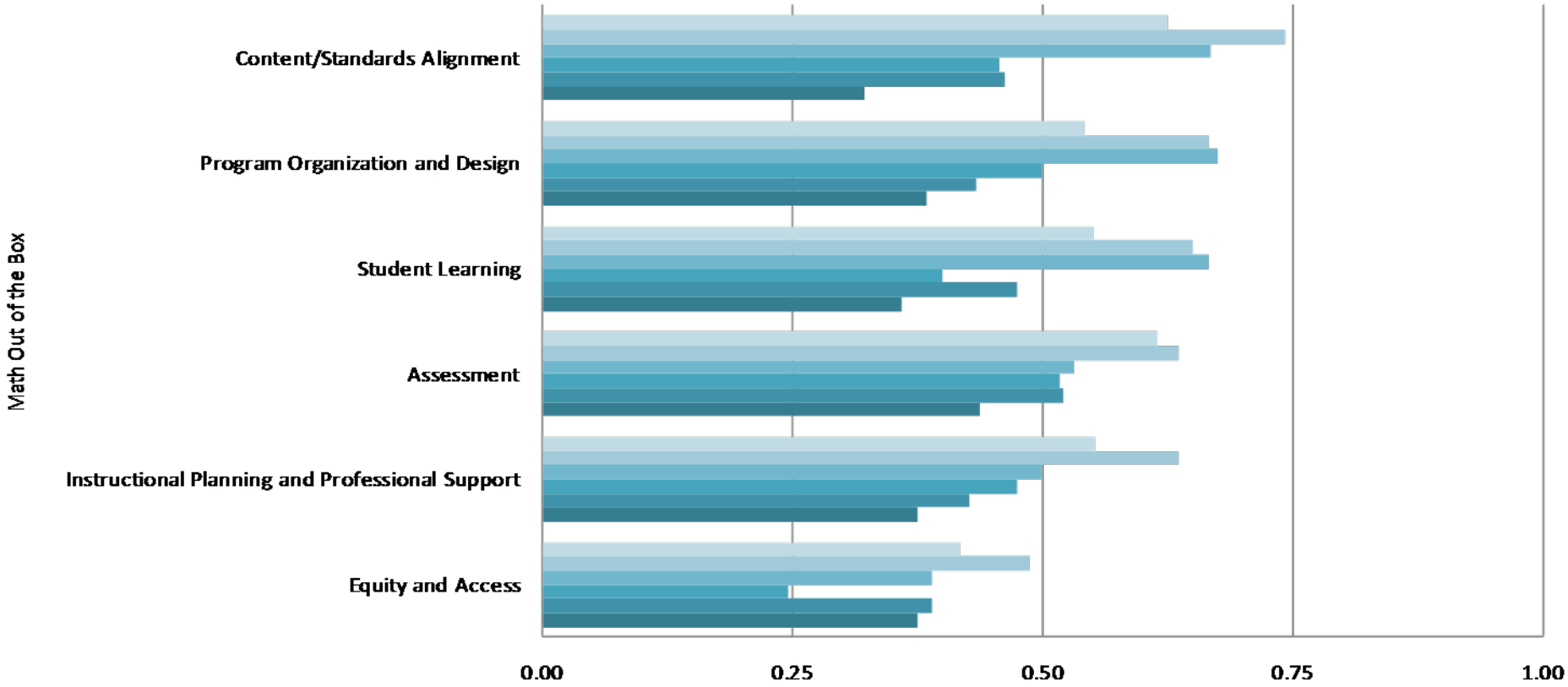
Elementary Composite Scores with 95% Confidence Intervals



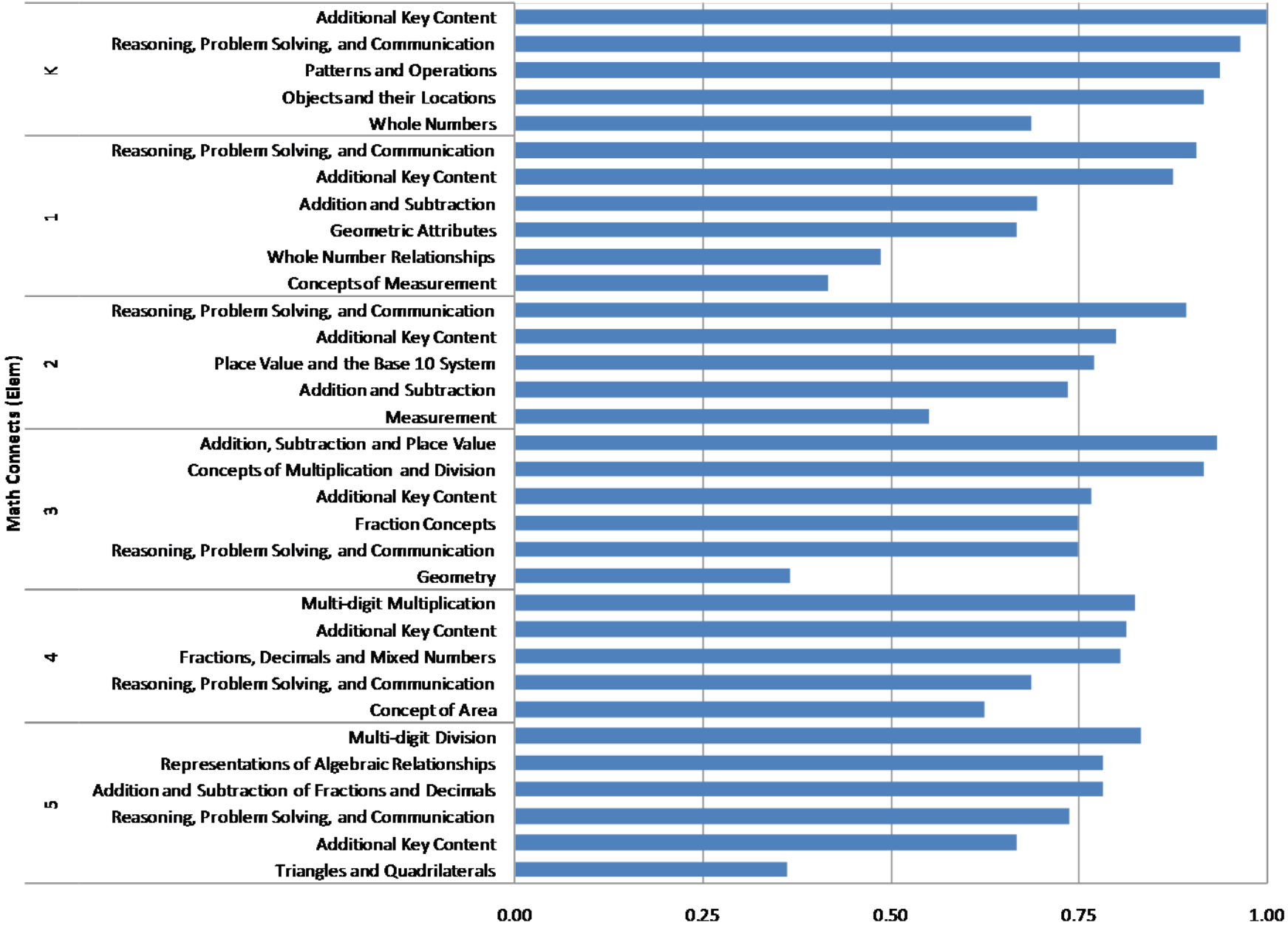
Middle School Composite Scores with 95% Confidence Intervals



PE	Math Connects (Elem)	Math Expressions	Bridges in Mathematics	Everyday Mathematics	Investigations	Growing with Mathematics	Math Out of the Box	Saxon Math (Elem)	enVision	Math Trailblazers	Singapore Math Standards	Progress in Mathematics	Overall Average
K.1.A	→	↑	↑	↑	↓	↑	↓	→	→	↓	→	↓	→
K.1.B	→	↑	↑	↑	↑	↑	↓	→	↓	↓	→	↑	↑
K.1.C	↑	↑	→	→	↑	↓	↓	↓	→	→	↓	↓	→
K.1.D	↑	↑	↓	↑	↑	↑	↓	↑	↓	↓	↑	↓	↑
K.1.E	→	↑	→	→	↑	↑	↓	↓	→	→	→	→	→
K.1.F	↑	↑	↑	→	↑	→	↓	↓	→	↓	↑	↓	↑
K.1.G	→	↓	↑	↑	→	↓	↓	↓	↓	↓	↓	↓	↓
K.1.H	↓	↑	↑	↓	↑	↓	↓	↓	↓	→	↓	↓	↓
K.2.A	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	→	↑	↑
K.2.B	↑	↑	↑	↑	↓	↑	↑	↑	→	↑	↓	↓	↑
K.2.C	↑	↑	↑	↑	→	↑	↑	↑	↑	↓	↑	↑	↑
K.2.D	↑	↑	↑	↑	→	↑	↑	→	→	→	→	↓	↑
K.3.A	↑	↑	↑	↑	↑	↑	↑	↑	↑	↓	↑	→	↑
K.3.B	↑	↑	↑	↑	↑	↑	↑	→	→	→	↓	→	↑
K.3.C	↑	→	↑	↓	↓	→	↑	↓	→	↑	↓	→	→
K.4.A	↑	→	↑	↑	↓	↑	↑	↑	→	↑	↑	↑	↑
K.5.A	↑	↑	↑	→	→	→	↑	↓	↓	↓	↓	↓	→
K.5.B	↑	↑	↑	→	↑	→	↑	↓	↓	↓	↓	↓	↑
K.5.C	↑	→	→	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
K.5.D	↑	↑	↑	→	↑	↓	↑	↓	↓	→	↓	↓	→
K.5.E	↑	↑	↑	↑	↑	↑	↑	→	↑	↑	↑	↑	↑
K.5.F	↑	↑	↑	→	↑	→	↑	↓	→	↑	↓	↓	↑
K.5.G	↑	↑	→	→	↓	→	↓	↓	↓	↓	↓	↓	↓
Overall Average	↑	↑	↑	↑	↑	↑	→	→	↓	↓	↓	↓	→



	Math Out of the Box					
	Equity and Access	Instructional Planning and Professional Support	Assessment	Student Learning	Program Organization and Design	Content/Standards Alignment
K	0.4167	0.5521	0.6146	0.5500	0.5417	0.6250
1	0.4861	0.6354	0.6354	0.6500	0.6667	0.7432
2	0.3889	0.5000	0.5313	0.6667	0.6750	0.6680
3	0.2444	0.4750	0.5167	0.4000	0.5000	0.4568
4	0.3889	0.4271	0.5208	0.4750	0.4333	0.4622
5	0.3750	0.3750	0.4375	0.3583	0.3833	0.3219


Math Connects (Elem)
K
Additional Key Content
Reasoning, Problem Solving, and Communication
Patterns and Operations
Objects and their Locations
Whole Numbers
1
Reasoning, Problem Solving, and Communication
Additional Key Content
Addition and Subtraction
Geometric Attributes
Whole Number Relationships
Concepts of Measurement
2
Reasoning, Problem Solving, and Communication
Additional Key Content
Place Value and the Base 10 System
Addition and Subtraction
Measurement
3
Addition, Subtraction and Place Value
Concepts of Multiplication and Division
Additional Key Content
Fraction Concepts
Reasoning, Problem Solving, and Communication
Geometry
4
Multi-digit Multiplication
Additional Key Content
Fractions, Decimals and Mixed Numbers
Reasoning, Problem Solving, and Communication
Concept of Area
5
Multi-digit Division
Representations of Algebraic Relationships
Addition and Subtraction of Fractions and Decimals
Reasoning, Problem Solving, and Communication
Additional Key Content
Triangles and Quadrilaterals
0.00
0.25
0.50
0.75
1.00

Sample Comments Received

- Will districts be required to adopt these materials?
- There are other ways to analyze the data. Why didn't you use method _____?
- What happens if some programs are tied with the top three?
- My district is using program _____, which is not in the top three. What will OSPI do to help us out?
- I think OSPI should pick a good traditional, balance, and reform program, not necessarily the top three.
- Will the state be funding textbook purchases, based on these results?
- I believe some standards are more important than others, why are they all weighted the same?
- Why are programs that address content a grade early given the same score as when they meet a standard a grade later than expected?
- There is some concern about program placement in the rank order, where individuals thought a program should have appeared higher or lower than it did.

Implications and Next Steps

- Support SBE contractor in their review of the results
- Provide communication supports and information to school districts and other stakeholders
- Finalize recommendations after receiving feedback from SBE
- Seek advice from stakeholder groups on 9-12 review