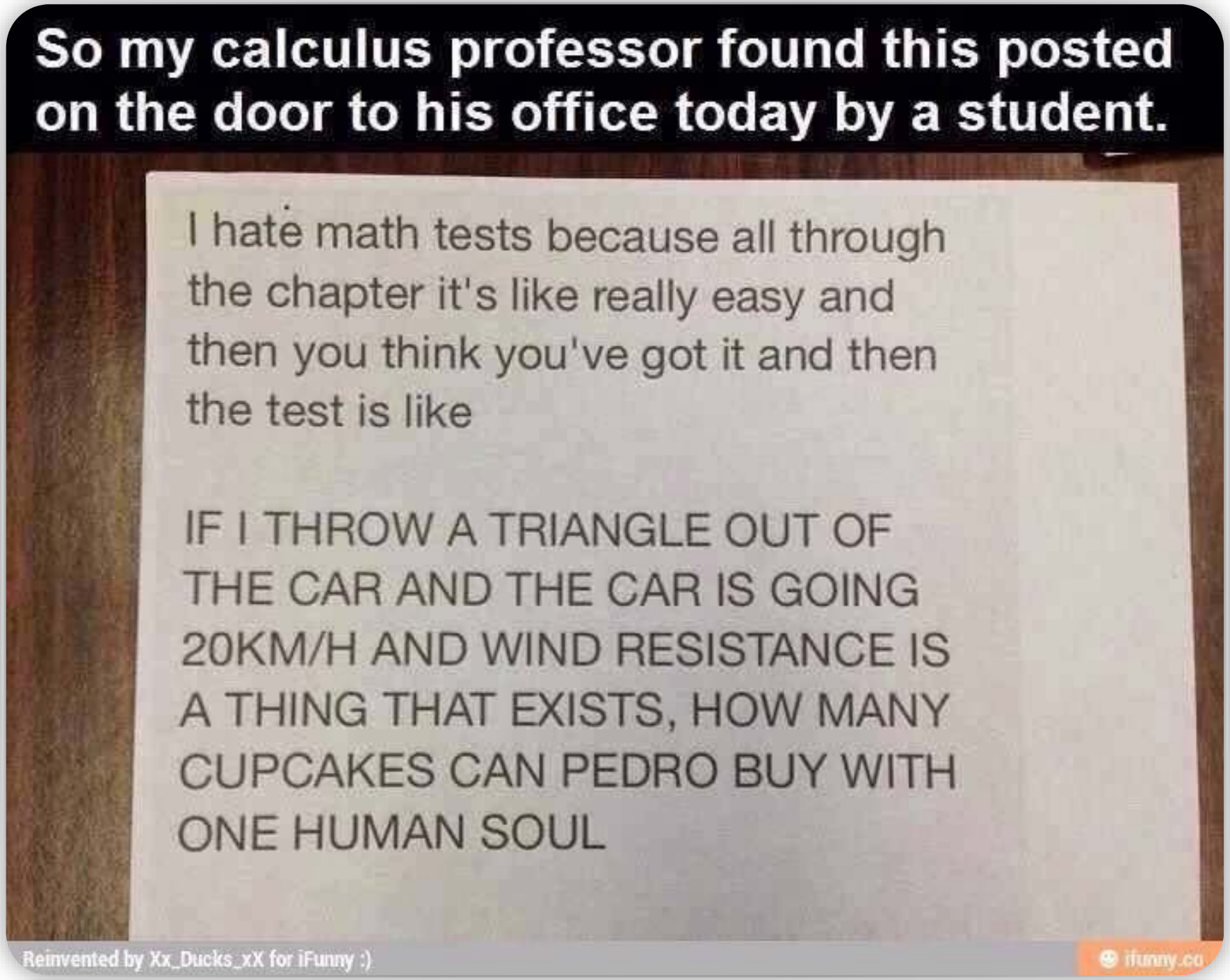
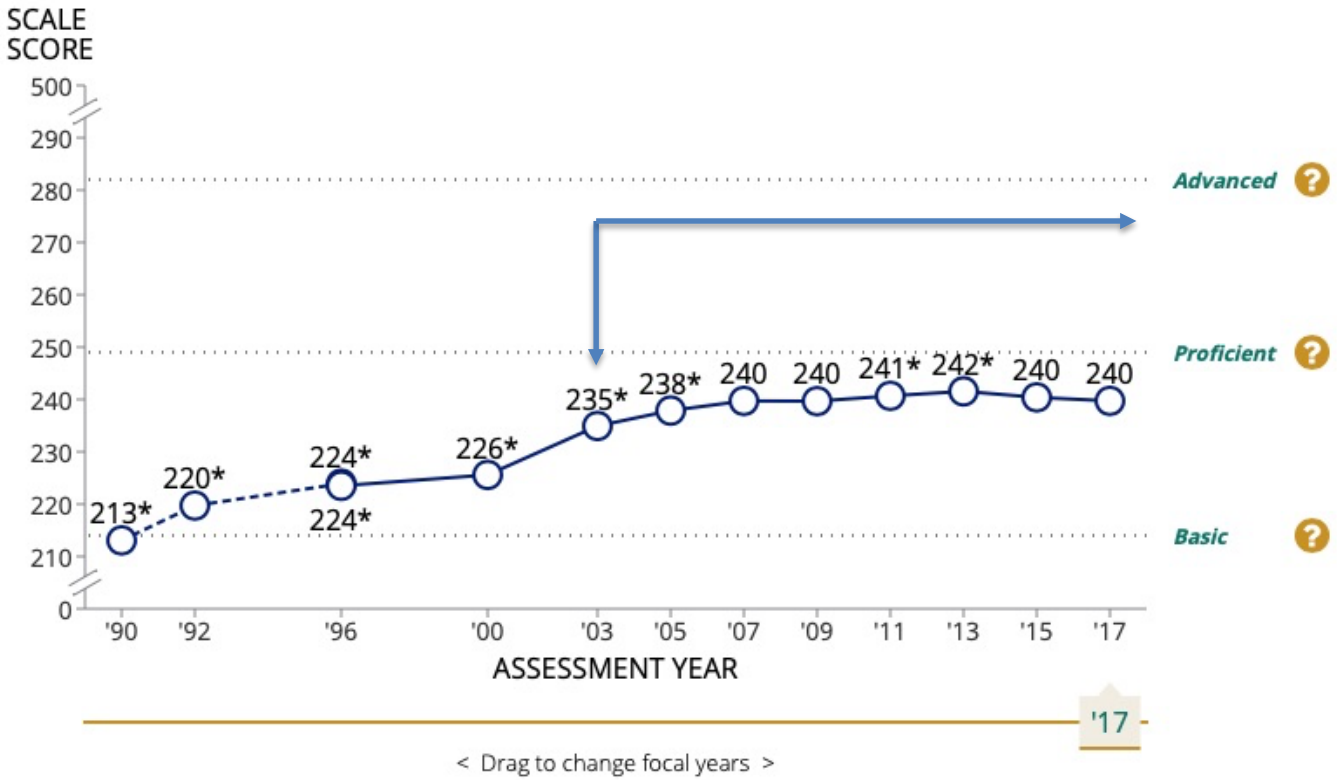
The Next Frontier: MTSS for Math

Amanda VanDerHeyden
www.springmath.com
@amandavande1
@springmathk8
amandavande@gmail.com


So my calculus professor found this posted on the door to his office today by a student.
I hate math tests because all through the chapter it's like really easy and then you think you've got it and then the test is like
IF I THROW A TRIANGLE OUT OF THE CAR AND THE CAR IS GOING 20KM/H AND WIND RESISTANCE IS A THING THAT EXISTS, HOW MANY CUPCAKES CAN PEDRO BUY WITH ONE HUMAN SOUL
Reinvented by Xx_Ducks_xX for iFunny :)
ifunny.co

An Entire Generation of K-12

Trend in fourth-grade NAEP mathematics average scores

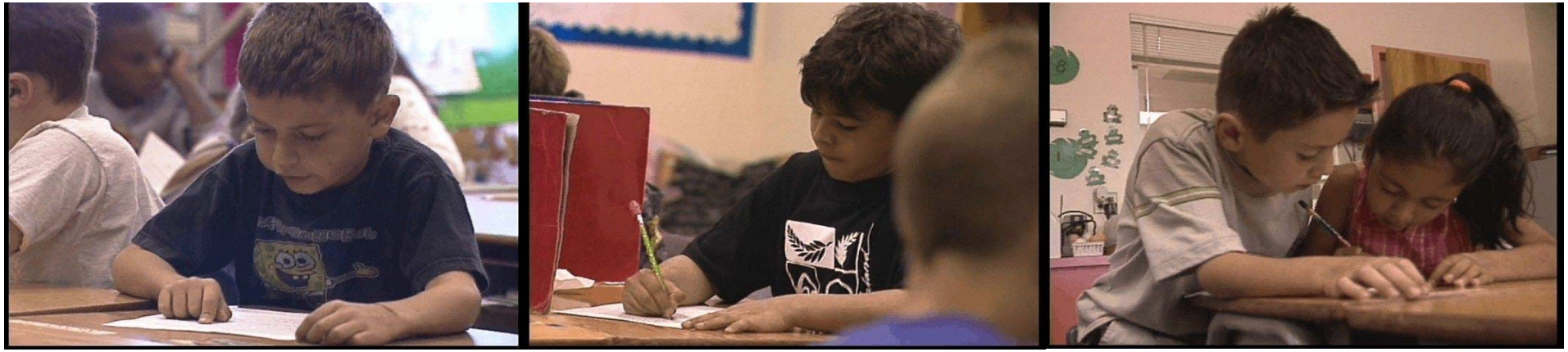


Today

- Morning
  - Effective instruction saves lives (it's the bedrock of all we do).
  - Modern math myths and what is evidence-based practice?
- Afternoon
  - How to screen
  - How to use classwide intervention as a layer between screening and small-group and/or individual intervention
  - How to build a math intervention.
  - How to support effective MTSS implementation in math.

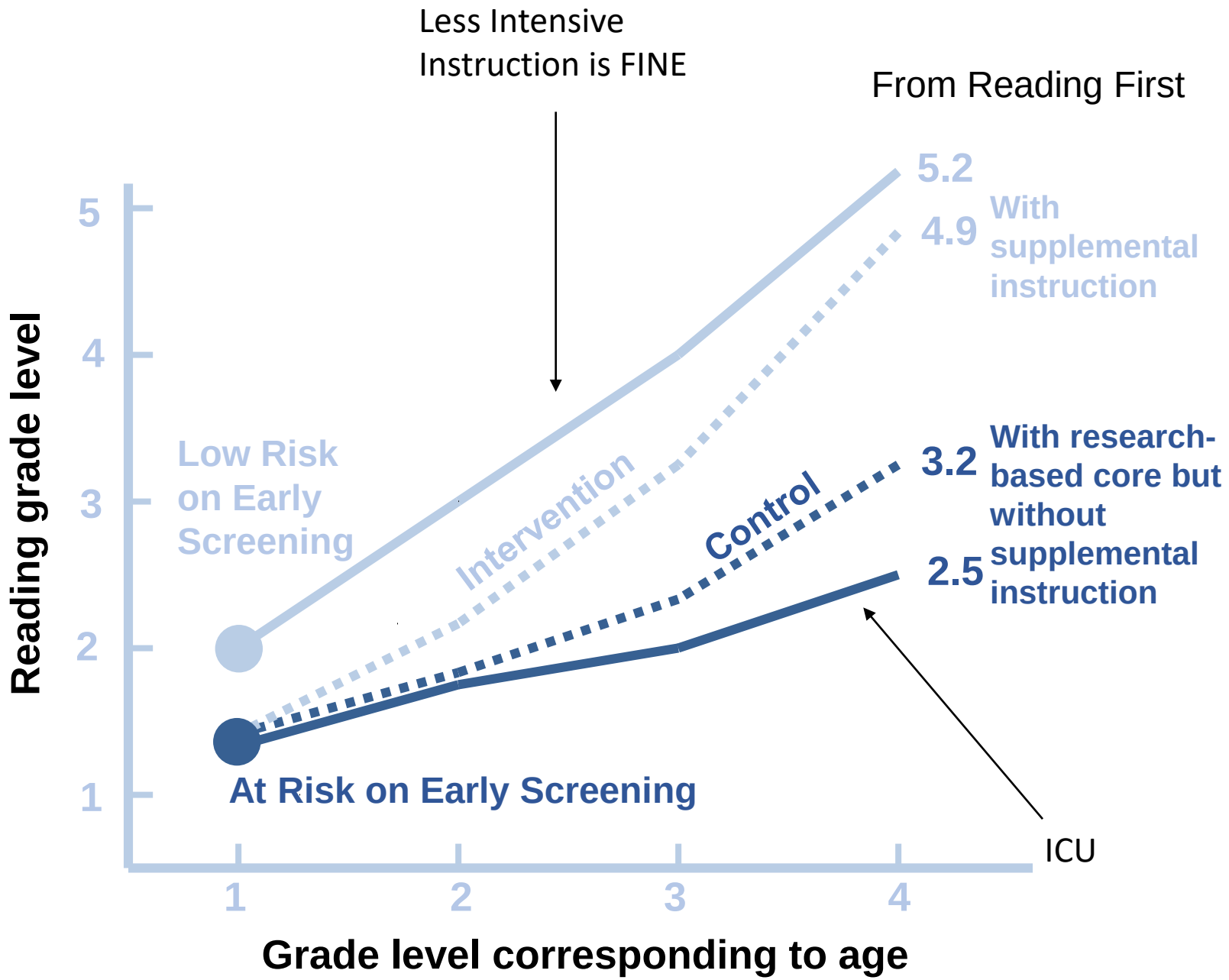
Effective Instruction Saves Lives

Some Students are Teaching-Proof (But Some Are Not)

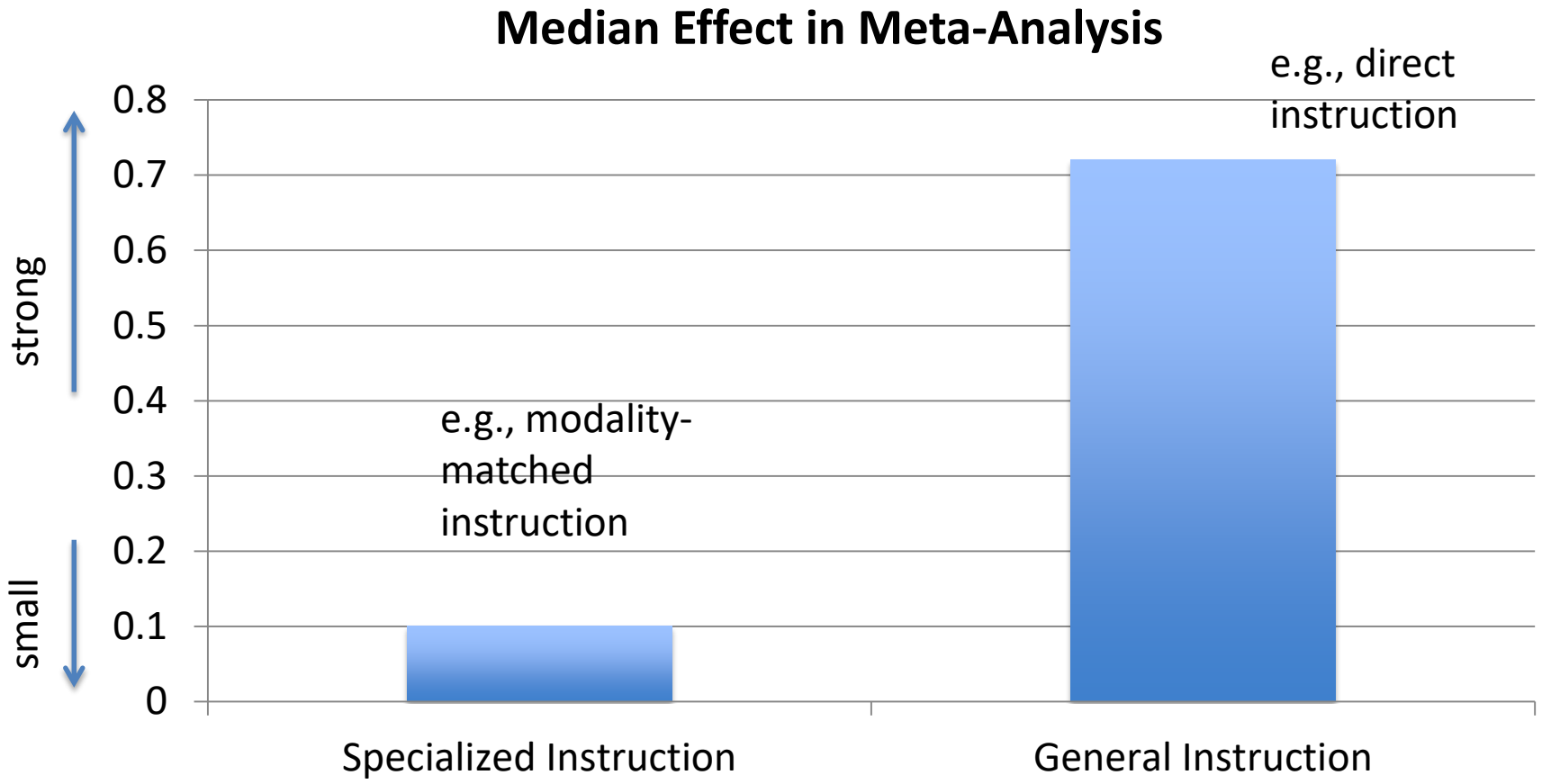


Trajectories are changed with Quality of Instruction

Teaching Proof


Less Intensive
Instruction is FINE
From Reading First
5.2
4.9
With
supplemental
instruction
Low Risk
on Early
Screening
Intervention
Control
3.2
With research-
based core but
without
supplemental
instruction
2.5
At Risk on Early Screening
ICU
Reading grade level
5
4
3
2
1
1
2
3
4
Grade level corresponding to age

No Effect for “Special” Instruction



Source: Kavale & Forness, 1999

What You DO Makes a Difference

Teaching	Effect Size
Quality of teaching	0.77
Reciprocal Teaching	0.74
Teacher-Student Relationship	0.72
Providing Feedback	0.72
Teaching student self-verbalization	0.67
Meta-Cognition Strategies	0.67
Direct Instruction	0.59
Mastery Learning	0.57
Average	*0.68*

Working Conditions	Effect Size
Within-class grouping	0.28
Adding $	0.23
Reducing Class Size	0.21
Ability Grouping	0.11
Multi-Grade/Age Classes	0.04
Open v. Traditional Classes	0.01
Summer break	-0.09
Retention	-.016
Average	*0.08*

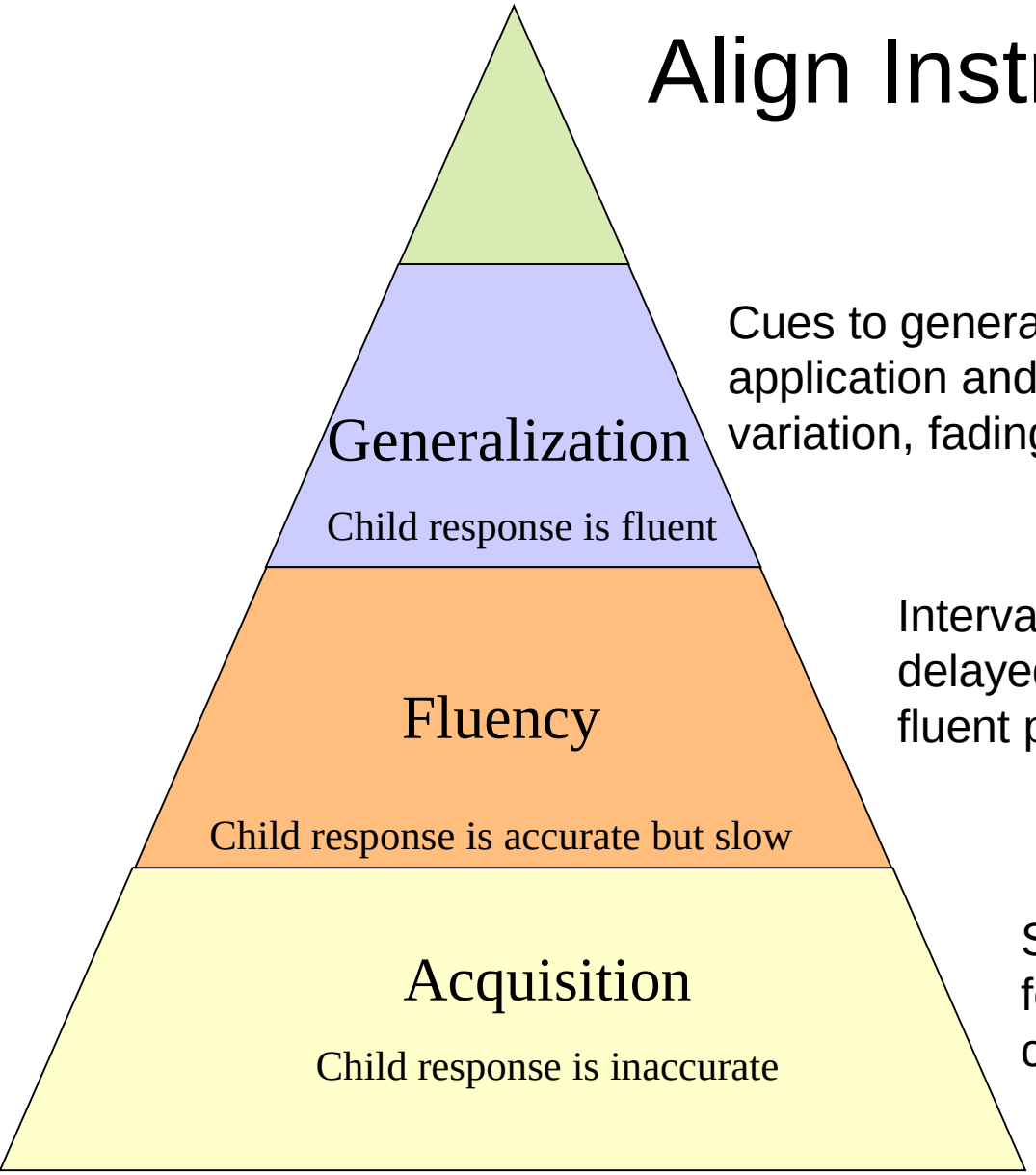
Source: Hattie (2009)

Low-Cost Interventions Can Be High-Yield

In MTSS: EVERYONE Grows

“In today’s context the measurement technologies ought to become integral parts of instruction designed to make a difference in the lives of children and not just a prediction about their lives.” Reynolds, 1975

Align Instruction with Student Proficiency

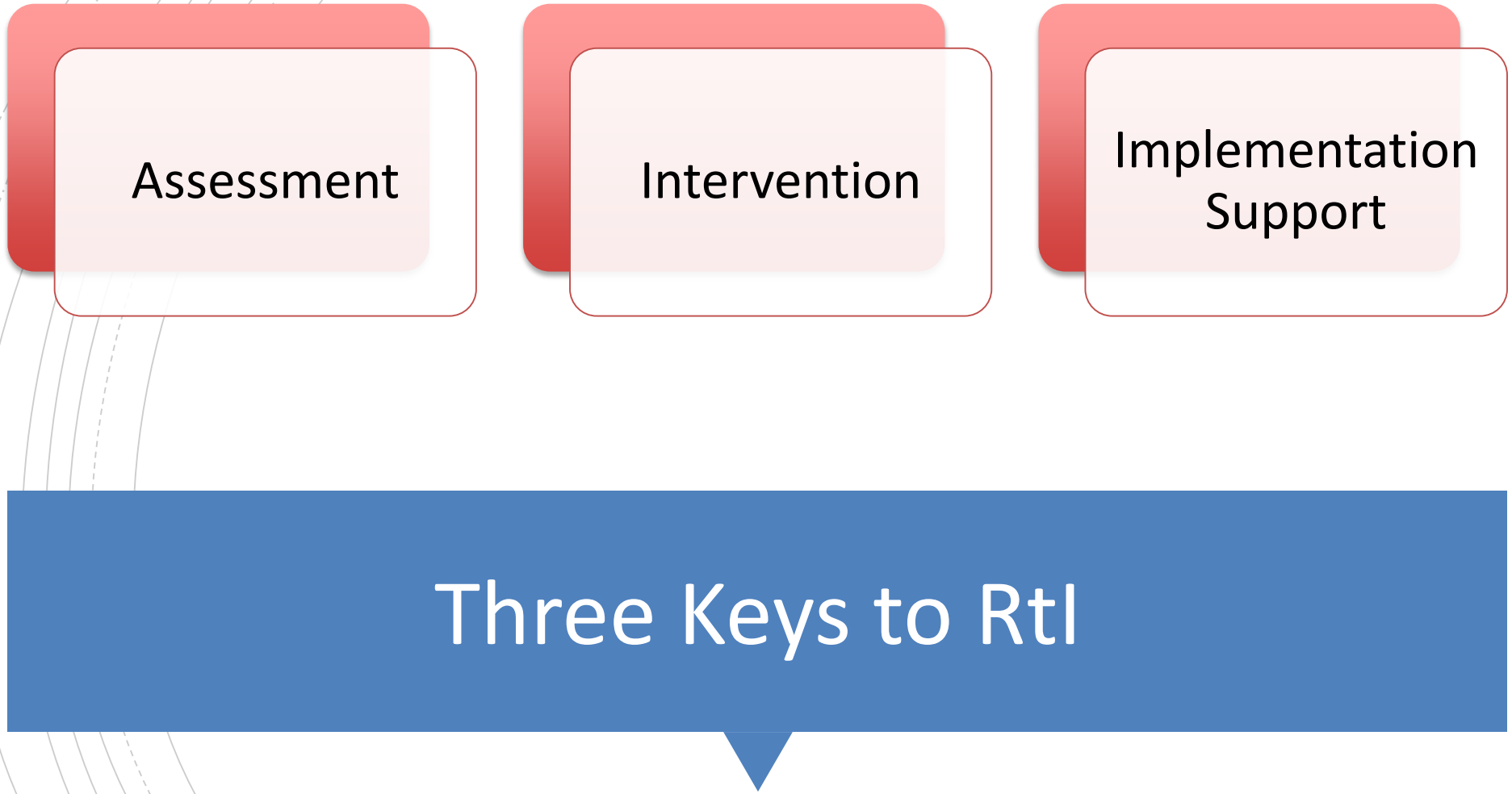


Cues to generalize, corrective feedback for application and problem-solving, systematic task variation, fading of support.

Intervals of practice, opportunities to respond, delayed feedback, ensure reinforcement for more fluent performance.

Salient cues, frequent & high-level prompting, immediate feedback, more elaborate feedback, sufficient exemplars of correct/incorrect, controlled task presentation.

Daly, Witt, Martens, & Dool, 1997; Witt, VanDerHeyden, & Gilbertson, 2004; Burns, Codding, Boice , & Lukito, 2010.


Assessment
Intervention
Implementation Support
Three Keys to RtI

Active Ingredients of MTSS

- Correct and early identification of risk
- Correct selection of intervention tactic and skill level
- Effective deployment of intervention to whole classes and individual students
- Addressing system targets
- Integration with core instruction via leadership (hiring, retaining, coaching, allocating support, material purchases, goals)

Barriers to MTSS in Math

- Accurate, Sensitive Screening
- Less know-how and access to high-quality materials for core instruction and supplementation
- Less know-how about what to measure when to guide decisions.
- Low access to high-quality “proven” intervention protocols and materials
- High base rates of low-performing students in math
- Less buy-in about the need to address STEM

In Math Screening Specifically

The preceding year-end test score is not bad to determine fall risk status

Single-skill computation measures work very well

Single-skill computation probes tend to be more sensitive than other measures.

But teachers tend to like measures that look like their instruction (reflect the full breadth of their instructional objectives)

Intervention trials make screening more accurate (because changes the base rate or prevalence of failure).

What should You Look for in MTSS/RtI for Math?

- Mastery Measurement.
- Common Core aligned w Emphasis on Essential Skills.
- Principle of Rigor & Varsity skills.
- Data interpretation
- Classwide intervention
- Peer-reviewed published evidence of effectiveness.
- Support for implementation!
  - Antecedent
  - Midstream
  - Embedded program evaluation

Step 1. Attend to High-Quality Core Instruction

Consume your screening data to identify system problems.

Evaluate effects of core instruction

For all students

For vulnerable students

Evaluate changes to core instruction

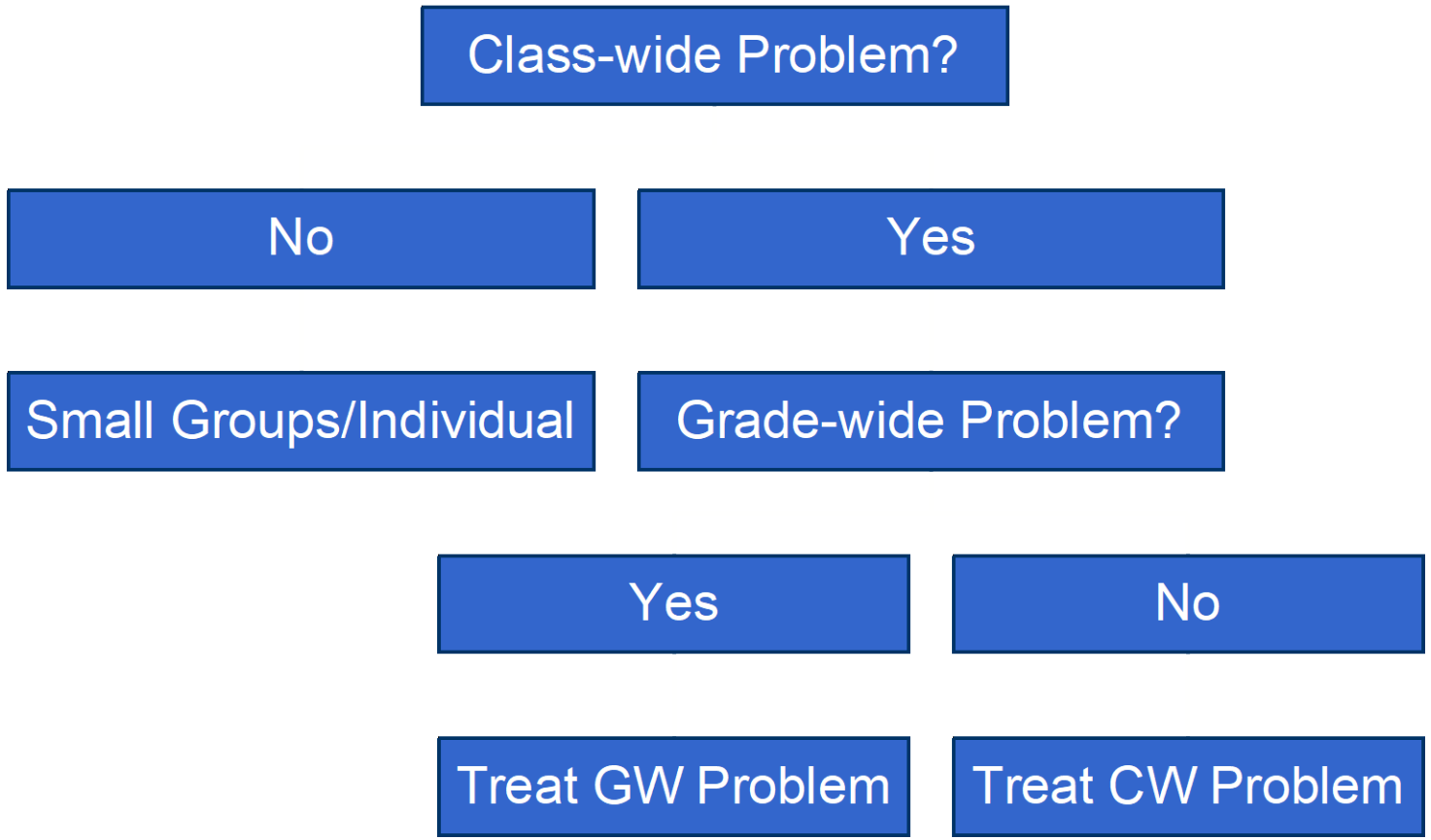
Develop benchmarks for performance that predict outcomes you care about

Evaluate programs locally based on data (e.g., special ed effects, Tier 2 and 3 intervention)

Let’s Talk about High-Quality Curricula EdReports.org

- Know where you are going first.
- Verify conceptual understanding and verify fluency.
- Check fluency on component skills (look for gaps).
- Support Acquisition, Fluency-building, and Application every day.
- Align instructional strategy to student need
- Avoid over-assessment, treat classwide problems with classwide interventions, and pay attention to integrity.

System Problems First



Everyday

What must students know?

Do students understand? Can they do it?

How will you

Establish conceptual understanding?

Build fluency?

Provide applied practice & discussion?

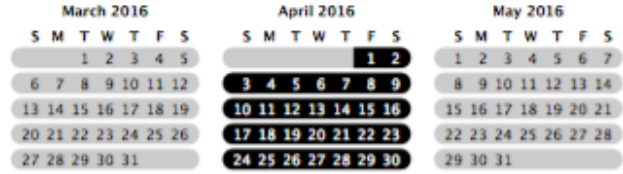
Everyday

- Be clear, in advance, about what the expected outcome of instruction is.
- Teach the patterns and rules explicitly- do not wait for these to be “discovered.”
- Explicitly connect what is being learned to what they know
- Do not rely on textbooks to set pace, provide all practice opportunities, and drive instruction
- Emphasize converting harder tasks to easier tasks from preK up
- Emphasize the “tool skills” (Johnson & Street)
- Make the key discrimination explicit

Most Common Core Fixes

- Specify Essential Skills
- Map Essential Skills onto Calendar of Instruction
- Use Assessment to Verify Mastery according to Timeline
- Maximize Instructional Time for Math
- Integrate Instruction with Student Proficiency

April 2016



US Holidays

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
27 Easter	28	29	30	31	1 April Fools Day Place Fractions on Number Line for denominators 2, 3, 4, 6, 8	2
3	4	5	6	7	8 Place Fractions on Number Line for denominators 2, 3, 4, 6, 8	9
10	11	12	13	14	15 Tax Day Place Fractions on Number Line for denominators 2, 3, 4, 6, 8 Quantity comparisons for fractions with like denominators.	16
17	18	19	20	21	22 Earth Day Distributive Property of Multiplication	23
24	25	26	27	28	29 Multiply 1-digit by 2-3 digits with and without regrouping. Use operations to solve word problems about quantity for volume, weight, length	30

May 2016

April 2016

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

May 2016

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

June 2016

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

US Holidays

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5	6	7
	We suggest cumulative mixed review					
8 Mother's Day	9	10	11	12	13 Division of 2 and 3-digit whole numbers in expanded notation format. Convert remainder to multiplication with whole number addend	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29 John F. Kennedy's Birthday	30 Memorial Day	31	1	2	3	4

Central Time Time Zone

Self-Check of Your Core

Do I have all the materials I need for math instruction and practice?	You can find practice materials in SM.
Do I know what the essential learning outcomes are for my grade level?	Review standards, specify sequence, teach essential skills to mastery
Have I mapped the essential learning outcomes in math onto a calendar for my school year?	Specify by which date essential skills will be mastered. Work with teachers to ensure calendar is followed.

Adapted from: VanDerHeyden, A. M., & Burns, M. K. (2010). Essentials of Response to Intervention. In A. S. Kaufman and N. L. Kaufman (Series Eds.) Essentials of Psychological Assessment Series. Hoboken, NJ: Wiley. (182 pp.)

Do I have enough instructional time for mathematics?	Review time allocated to instruction, make adjustments based on priorities.
Do I have access to a coach?	Ensure a focus on intervention targets and priorities.
Is my task presentation clear?	Include observation in class with feedback
Do I use cues and prompts to support accurate responding when teaching new skill?	Include observation in class with feedback
Is the pace of my instruction tied to the students' skill proficiency?	Use student assessment with instructional planning

Adapted from: VanDerHeyden, A. M., & Burns, M. K. (2010). Essentials of Response to Intervention. In A. S. Kaufman and N. L. Kaufman (Series Eds.) Essentials of Psychological Assessment Series. Hoboken, NJ: Wiley. (182 pp.)

Is my feedback aligned with student proficiency?	Integrate student assessment data with instruction
Am I following my calendar of instruction?	Build a calendar of instruction, verify student mastery as you go.
Are all my students actively engaged, actively responding?	Check via direct obs: Task difficulty, CW intervention, trans times, active with f/b and incentives
Am I minimizing transition times between and within activities?	Transitions under 2 min. Address with transition routine.
Am I providing high rates of practice with feedback during instruction?	Check via observation. Professional dvlp for active student responding goals.

Adapted from: VanDerHeyden, A. M., & Burns, M. K. (2010). Essentials of Response to Intervention. In A. S. Kaufman and N. L. Kaufman (Series Eds.) Essentials of Psychological Assessment Series. Hoboken, NJ: Wiley. (182 pp.)

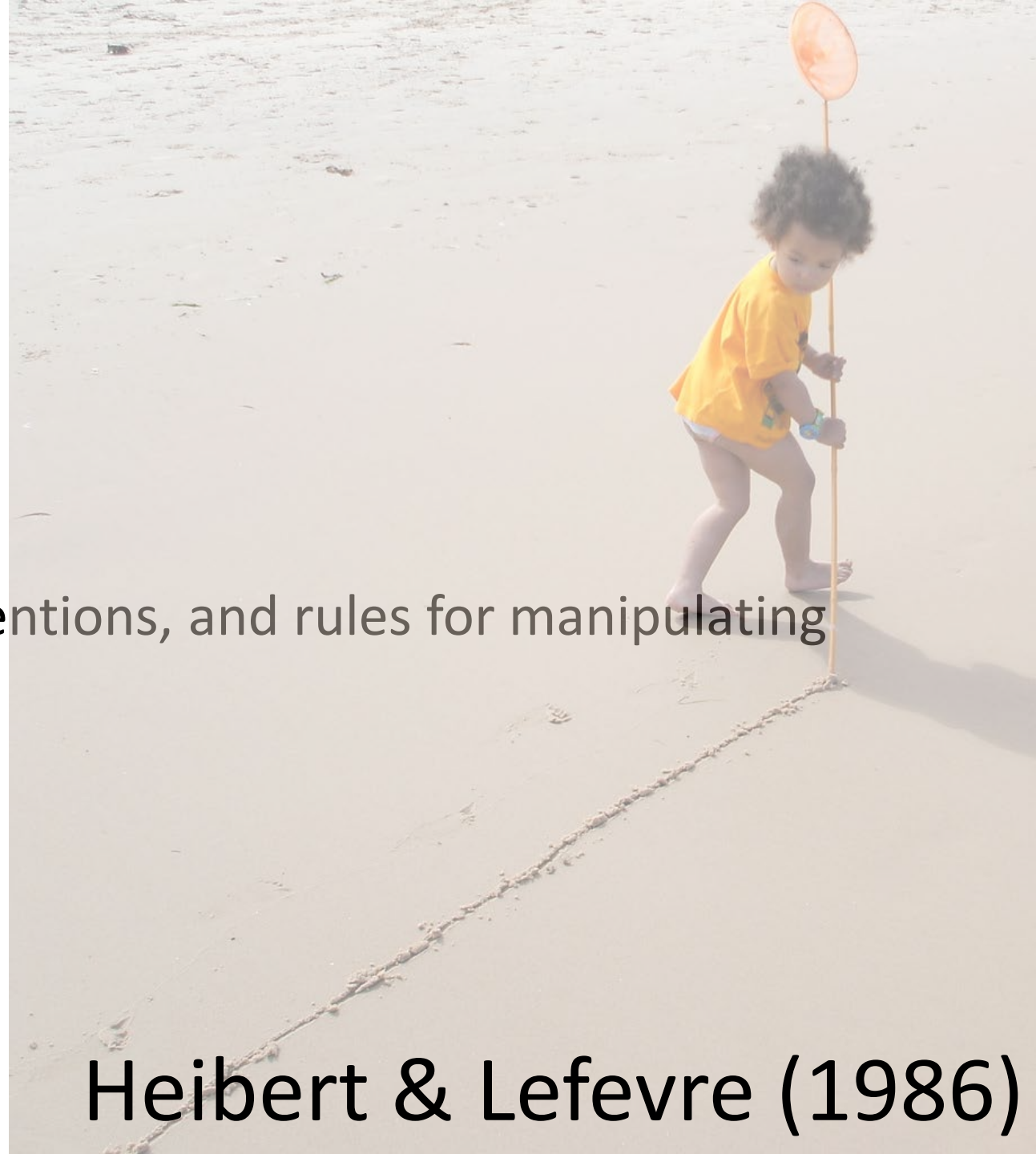
Modern Math Myths

Let’s Talk about the Math Wars

- Schoenfeld (1985) Four Categories of Math Knowledge
  1. resources – proposition and procedural knowledge of mathematics,
  2. heuristics – strategies and techniques for problem solving such as working backwards, or drawing figures,
  3. control – decisions about when and what resources and strategies to use, and
  4. beliefs – a mathematical “world view” that determines how someone approaches a problem.

Conceptual v. Procedural Knowledge

- Procedural knowledge
  - Superficial
  - "knowledge of syntax, steps, conventions, and rules for manipulating symbols."
  - Only sequential relationships.
  - Basically algorithms

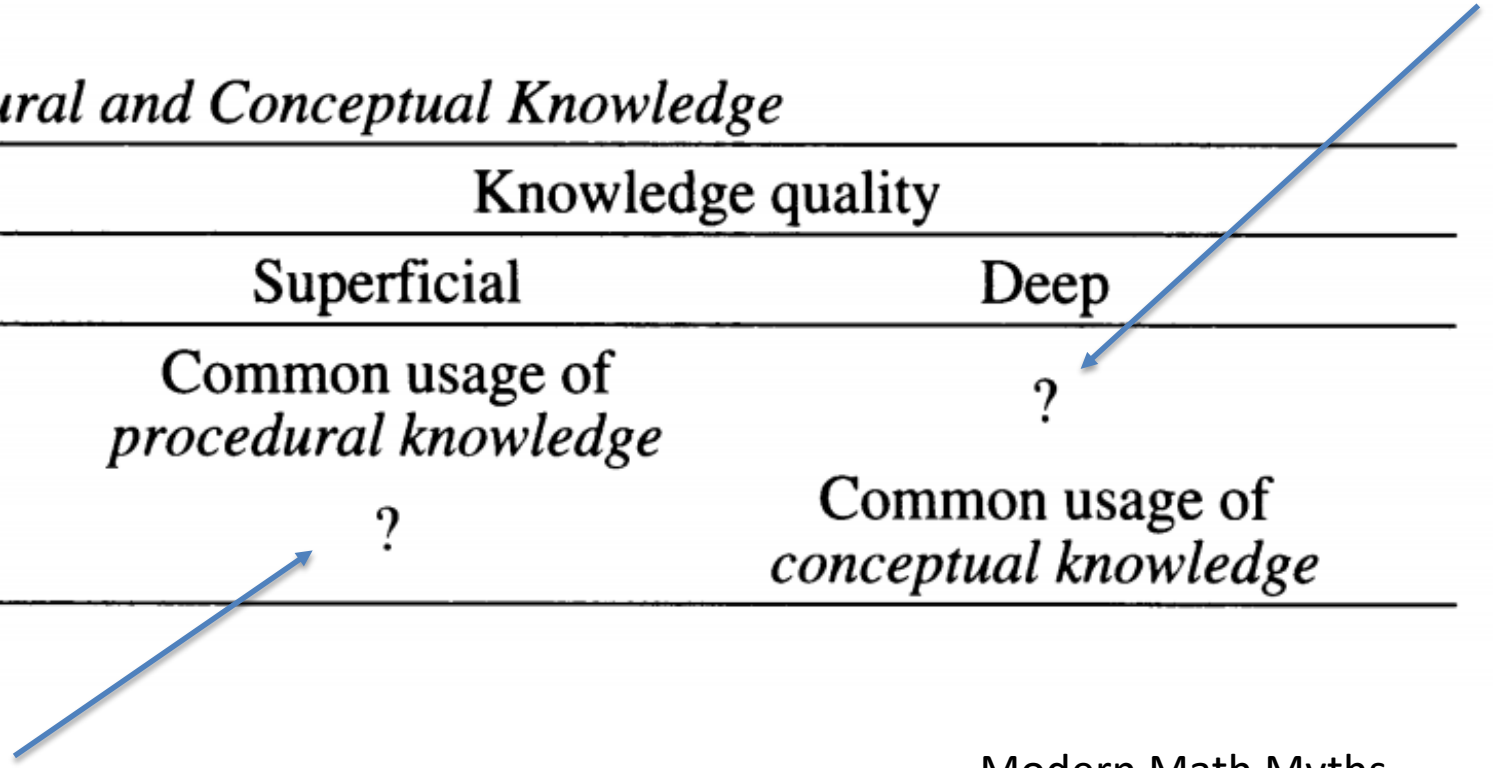


Heibert & Lefevre (1986)

Star (2005)

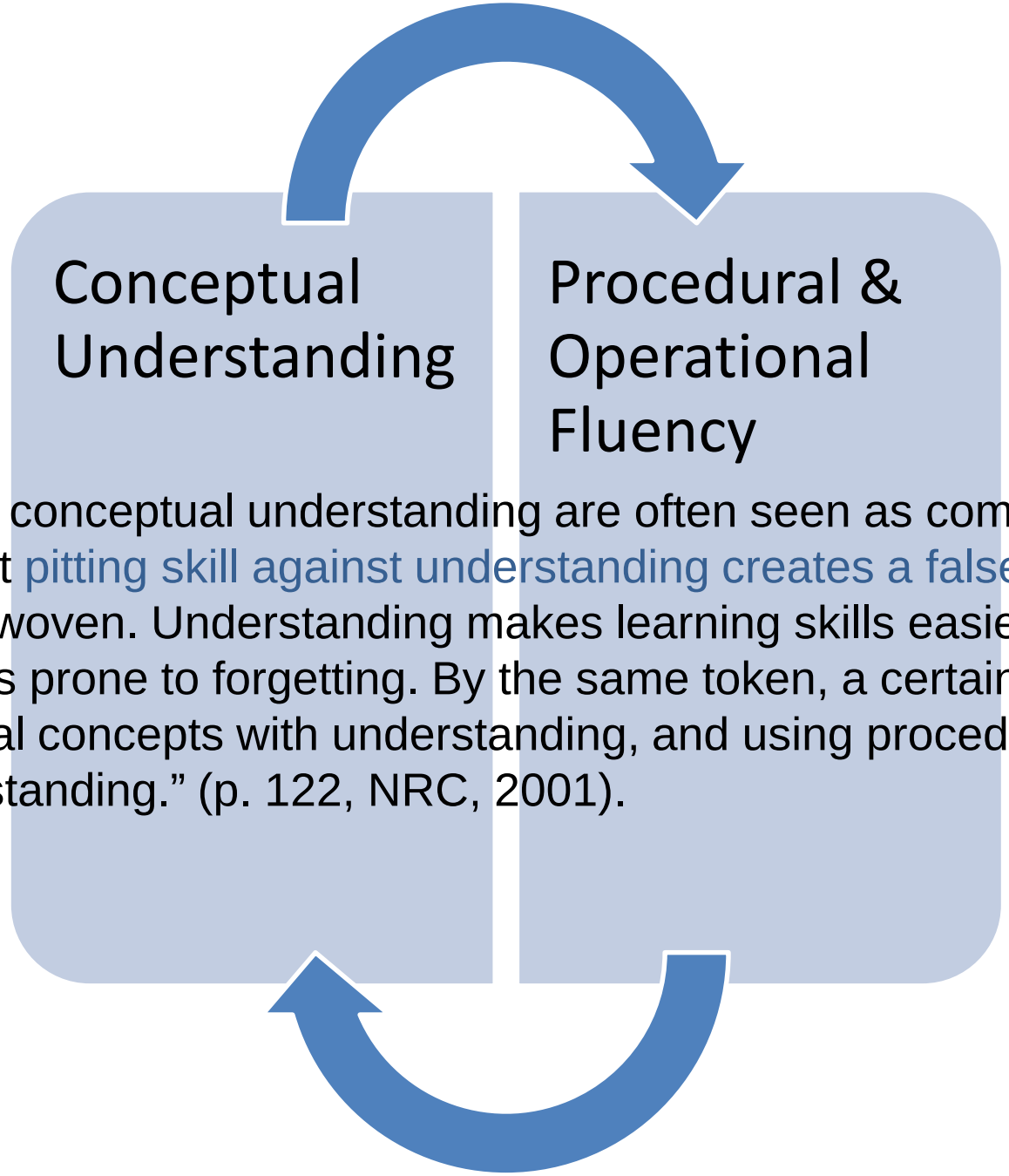
Table 1
Types and Qualities of Procedural and Conceptual Knowledge

Knowledge type	Knowledge quality	
	Superficial	Deep
Procedural	Common usage of *procedural knowledge*	?
Conceptual	?	Common usage of *conceptual knowledge*



Bi-Directional, Iterative

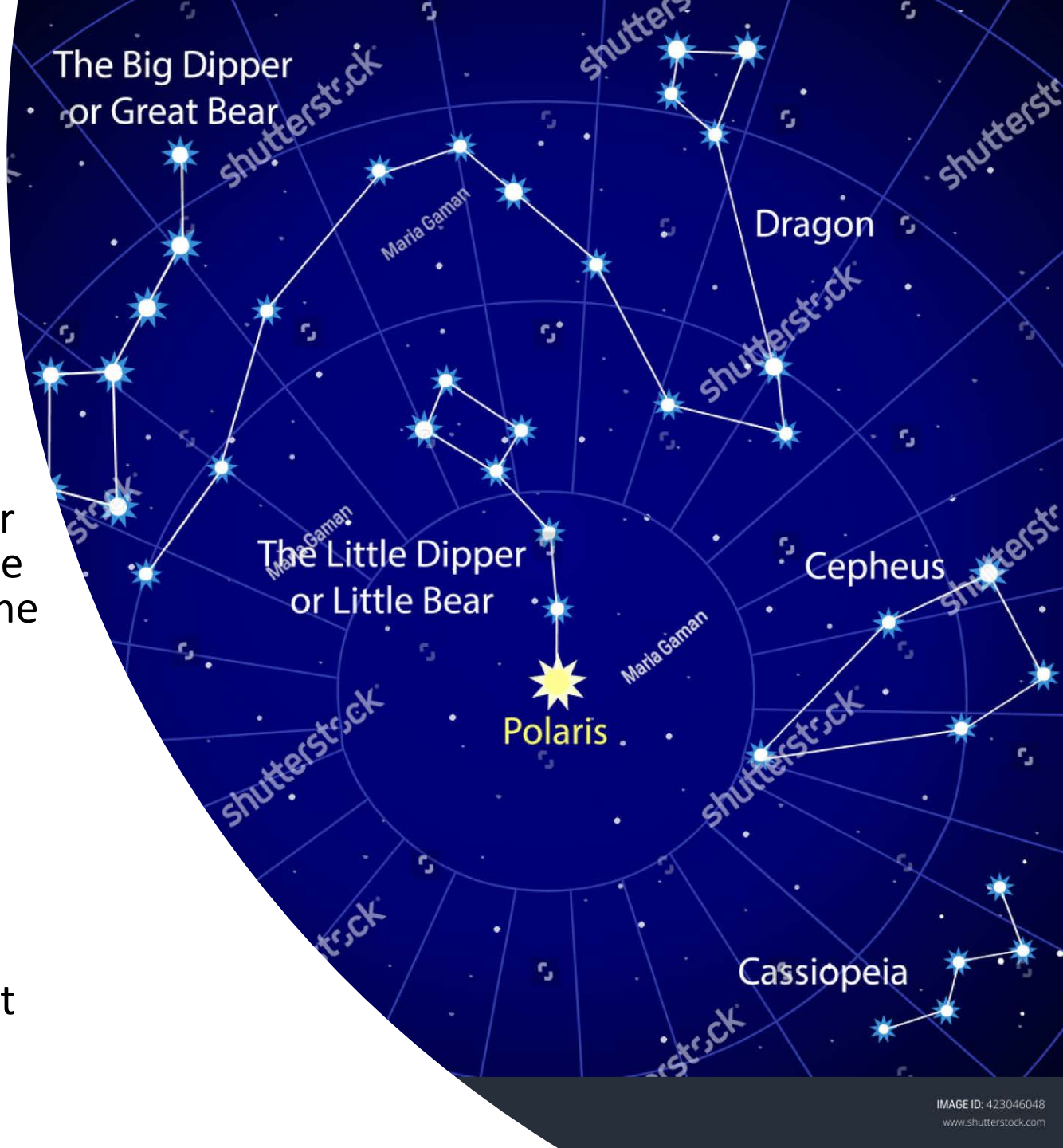
- https://www.researchgate.net/publication/314230137_Developing_Mathematics_Knowledge (Rittle-Johnson, 2017)
- Iterative knowledge development.
- Predictive, bi-directional relationships between conceptual & procedural knowledge
  - PK 4th graders w fractions predicted 5th grade fraction CK and vice versa after controlling for prior knowledge (Hecht & Vagi, 2010).
  - Targeting CK produces gains in PK and vice versa (Schneider, Rittle-Johnson, & Star, 2011).
- Suggesting that one type of knowledge must precede the other is simply not consistent with research data.



“Procedural fluency and conceptual understanding are often seen as competing for attention in school mathematics. But pitting skill against understanding creates a false dichotomy. As we noted earlier, the two are interwoven. Understanding makes learning skills easier, less susceptible to common errors, and less prone to forgetting. By the same token, a certain level of skill is required to learn many mathematical concepts with understanding, and using procedures can help strengthen and develop that understanding.” (p. 122, NRC, 2001).

Deep Procedural Knowledge (Star, 2005)

- Not sequential, but RICH in relationships
  - "knowledge of procedures… includes…order of steps, the goals and subgoals of steps, the environment or type of situation in which the procedure is used, the constraints imposed upon the procedure by the environment or situation, and any heuristics or common sense knowledge that are inherent in the environment or situation" (p. 409)
- Flexibility
  - someone w only superficial knowledge will use the standard technique which might not be the most efficient



NCTM Attempts to Bridge

- Accuracy
- Fluency
- Efficiency
- Flexibility

- But does a poor job of articulating actual plans, active ingredients, and especially in balancing empiricism with theory-informed practices.

- What does it mean to teach math in ways that provides “rich relationships” between numbers/operations?

- How do we specifically cultivate flexibility?

Examples of Flexibility

- Choosing the format of a proportion
  - 33/57 versus .58; 3/5 versus 60%
- Choosing a method of simplification
  - 22/44 = 11/22 = ½ versus 22/44 = ½
- Choosing to not simplify a fraction
  - 6 x (14 ÷ 6) + 10
- Choosing a method for solving a linear equation
  - 2 (x + 1) + 3 (x + 1) = 10
    - 5 (x + 1) = 10 (collect then distribute)
    - 2 x + 2 + 3x + 3 = 10 (distribute then collect)
  - 2 (x + 1) + 3 (x + 2) = 10
    - 2x + 2 + 3x + 6 (you must distribute then collect to solve– only one option).

Activity:
Solve: 6 x (14 ÷ 6) + 10

- P
- E
- MD
- AS

Activity:
Solve: 6 x (14 ÷ 6) + 10

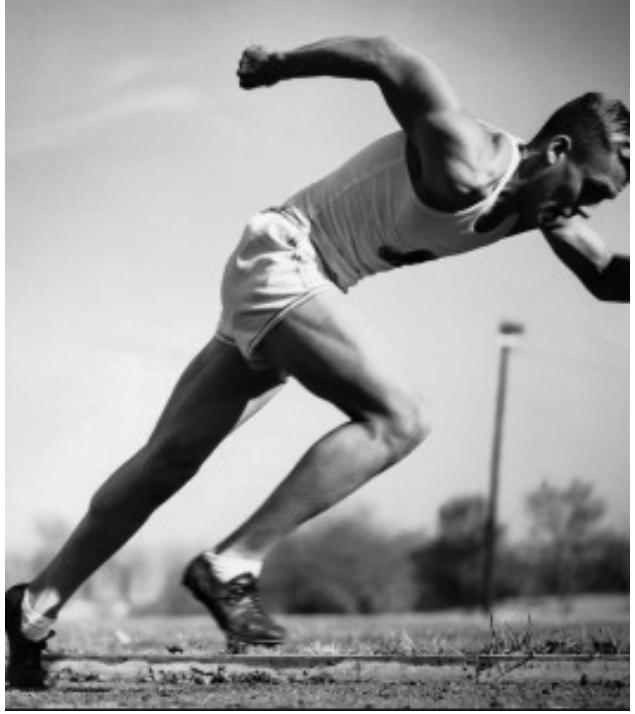
- Math coach says: answer cannot be 24 because 14 ÷ 6 = 2.33 and so 6 x 2.33 + 10 = 23.98
- Does this make sense to you?
- What is the mistake?

We intend for students to use a fraction to represent the division. So the example of 6 x (14 divided by 6) + 10, we want children to solve as 6 x 14/6 + 10. When the problem is represented in this way, it is easy to solve and the correct answer is a whole number. Solving in this way is not only easier, but reflects a child's understanding of the inverse relationship between multiplication and division. Logically, if you divide a number by a factor and then multiply the result by the same factor, you will always get the number you started with. So the solution to this problem is actually pretty simple when the student can solve that way. We believe that part of the work of math (and success with math) is not just going through the motion of problem solving, but thinking about the easiest way to solve a problem given important math skills like creating equivalent quantities and solving for unknowns. This is why we provide rigorous problems like this one that requires a child to think. Also, we do note in the directions for this measure that children should be encouraged to represent division with fractions if that allows for easier problem solving (and here's a hint that is fine to share with students— if the division operation does not result in a whole number answer, then generally using a fraction will be the easier way to solve). Here are the directions for this measure with the relevant part in bold face font.

- https://youtu.be/EUvOyz2Ysq0
- https://youtu.be/Tr1qee-bTZI?t=60

Conceptual & Procedural (Flexibility)

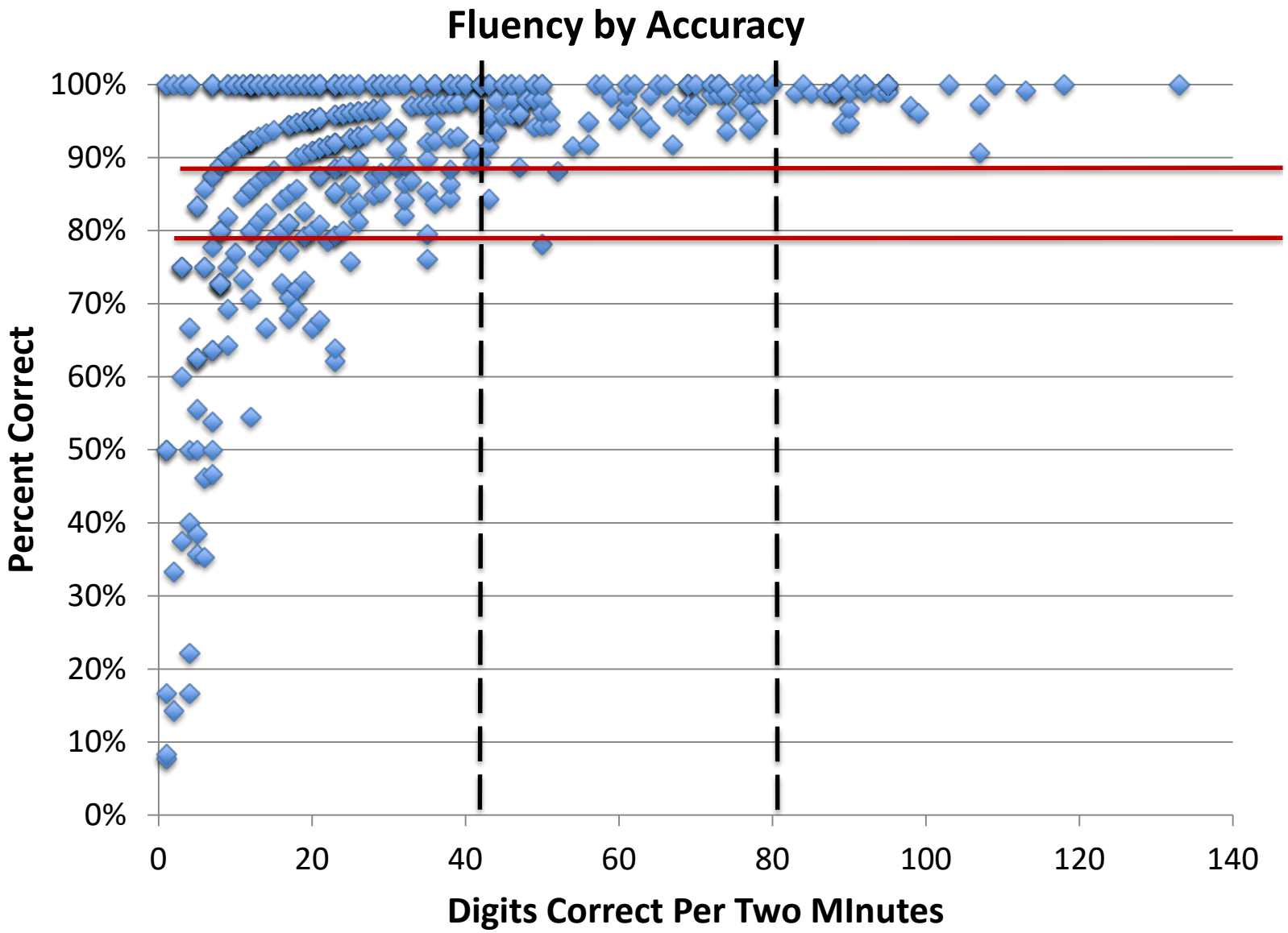
- Explicitly teach algorithm and relationships.
- Teach more than one way to solve
- Create equivalent quantities
- Solve for unknown set up from kindergarten up (prepares for applied work and word problems)
- Target vocabulary (Riccomini, Smith, Hughes & Fries, 2015) directly by giving teacher scripts and using mathematically correct language in the instructional context



On Fluency

Roediger & McDaniel: “Pitting the learning of basic knowledge against the development of creative thinking is a false choice. Both need to be cultivated. The stronger one’s knowledge about the subject at hand, the more nuanced one’s creativity can be in addressing a new problem. Just as knowledge amounts to little without the exercise of ingenuity and imagination, creativity absent a sturdy foundation of knowledge builds a shaky house.”

Carl Binder: http://binde1.verio.com/wb_fluency.org/Publications/Binder2003.pdf


Fluency by Accuracy
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percent Correct
0
20
40
60
80
100
120
140
Digits Correct Per Two MInutes

What about Anxiety?

- Gunderson, E. A., Park, D., Maloney, E. A., Beilock, S. L. & Levine, S. C. (2018) Reciprocal relations among motivational frameworks, math anxiety, and math achievement in early elementary school. *Journal of Cognition and Development, 19*, 21-46. doi: 10.1080/15248372.2017.1421538
- High math achievement especially strong predictor of lower math anxiety in first 2 years of school == Reciprocal effect of less entity oriented motivation (ability is fixed), anxiety, achievement.

What about Cognitive Assessment-Informed Instruction?

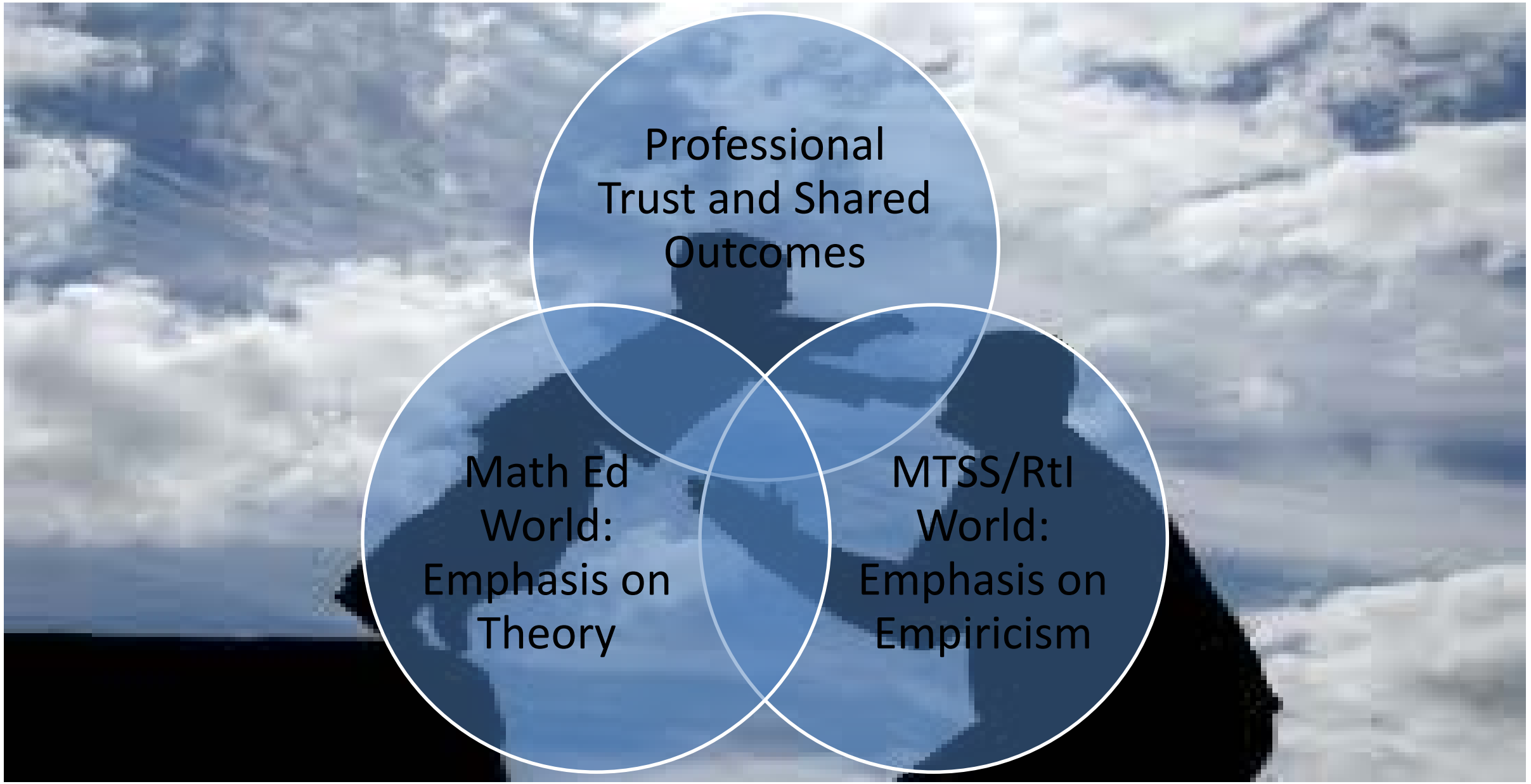
	Model 1				Model 2			
	B	S.E.	β	t	B	S.E.	β	t
Traditional Drill								
Constant	-0.32	2.13		-0.15	-0.37	1.75		-0.21
Math Calculation	0.03	0.03	.19	1.00	-0.01	0.03	-.02	0.91
Memory					0.45	0.12	.62	3.68*
	R^2 = .04, F Change = 0.99				R^2 = .38, F Change = 13.55*			
Incremental Rehearsal								
Constant	2.57	1.69		1.52	2.50	1.71		1.46
Math Calculation	0.02	0.02	.14	0.71	0.01	0.03	.09	0.45
Memory					0.09	0.12	.15	0.72
	R^2 = .02, F Change = 0.50				R^2 = .04, F Change = 0.52			

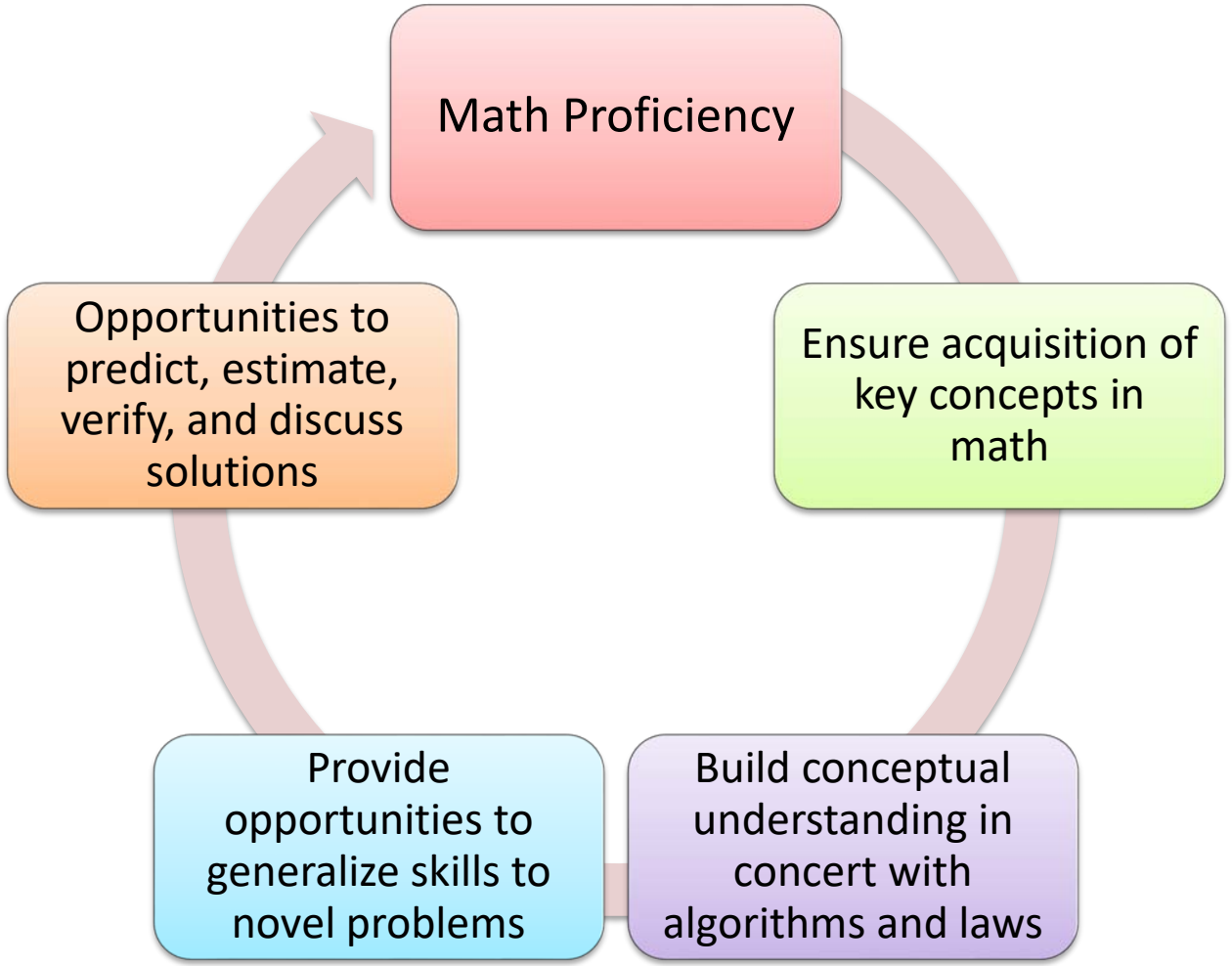
Burns et al. (in press). Comparing the Effects of Incremental Rehearsal and Traditional Drill on Retention of Mathematics Facts and Predicting the Effects with Memory

Hung-Hsi Wu

"… the resistance that some math educators (and therefore teachers) have to explicitly teaching children the standard algorithms may arise from not knowing the coherent structure that underlies these algorithms: the essence of all four standard algorithms is the reduction of any whole number computation to the computation of single-digit numbers."

p. 9 American Educator (2011)


Professional Trust and Shared Outcomes
Math Ed World: Emphasis on Theory
MTSS/RtI World: Emphasis on Empiricism



What is Balanced Math Instruction?

Teacher Characteristics

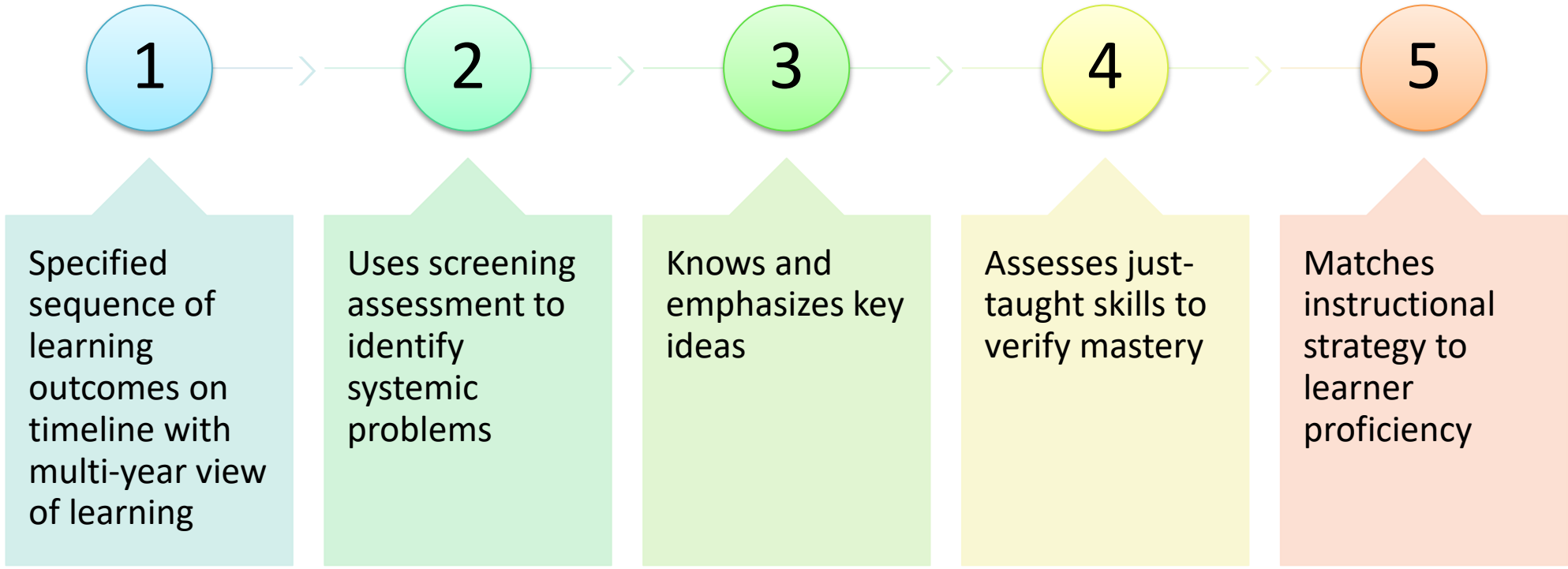
- Understands sequence of content and how skills to be learned are related to previously learned skills and skills to be learned in the future
- Can provide a mathematical proof or reasoning for why a solution works
- Anticipates common misconceptions and error patterns that represent faulty thinking
- Has a system for knowing which students are on track or not

Teacher Characteristics

- Hattie - *d* = .09 for subject matter knowledge
- Enhancing teacher knowledge alone is not enough
- Consider Ma's findings

Chinese Teachers	U.S. Teachers
Mathematical proofs	Procedural explanations only; Could not explain why procedure worked
>1 way to solve problem	Algorithm only AND ineffective use of tools
Prioritized content & Concept Maps	Did not have map of key ideas related to new skill understandings

Planning: Deciding what to Teach



Conceptual Understanding is Promoted When

01

We teach children to combine and recombine numbers in problems using associative, commutative, and distributive laws

02

Convert division and subtraction problems to unknown factor and missing addend problems

03

Explicitly connect what is being learned to what they already understand

04

Explicitly teach how to turn challenging problems into easier problems

To Build Conceptual Understanding

- Emphasize quantity understanding
- Emphasize predictable effect of various operations on whole numbers, fractions, and integers
- Emphasize converting hard problems to easier problems from preK up
- Emphasize solving for unknowns from first grade up
- Do not underestimate the amount of practice with feedback required for fluent understanding
- Use Precise language/Build math vocabulary

http://www.nctm.org/Publications/Teaching-Children-Mathematics/Blog/13-Rules-That-Expire/

Common Procedural Errors

- Not attending to operation, wrong operation
- Regrouping errors in addition, subtraction, and multiplication
- Dysfluency in basic computations and operations
- Prevent procedural errors that interfere with conceptual understanding

http://www.nctm.org/Publications/Teaching-Children-Mathematics/Blog/13-Rules-That-Expire/

How do you assess in Math?

Necessarily skill dependent.

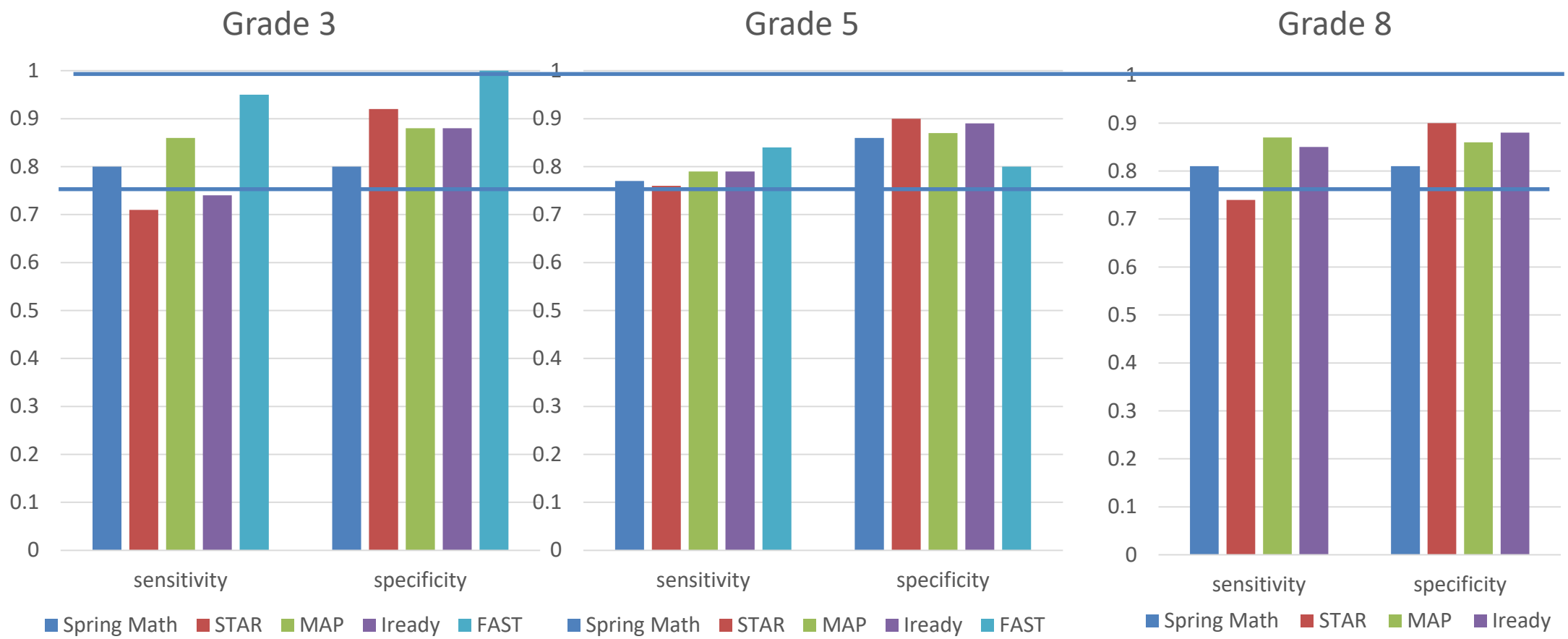
Connected to intervention selection.

Sensitivity for risk. Sensitivity to growth.

	Screening Fall	Screening Winter	Screening Spring
Kindergarten	• Counting Objects to 10, Circle Answer • Identify Number, Draw Circles to 10 • Quantity Comparison with Dots to 10 • Missing Number 0-10	• Count Objects, Write Number to 20 • Identify Number, Draw Circles • Quantity Comparison with Dots to 20 • Missing Number 0-20	• Change Quantity with Dots to 10 • Missing Number 0-20 • Sums to 5 Kinder • Subtraction 0-5 Kinder
1st Grade	• Sums to 6 • Subtraction 0-5 • Quantity Comparison 20-99	• Sums to 12 • Subtraction 0-5 • Fact Families Addition & Subtraction 0-5 • Quantity Comparison 101-999	• Sums to 20 • Subtraction 0-20 • Fact Families Addition & Subtraction 0-9
2nd Grade	• Sums to 20 • Subtraction 0-20 • Fact Families Addition & Subtraction 0-20 • Quantity Comparison 1001-9999	• 2-dig add without regrouping • 2-dig sub without regrouping • Quantity Comparison Sums/Differences to 20	• 2-digit Addition with regrouping • 2-digit Subtraction with regrouping • Create equivalent Addition & Subtraction Problems (using place value & decomposition) • Create equivalent Addition & Subtraction problems (Using Associative Property & Near Easy)
3rd Grade	• Fact Families +/- 0-20 • 3-dig add with & without regrouping • 3-dig sub with & without regrouping	• Multiplication 0-9 • Division 0-9 • Fact Families Multiplication & Division 0-9	• Multiply 1 by 2-3 digit without Regrouping • Divide 1-digit into 2-3 digit without remainders • Quantity Comparison fractions with Like Denominators • Place Fractions on Number Line (2, 4, 8)

4th Grade	• Fact Families Multiply/Divide 0-12 • Multiply 1 by 2-3 with & without regrouping • Place Fractions on Number Line (2, 3, 4, 5, 6, 8, 10) • Quantity Comparison Decimals to Hundredths	• Multiply 2 x 2 with & without regrouping • Add & Subtract Mixed Numbers with Like Denominators & Regrouping • Quantity Comparison for Fractions with Unlike Denominators	• Add & Subtract with Decimals to Hundredths • Convert Decimals to Fractions & Fractions to Decimals • Quantity Comparison fractions, decimals, whole numbers • Create Equivalent Multiplication Problems by Factoring
5th Grade	• Fact Families Mult/Div 0-12 • Add & Sub Decimals to 100ths • Multiply 2 x 2 with and without Regrouping • Find Least Common Denominator	• Convert Improper Fractions to Mixed Numbers • Add & Subtract Fractions with Unlike Denominators • Quantity Comparison fractions, decimals, whole numbers	• Simplify Fractions • Multiply & Divide Decimals • Multiply & Divide Proper & Improper Fractions • Quantity Comparison with whole numbers, fractions, decimals, percents
6th Grade	• Add & Subtract Fractions with Unlike Denominators • Convert Improper Fractions to Mixed Numbers • Order of Operations	• Multiply & Divide Mixed Numbers • Multiply 2 x 2 with decimals • Distributive Property of Expression	• Mixed Fraction Operations • Substitute Whole Number to Solve Equations • Mixed Decimal Operations • Collect Like Terms
7th Grade	• Solve Algebraic Proportions • Solve Missing Value in a Percentage Problem • Mixed Operations Integers	• Order of Operations • Inverse Operations with Addition & Subtraction • Inverse Operations with Multiplication & Division	• Solve 2-step Equations • Translate Verbal Expressions into Math Equations • Solve 2-step Equations with Fractions
8th Grade	• Order of Operations • Distributive Property to Simplify Expressions • Collect Like Terms to Simplify Expressions	• Mixed Operations with Exponents • Simplify Expressions • Solve for Slope & Intercept using Linear Function	• Linear Combinations to Solve Equations • Substitute Equation to Solve Linear Equations • Comparison Method to Solve Linear Equations

Screening Accuracy Must Be Strong



Screening | Students | Growth

Screen each student to see who's on track and who might need intervention.

Once screening is complete we will show you your results.

Print Your Assessments

After screening, please enter scores below.

***0 of 16** Students Accounted For*

Screen All Students to Continue

	Measure 1 Multiplication 0-9 (Instructional target = 13)	**Measure 2** Division 0-9 (Instructional target = 20)	**Measure 3** Fact Families: Multiplication/Division 0-9 (Instructional target = 17)	
Sort by: Last, First				
Adams, Maximus	Enter Score	Enter Score	Enter Score	Mark Student Absent
Blick, Jerald	Enter Score	Enter Score	Enter Score	Mark Student Absent

Spring 2017-18 Screening Results

The results are in. Let's take a look...

Classroom Performance

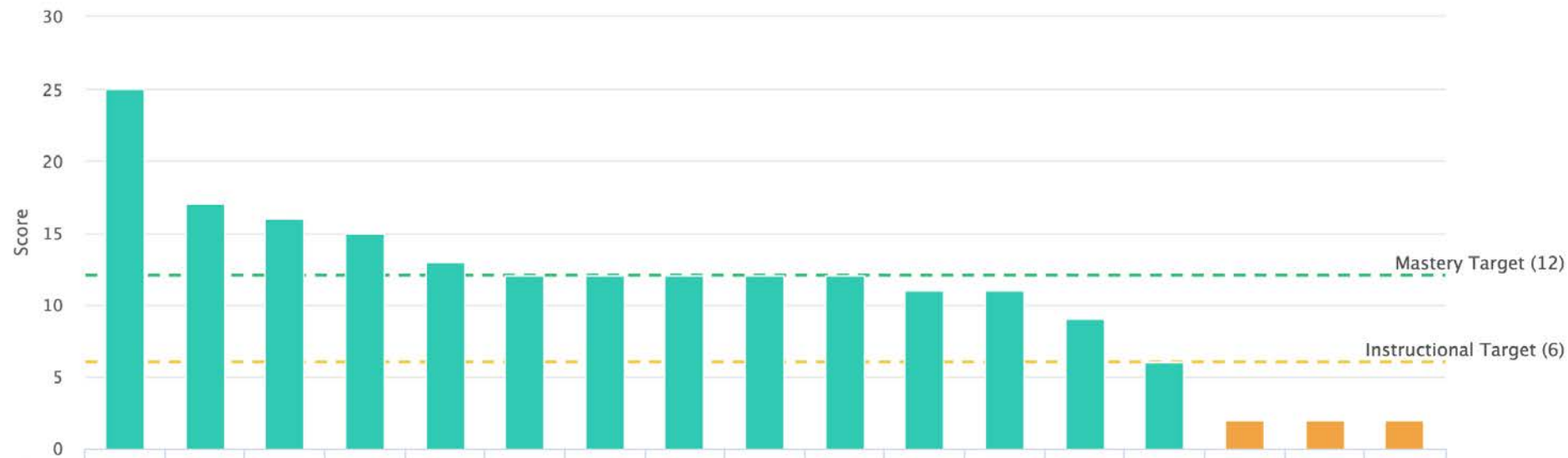
6% of your class reached the target on all of the screening assessments. Extra practice will help you reach mastery at this grade level.

The classwide intervention has already been started.

82%	12%	94%	24%
Measure 1	*Measure 2*	*Measure 3*	*Measure 4*

Measure 1: Multiply 1 Digit by 2-3 Digit w/ & w/o Regrouping

Your students' screening scores compared to the target score.



Classwide Intervention | Screening | Students

Fall 2017-18 Screening Results

The results are in. Let's take a look...

Classroom Performance

Pre-Intervention

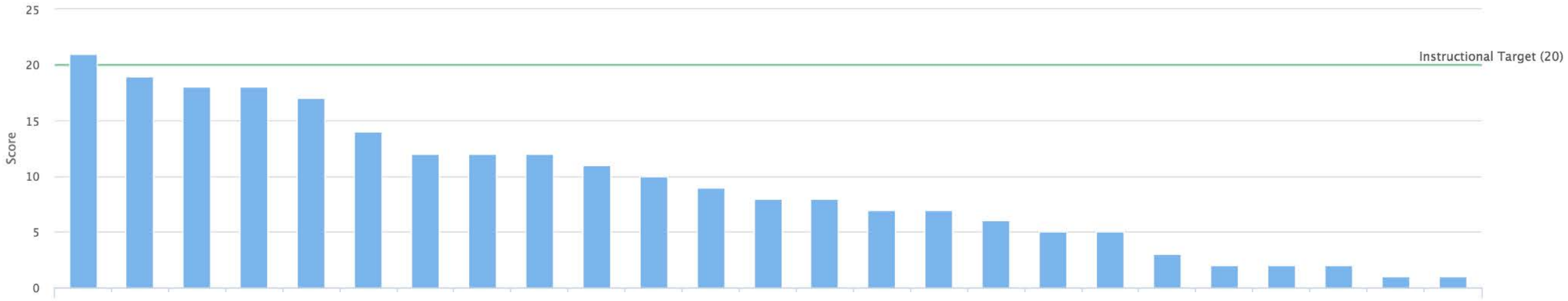
96% of your class appears to need extra practice to reach mastery at this this grade level.

We call this a classwide problem and *recommend classwide practice* to get the class on track to reach mastery.

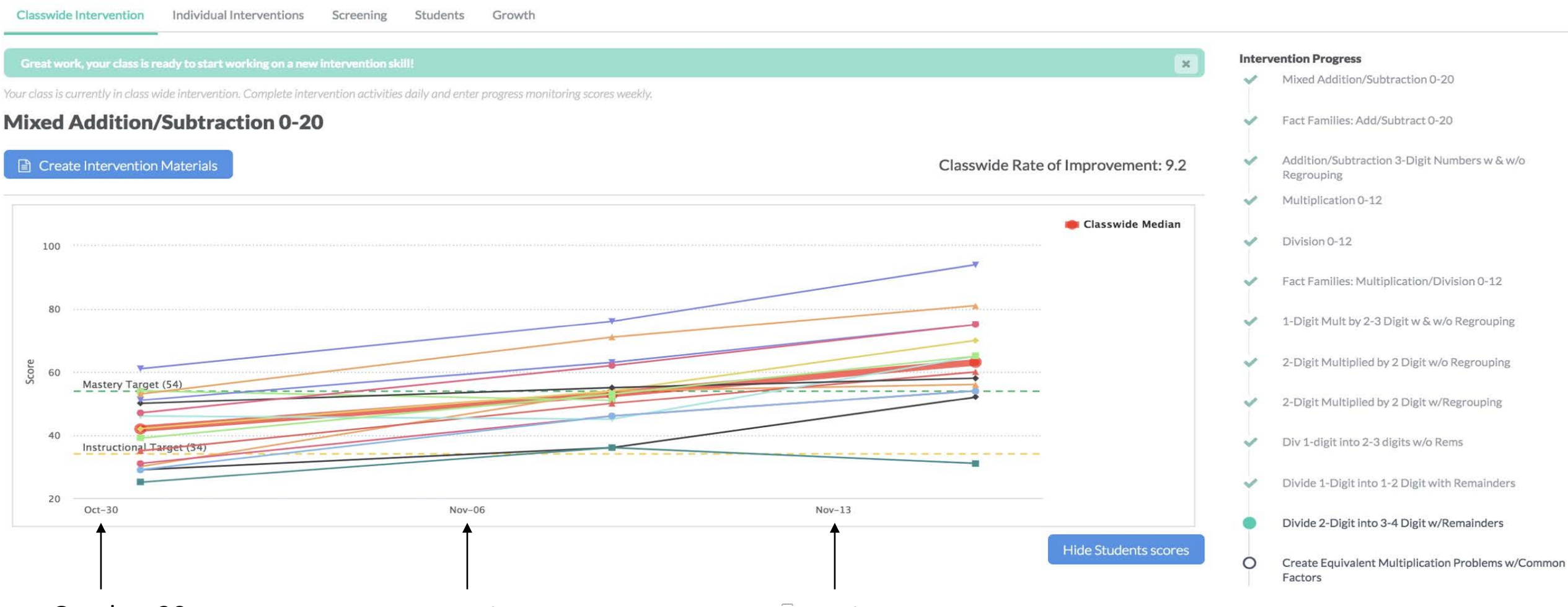
4%!	16%!	52%
Measure 1	*Measure 2*	*Measure 3*

Measure 1: Sums to 6

Your students' screening scores compared to the target score.



Use Classwide Intervention for Gated Decisions

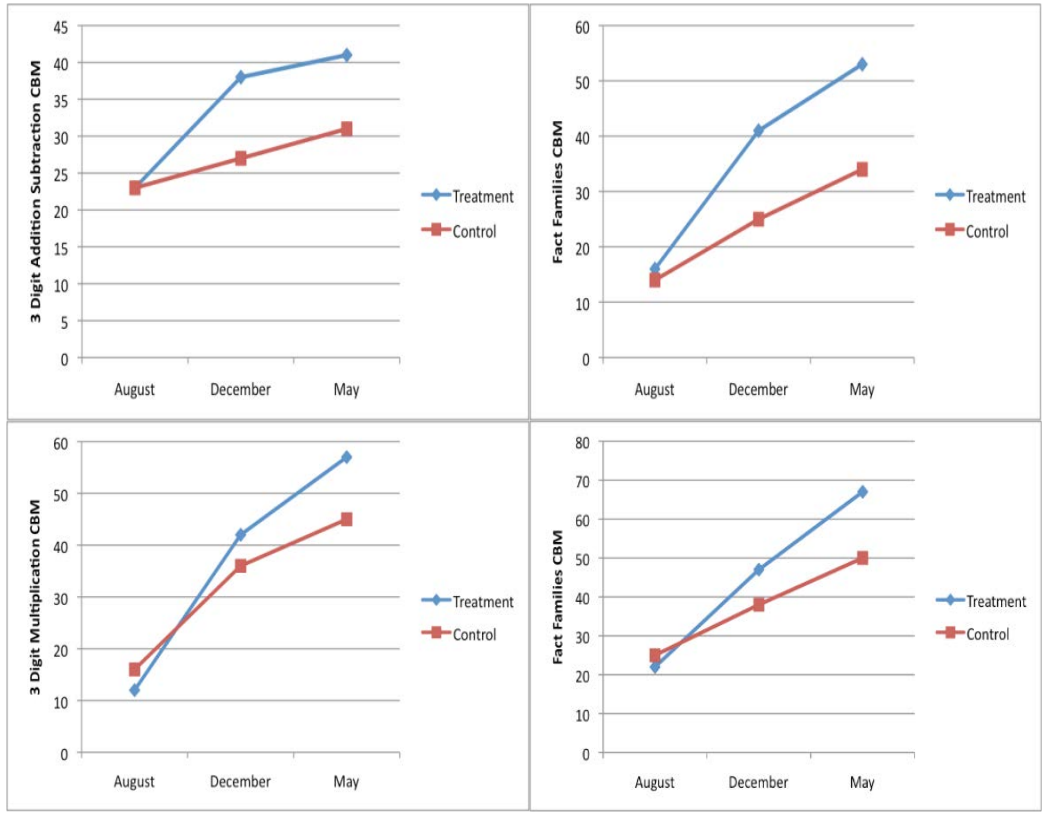


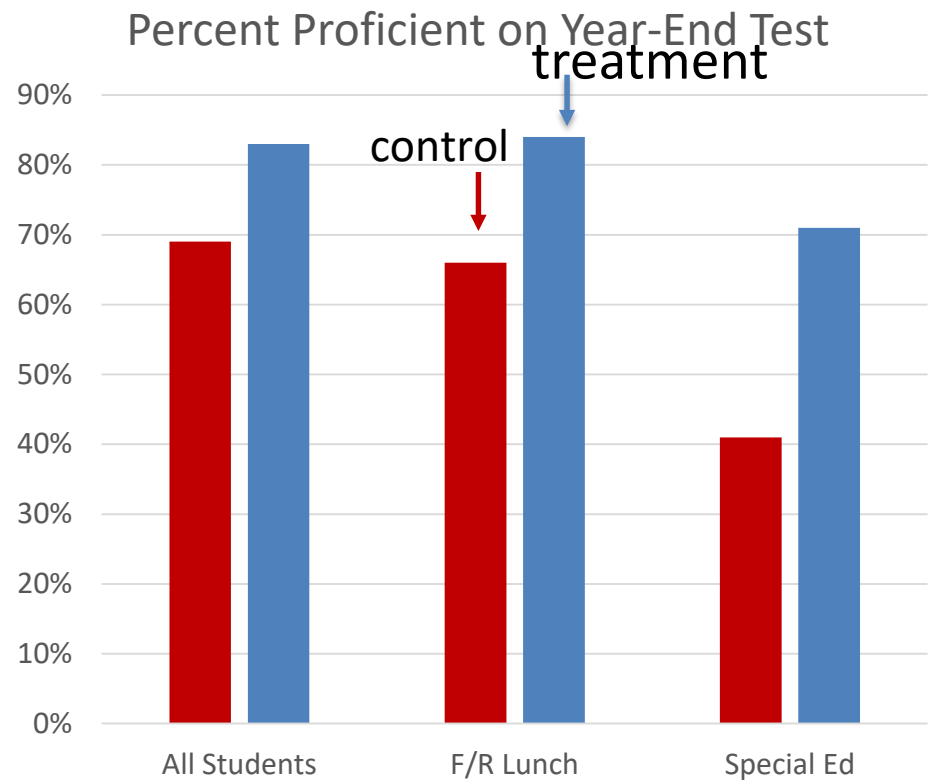
October 30

November 6

November 13

Why Classwide Intervention?





All	Title	Study	Study Type	Participants	Design	Fidelity of Impl.	Measures (Targeted)	Measures (Broader)
☐	Spring Math	Codding, VanDerHeyden, Martin, & Perrault (2016)	Group Design	●	◒	●	●	●
☐	Spring Math	VanDerHeyden, McLaughlin, Algina, & Snyder (2012)	Group Design	●	●	●	●	●

ES = .68 CBMs
ES = .18 Gr 4
ES = .79 for at-risk

http://www.intensiveintervention.org/chart/instructional-intervention-tools (NCII)

Classwide Math Intervention

Addresses high base rates of risk & allows for more accurate detection of intensive intervention need

Touches a high number of students for the same investment of time

Can improve achievement systemwide

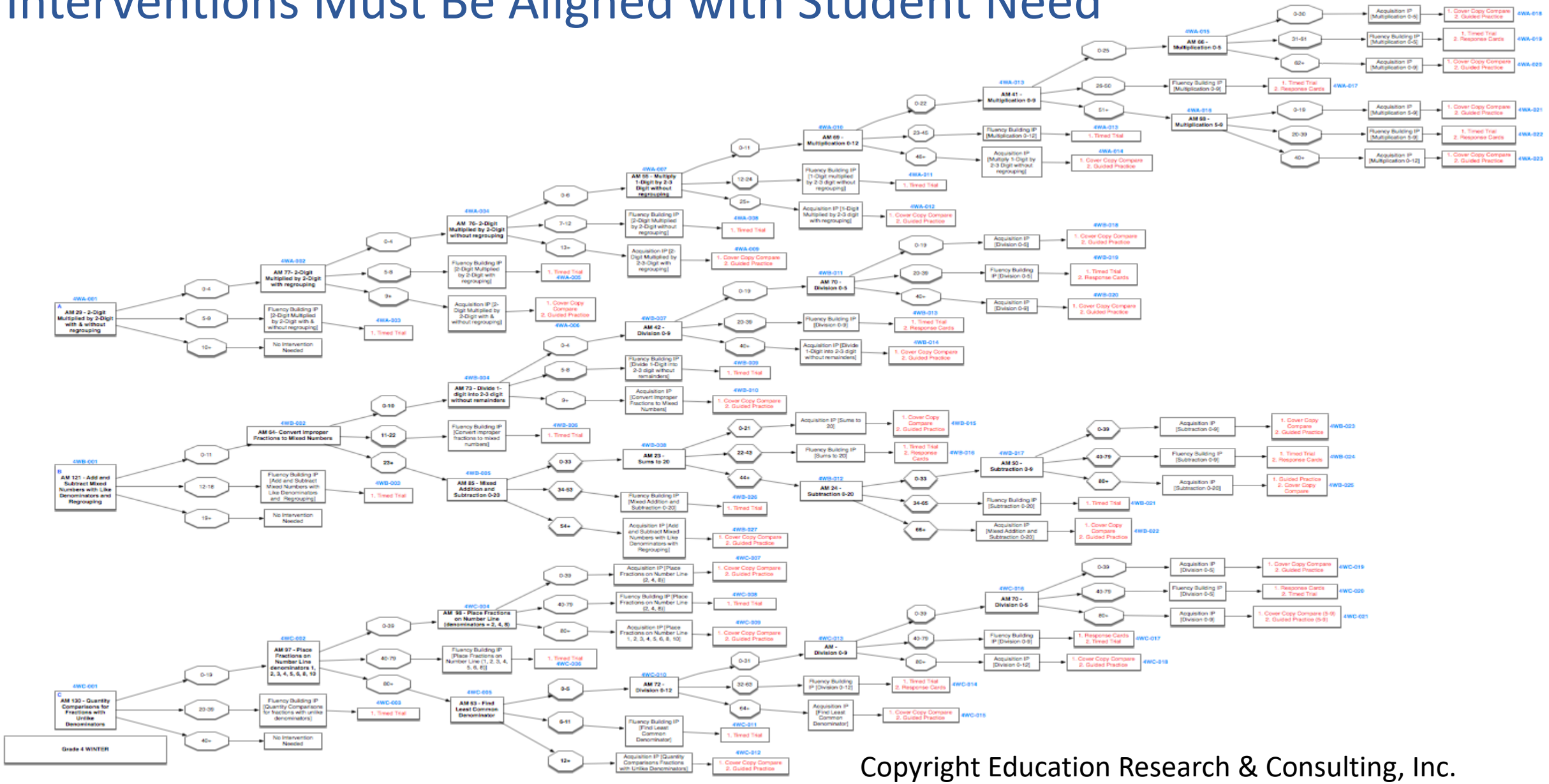
Some caveats

- Universal v. homogeneous
- Requires implementation support

You will Need a Range of Interventions & Data to Connect them to the Student

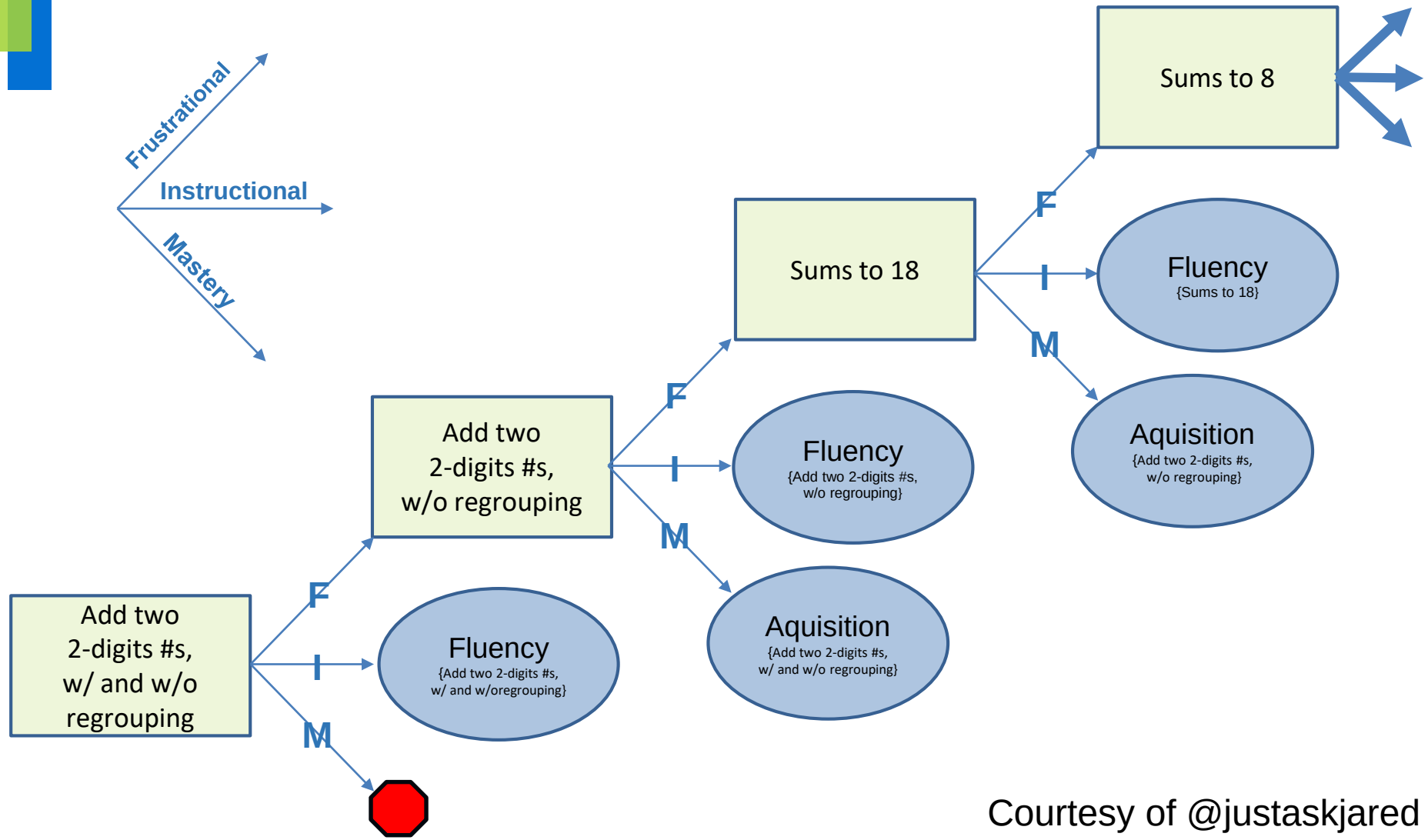
Procedural & Conceptual Understanding for Middle School Math						
Fluency-Building →			Acquisition →			
Classwide Math Intervention	Timed Trial	Response Cards	Cover Copy Compare	Guided Practice	Incremental Rehearsal	Bingo

Interventions Must Be Aligned with Student Need



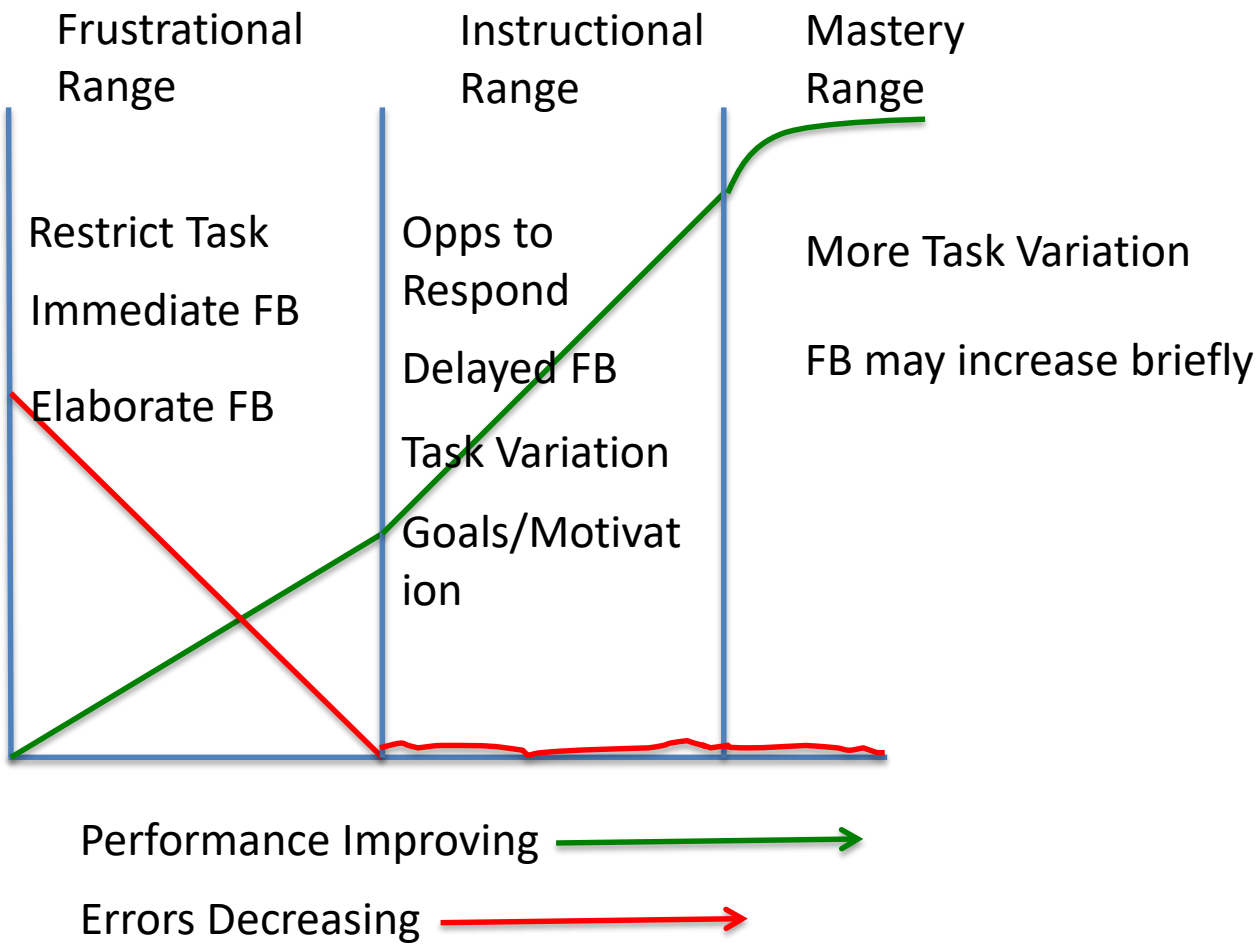
Not a real tree!

Assessment-Intervention Match

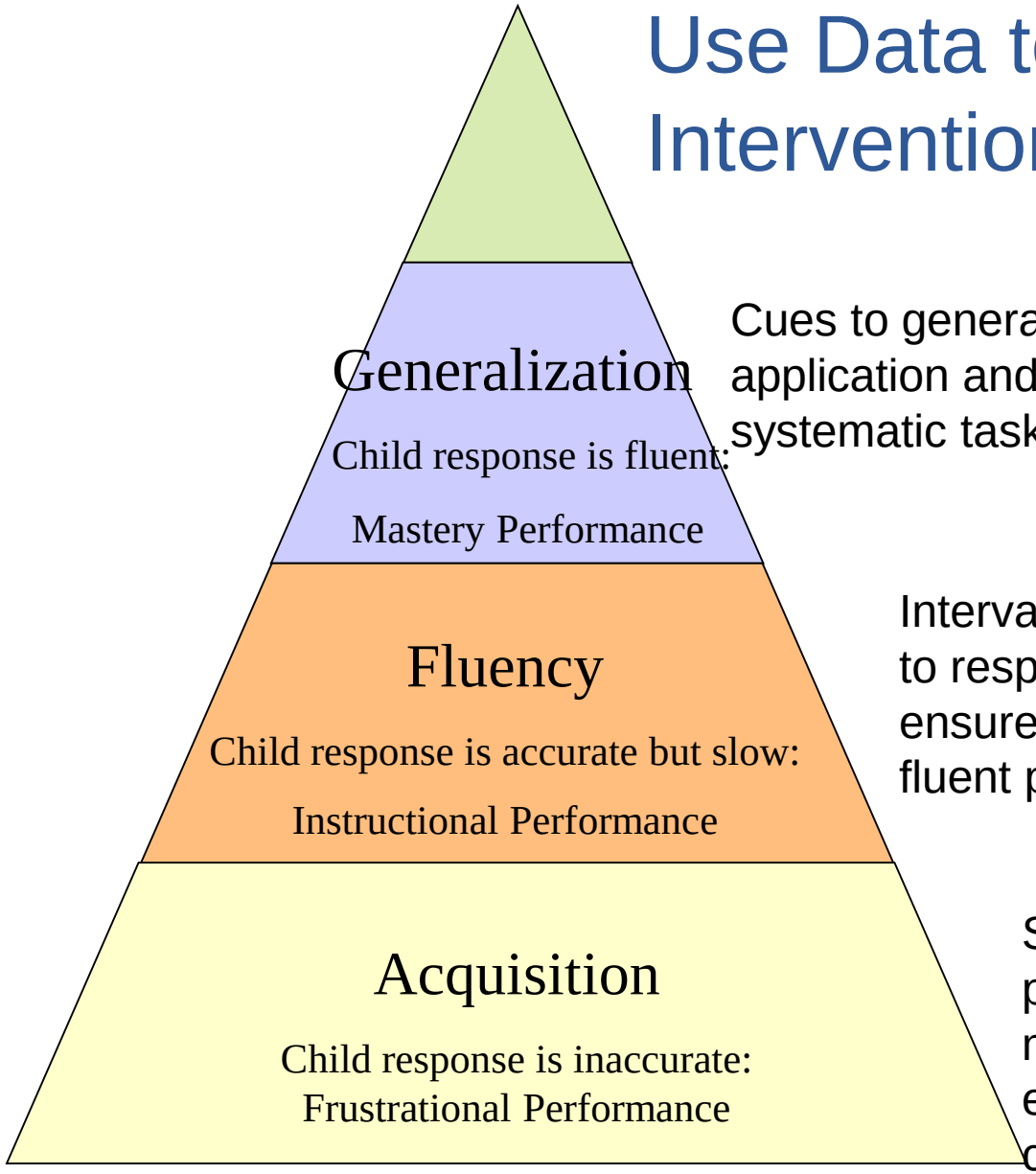


Courtesy of @justaskjared
Jared Campbell, PaTTAN

The Instructional Hierarchy



Use Data to Drive Individual Intervention

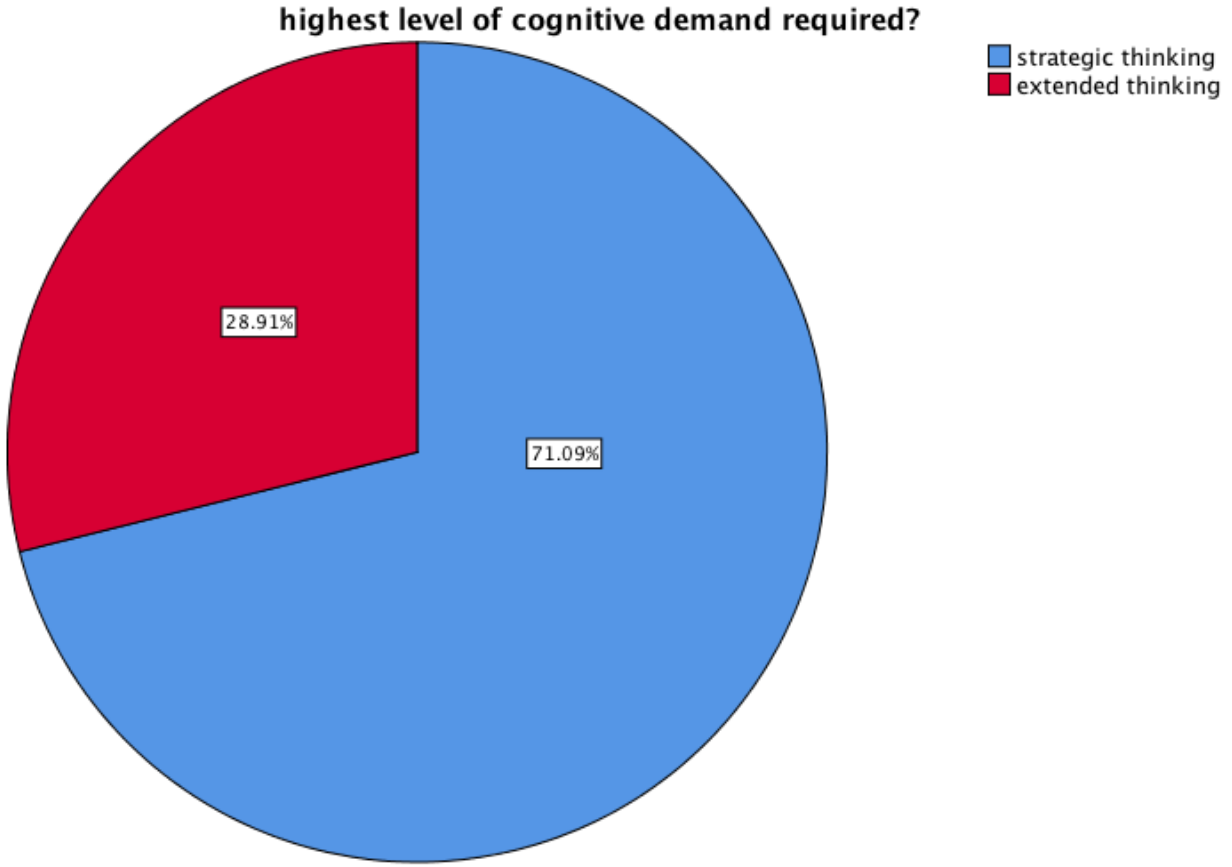


Cues to generalize, corrective feedback for application and problem-solving, systematic task variation, fading of support.

Intervals of practice, opportunities to respond, delayed feedback, ensure reinforcement for more fluent performance.

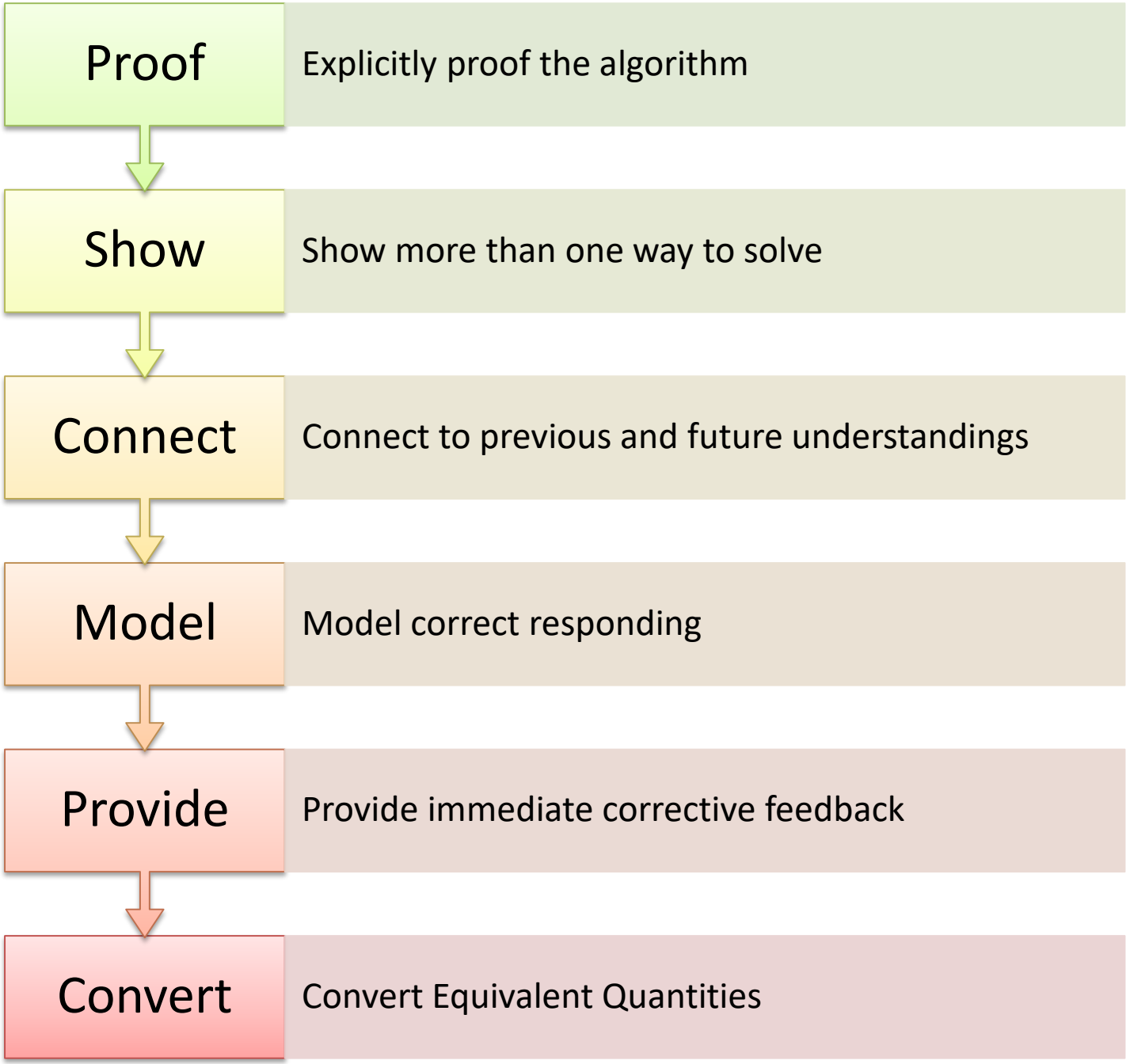
Salient cues, frequent & high-level prompting, immediate feedback, more elaborate feedback, sufficient exemplars of correct/incorrect, controlled task presentation.

Look for Rigor

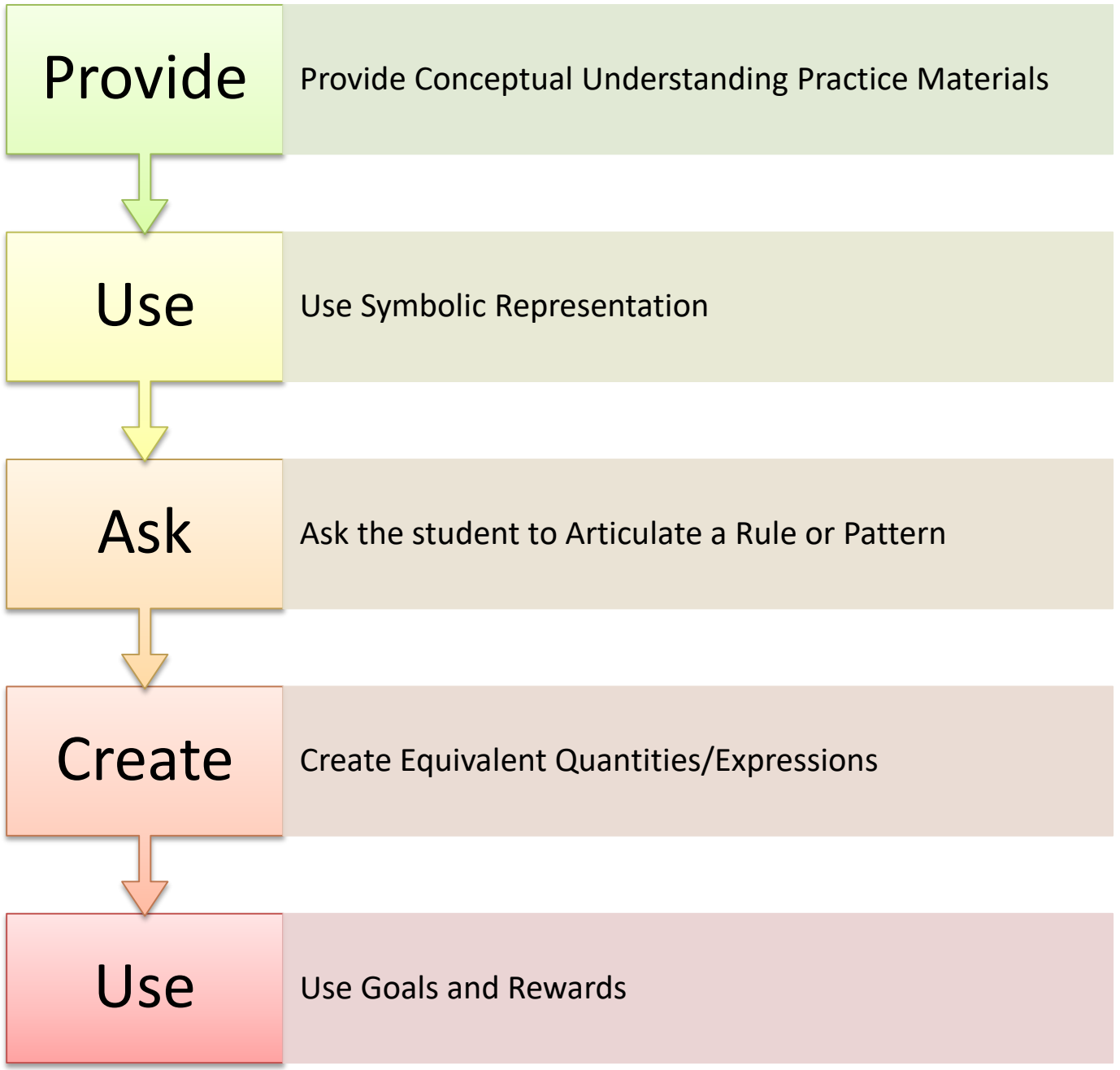


Education Trust Rubric for Rigor in Mathematics Assignments

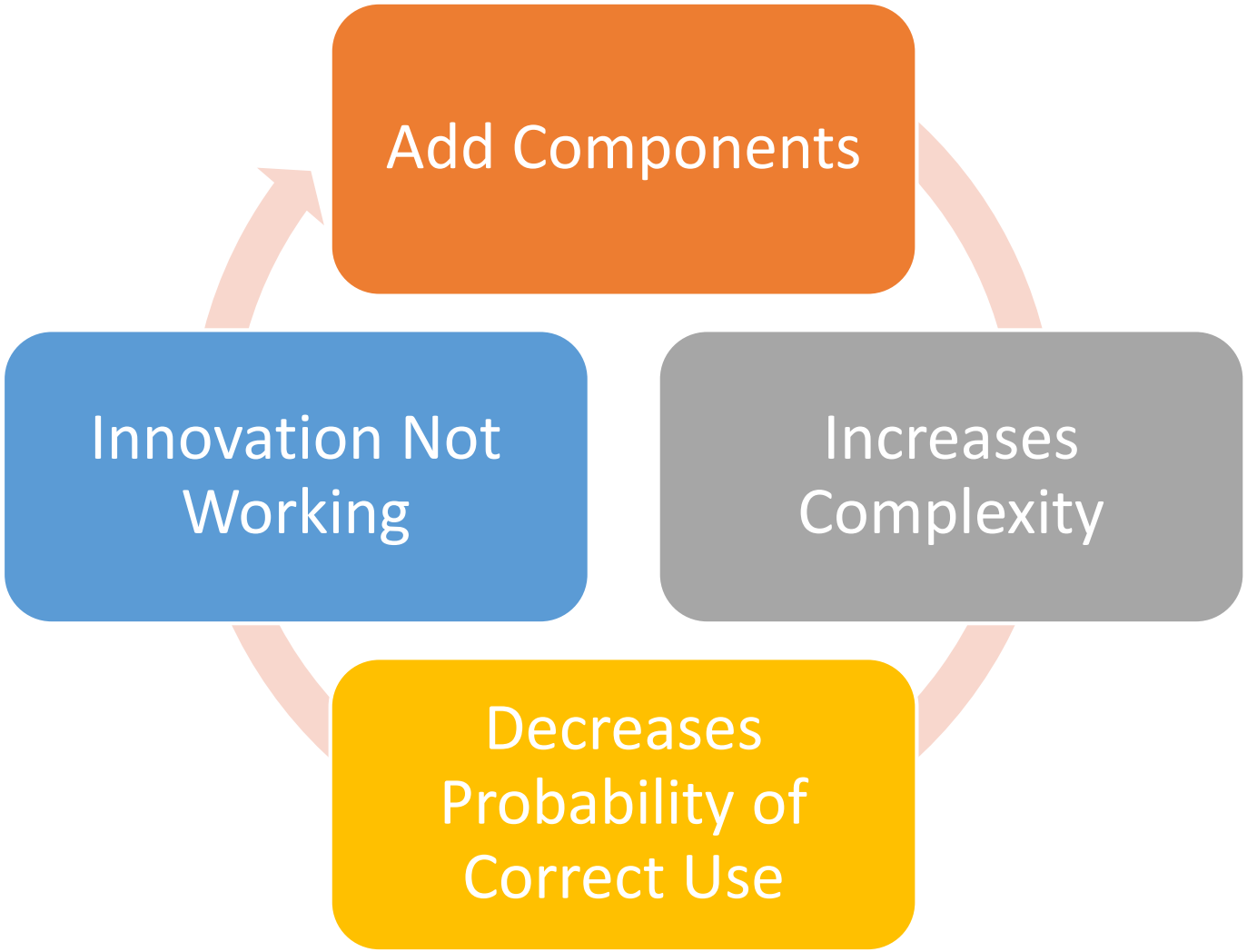
Look for Interventions that



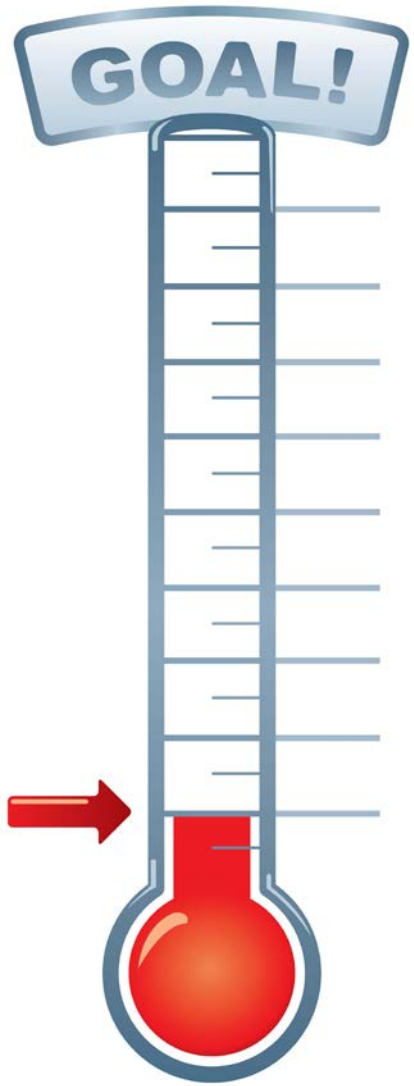
Look for Interventions that



Typical Education Approach



Antecedent Supports



A

- Minimize Steps
- Minimize Adults
- Make Easy to Use
- In-Class Training
- Acceptable to Teacher

B

- Intervention Use (quality, consistency)
- Child Response

C

- ?

With Consequent Supports

A

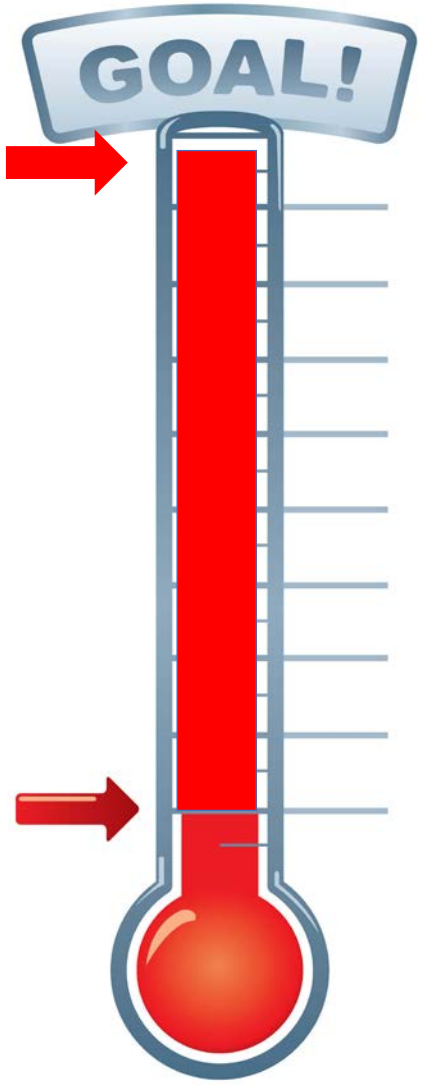
- Minimize Steps
- Minimize Adults
- Make Easy to Use
- In-Class Training
- Acceptable to Teacher

B

- Intervention Use (quality, consistency)
- Child Response

C

- Performance Feedback
  - Graphed
  - Tied to child improvement
  - Weekly



100%

Use Implementation Science

Plan to be present when intervention is started.

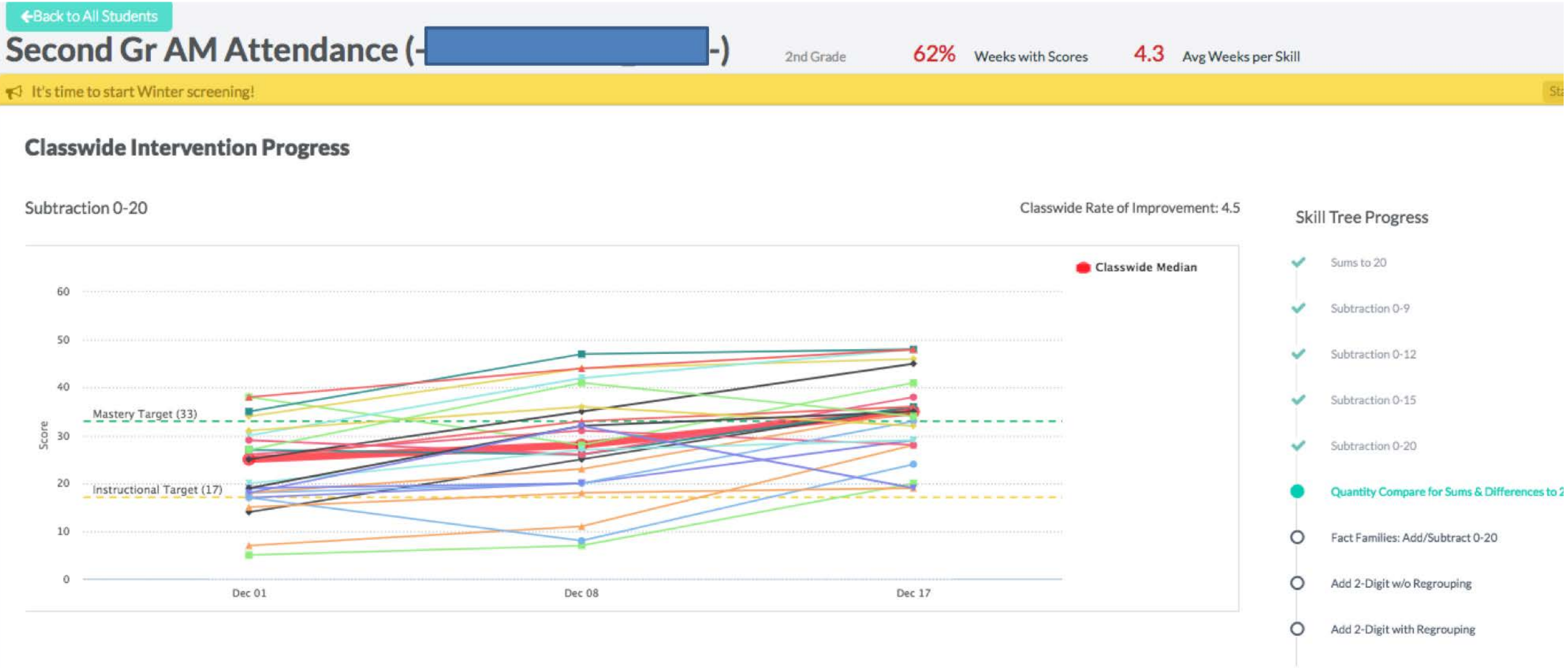
Track intervention effects weekly.

When growth is weak, check-in with the teacher by watching the intervention being implemented.

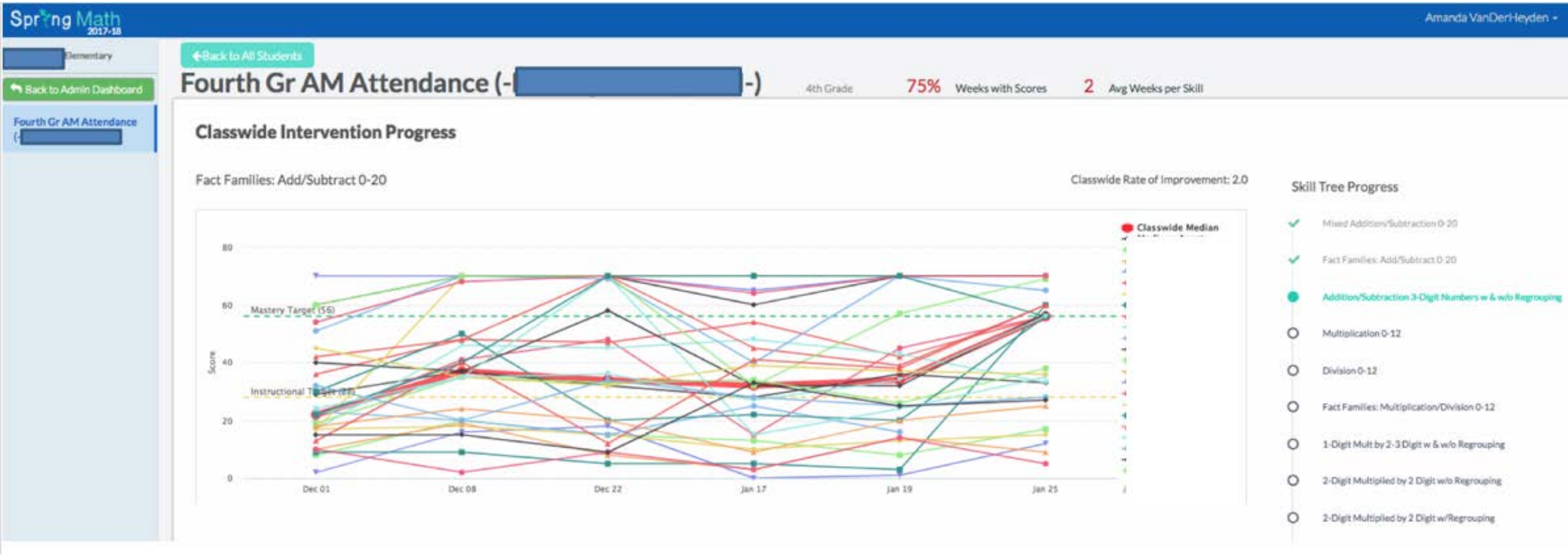
Help troubleshoot any barriers and say that you will check in again next week.

Wash, Rinse, Repeat.

This is a High-Integrity Intervention

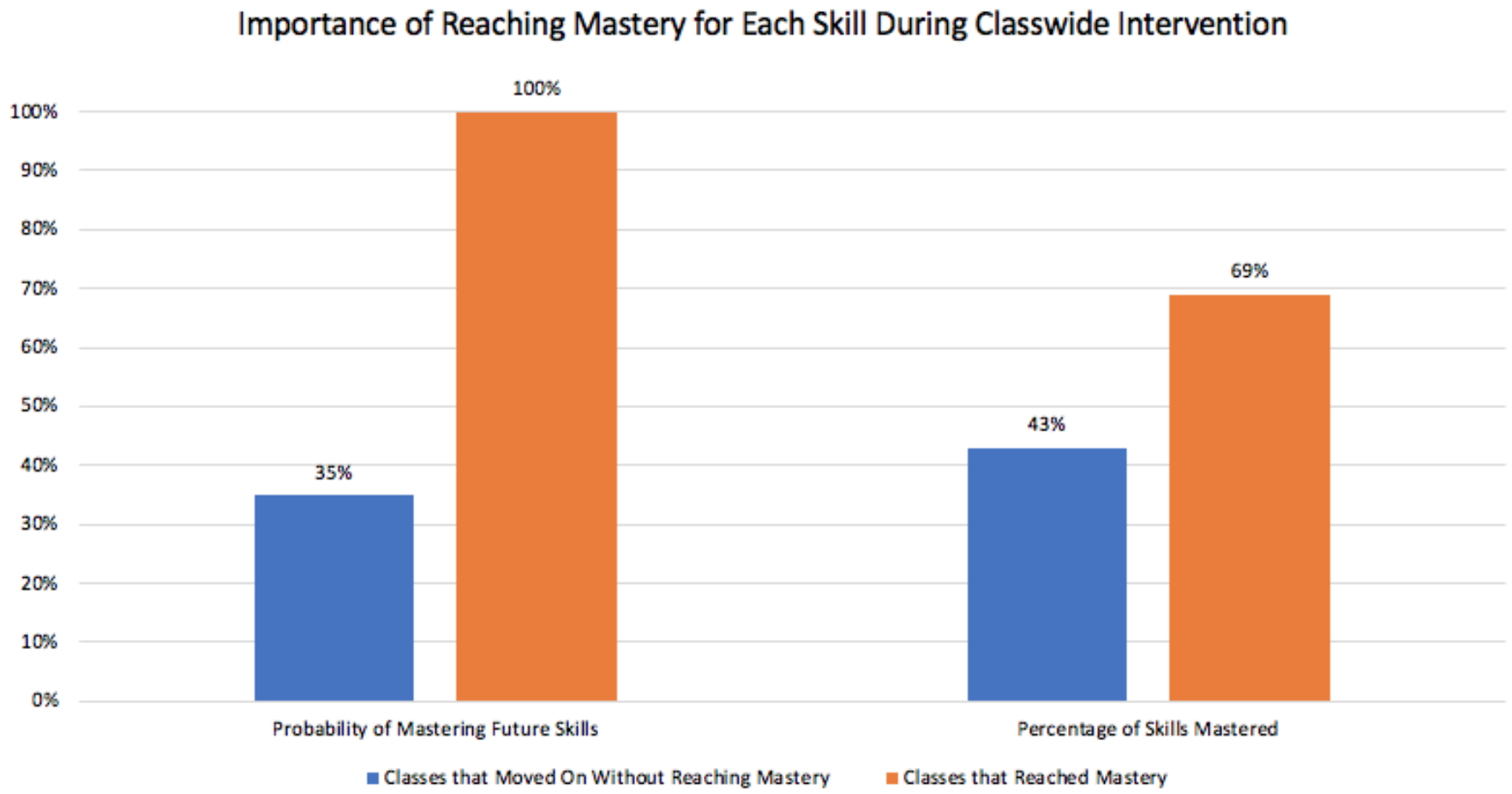


This Growth Indicates a Problem



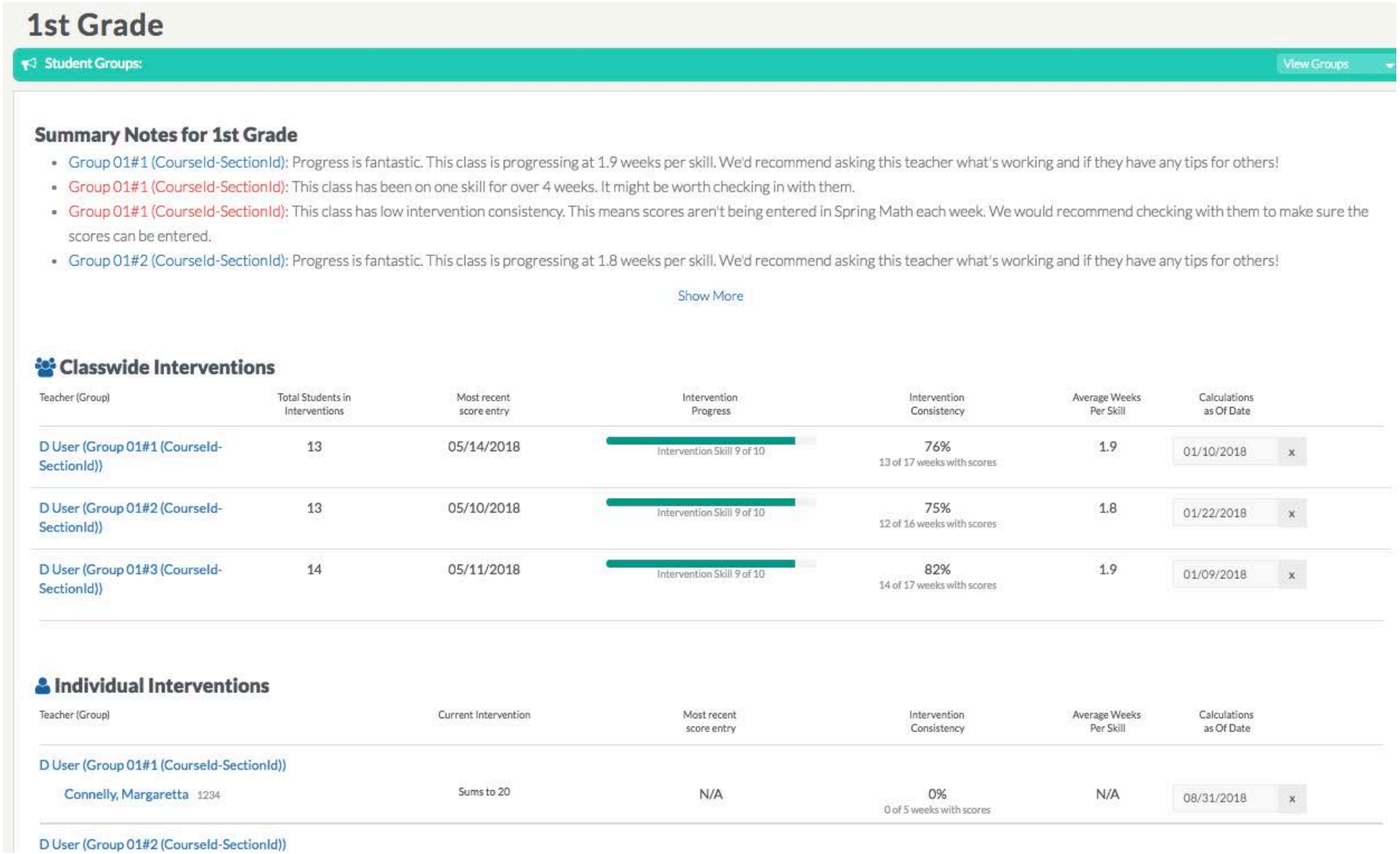
Even Veteran Districts will Drift

My students can't meet the mastery criterion, can't we just move on?



What Must Leaders Know?

- What actions are underway?
- What are the results right now?
- Where is support needed?
- Are proximal indicators headed in the right direction?
- What are the barriers we can troubleshoot?



1st Grade

Student Groups: View Groups

Summary Notes for 1st Grade

- Group 01#1 (CourseId-SectionId): Progress is fantastic. This class is progressing at 1.9 weeks per skill. We'd recommend asking this teacher what's working and if they have any tips for others!
- Group 01#1 (CourseId-SectionId): This class has been on one skill for over 4 weeks. It might be worth checking in with them.
- Group 01#1 (CourseId-SectionId): This class has low intervention consistency. This means scores aren't being entered in Spring Math each week. We would recommend checking with them to make sure the scores can be entered.
- Group 01#2 (CourseId-SectionId): Progress is fantastic. This class is progressing at 1.8 weeks per skill. We'd recommend asking this teacher what's working and if they have any tips for others!

Show More

Classwide Interventions

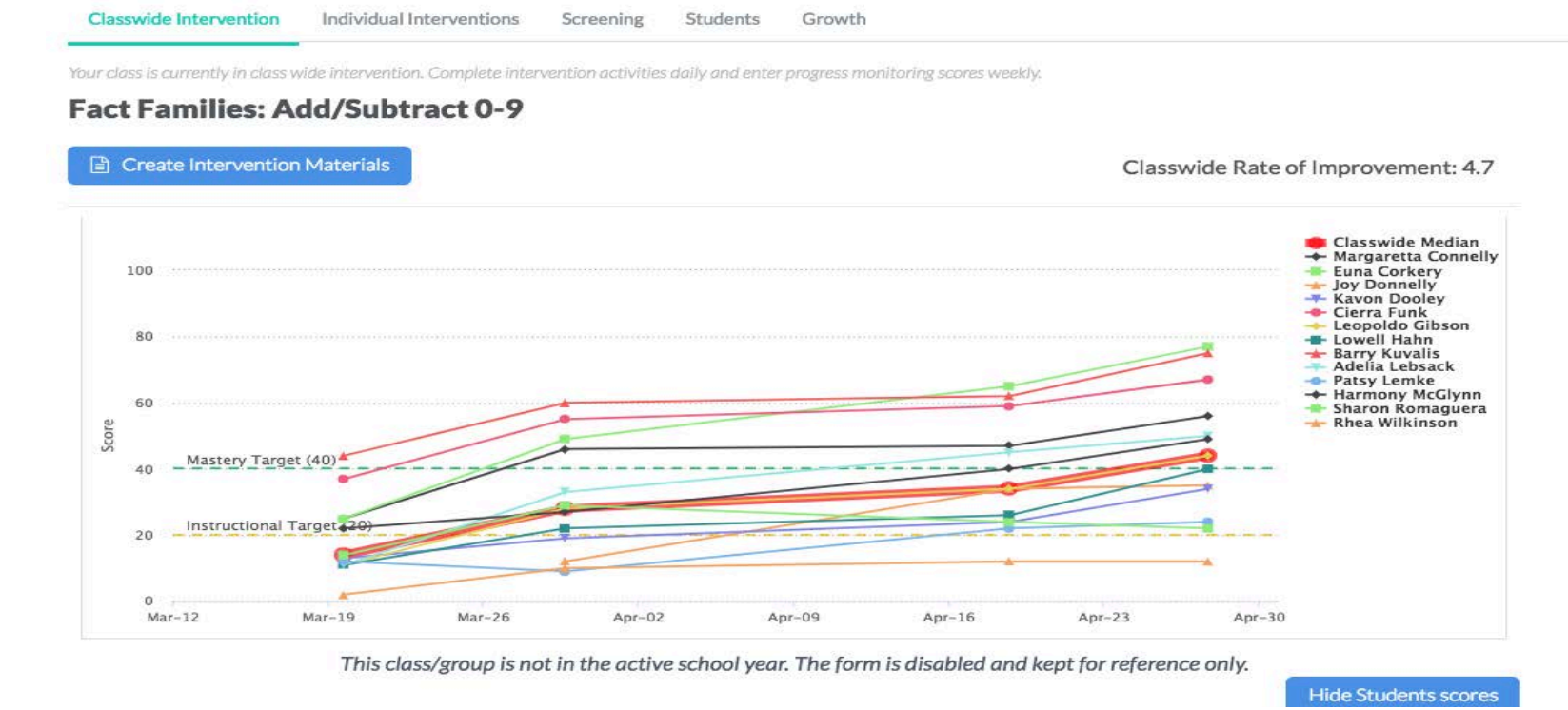
Teacher (Group)	Total Students in Interventions	Most recent score entry	Intervention Progress	Intervention Consistency	Average Weeks Per Skill	Calculations as Of Date
D User (Group 01#1 (CourseId-SectionId))	13	05/14/2018	Intervention Skill 9 of 10	76% 13 of 17 weeks with scores	1.9	01/10/2018 x
D User (Group 01#2 (CourseId-SectionId))	13	05/10/2018	Intervention Skill 9 of 10	75% 12 of 16 weeks with scores	1.8	01/22/2018 x
D User (Group 01#3 (CourseId-SectionId))	14	05/11/2018	Intervention Skill 9 of 10	82% 14 of 17 weeks with scores	1.9	01/09/2018 x

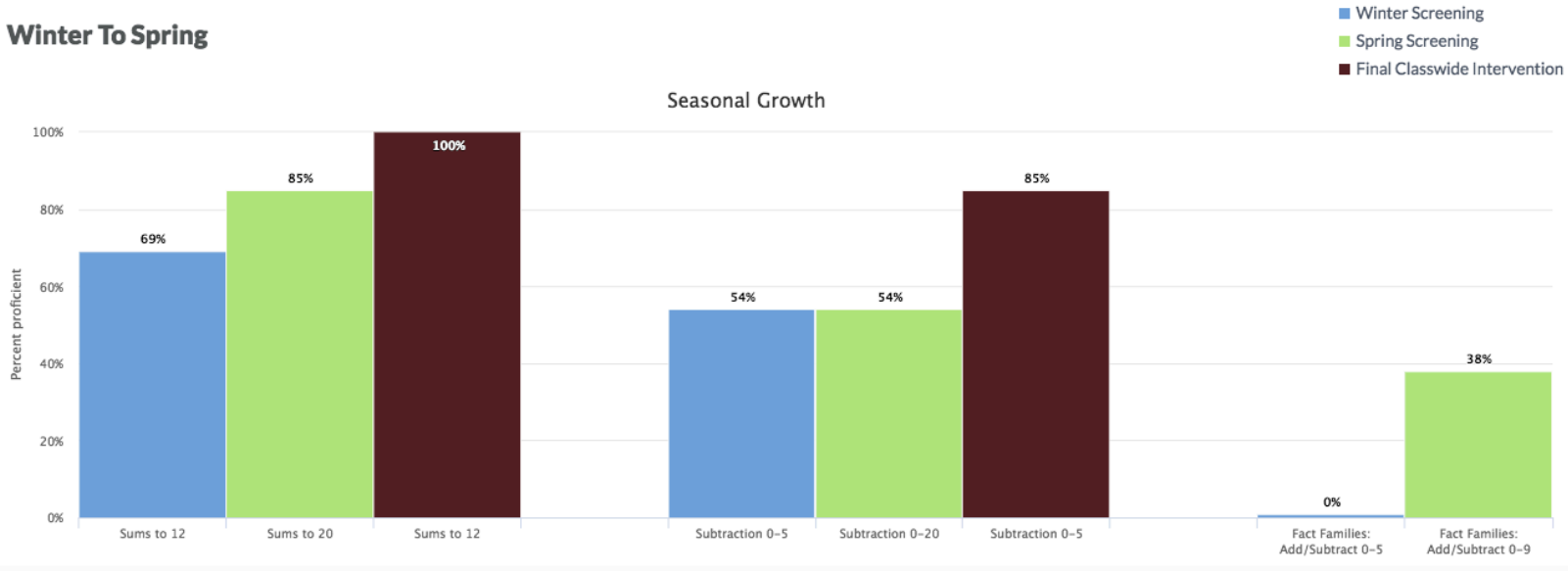
Individual Interventions

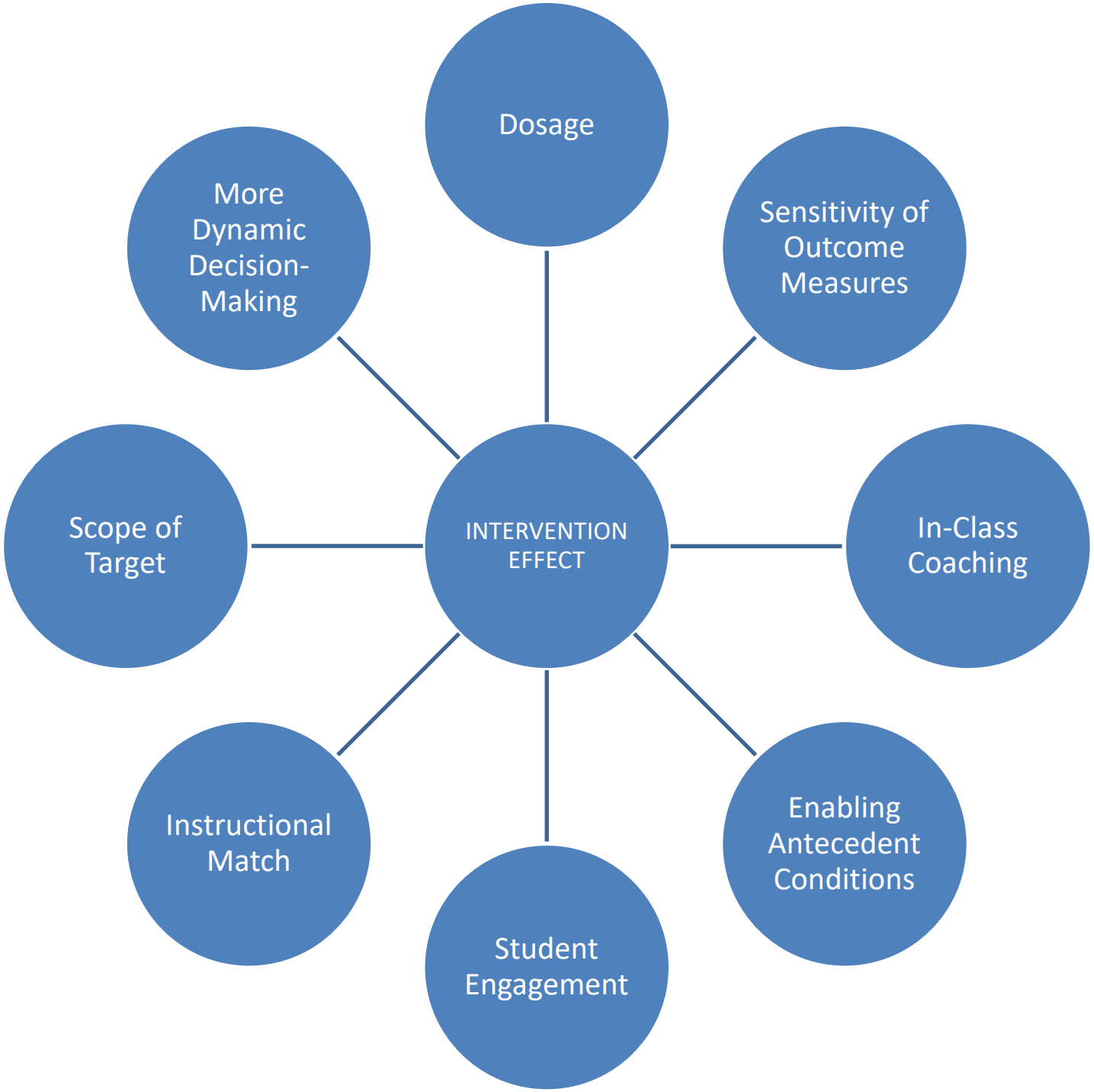
Teacher (Group)	Current Intervention	Most recent score entry	Intervention Consistency	Average Weeks Per Skill	Calculations as Of Date
D User (Group 01#1 (CourseId-SectionId))					
Connelly, Margaretta 1234	Sums to 20	N/A	0% 0 of 5 weeks with scores	N/A	08/31/2018 x
D User (Group 01#2 (CourseId-SectionId))					

Teacher: Are Students Growing?

Teacher: Does Growth Transfer?





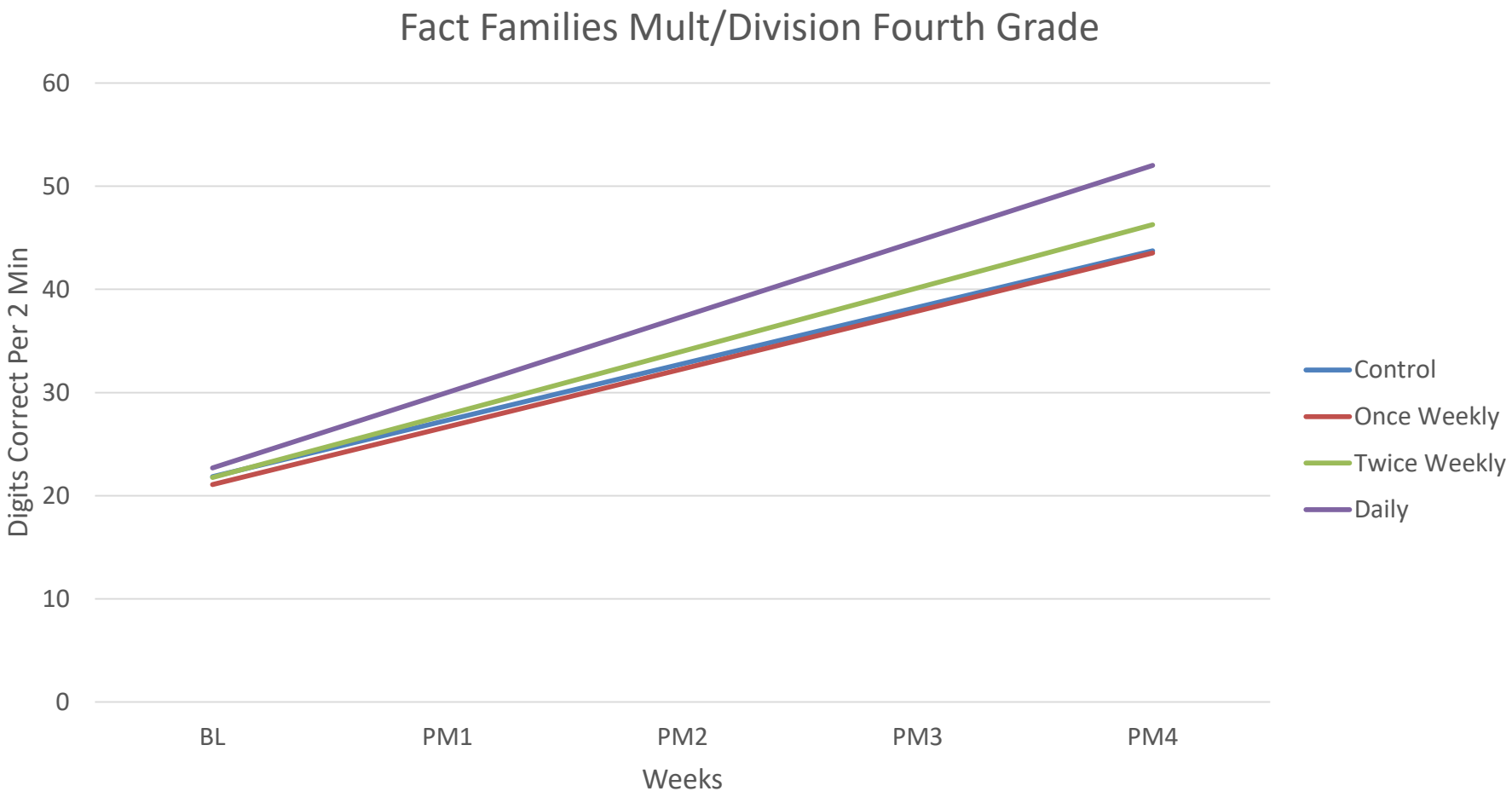


Professional Development

Content Knowledge

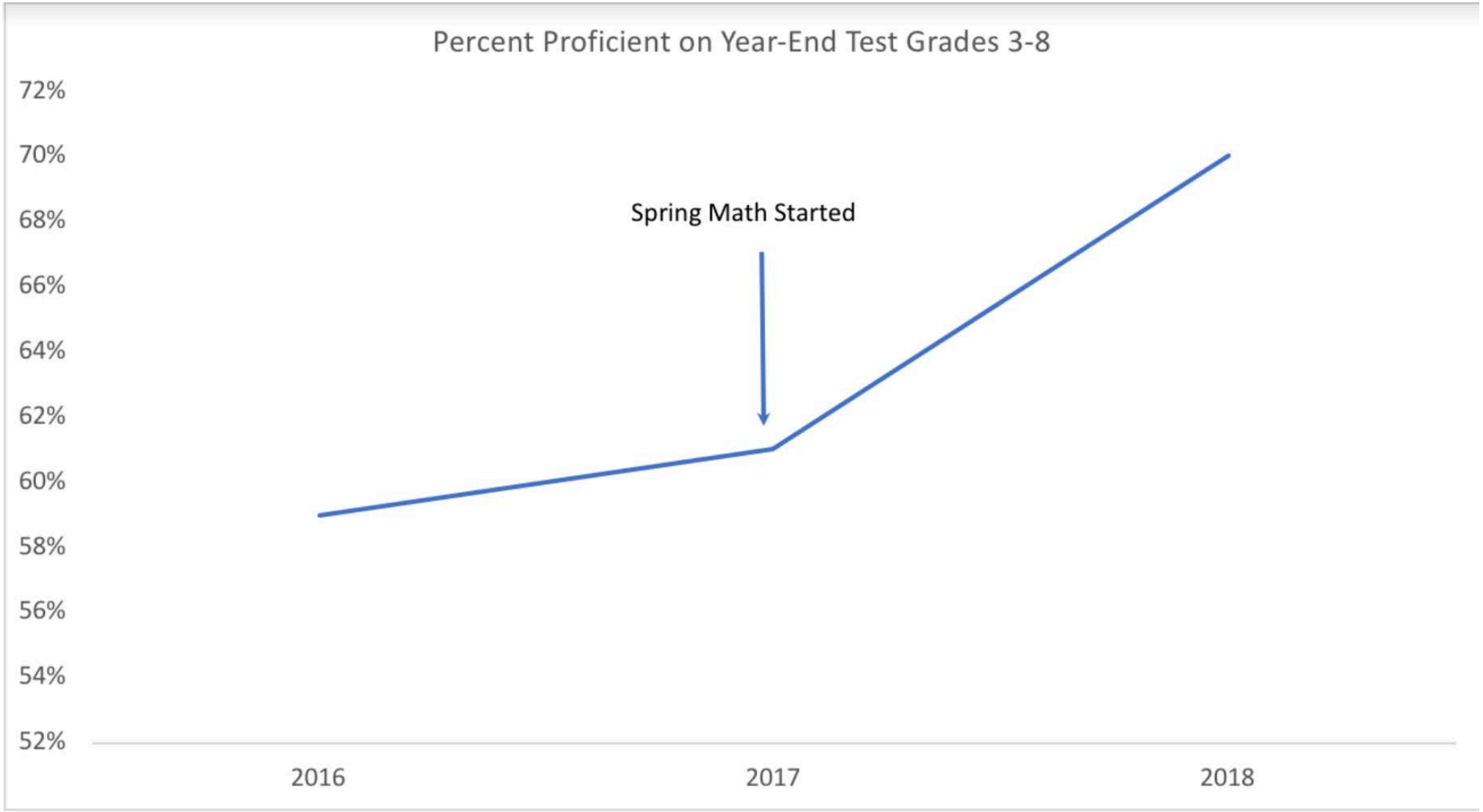
Teacher: Student Ratio

Pay Attention to Dosage

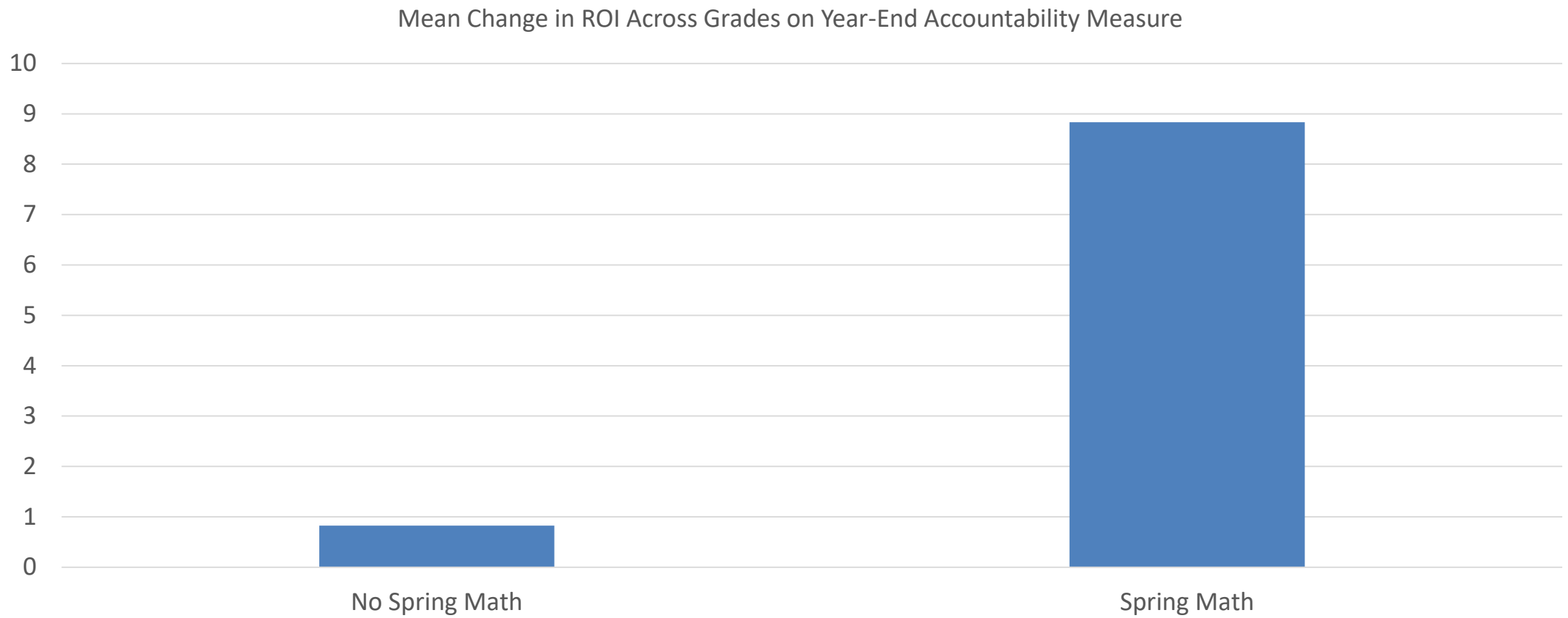


Codding, R., VanDerHeyden, Martin, R. J., & Perrault, L. (2016). Manipulating Treatment Dose: Evaluating the Frequency of a Small Group Intervention Targeting Whole Number Operations. Learning Disabilities Research & Practice, 31, 208-220. Kirk Award for Best Research Article of the Year from the Division of Learning Disabilities of the Council for Exceptional Children.

To Move the Big Indicators



If You Move the Baby Indicators, You will Move the Big Indicators. It's not rocket science.



Signs of an Effective Intervention

- Scores available for each week.
- Median increases each week within instructional groupings.
- Most students grow week over week.
- Very few students remain in the frustrational range.
- Few students require more intensive intervention.

NCII DBI Implementation Rubric

https://intensiveintervention.org/resource/dbi-implementation-rubric-and-interview

What are the Consequences of our Actions?

- Is risk going down?
- Who is vulnerable (still)?
- Are vulnerable students growing/catching up?

Amanda VanDerHeyden
Fairhope, Alabama
@amandavande1
www.springmath.com
amandavande@gmail.com

#DoWhatWorks