Break the Cycle of Failure

Save Struggling Students with Math Intervention

NCTM Richmond Conference 2014

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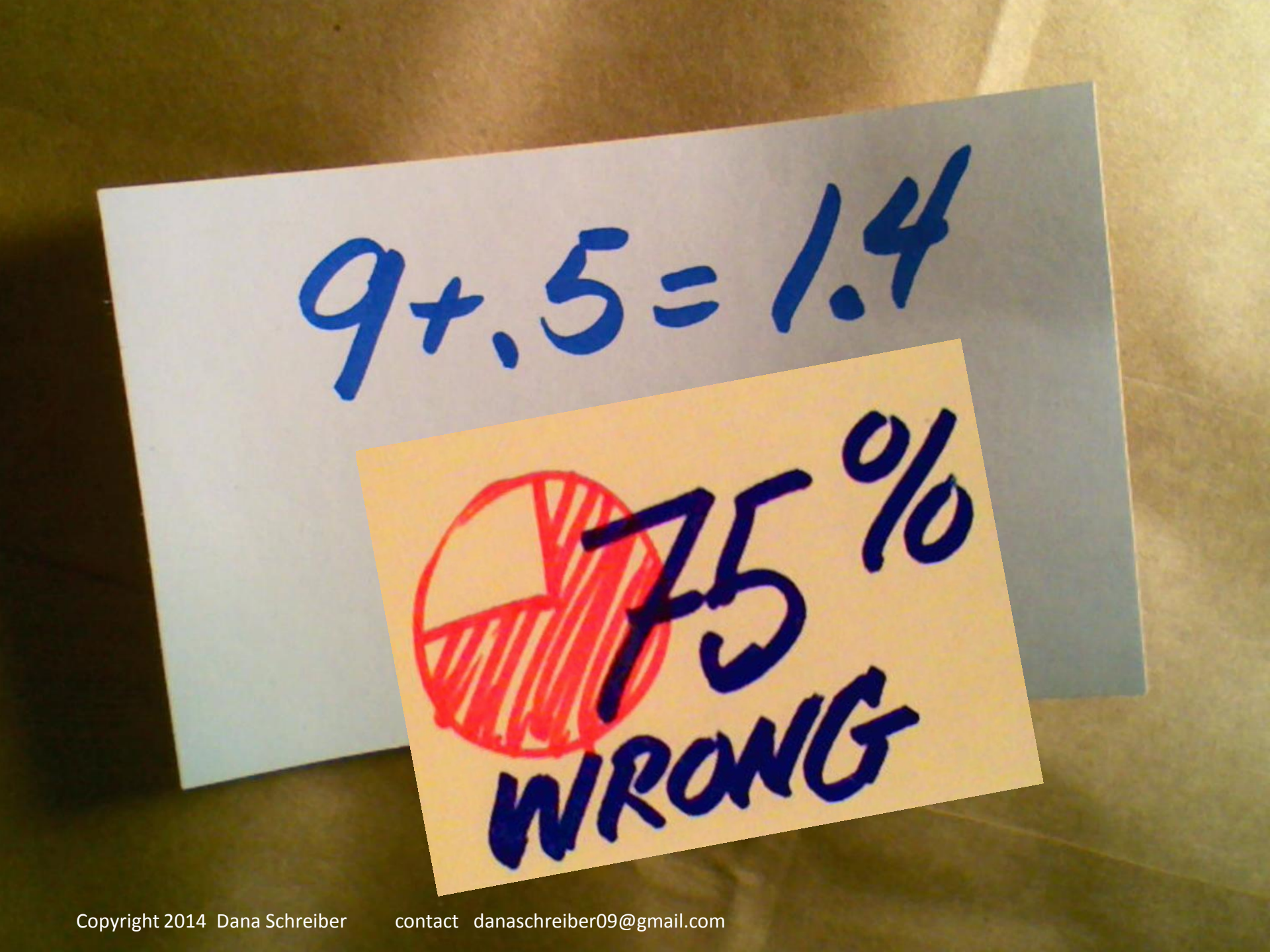

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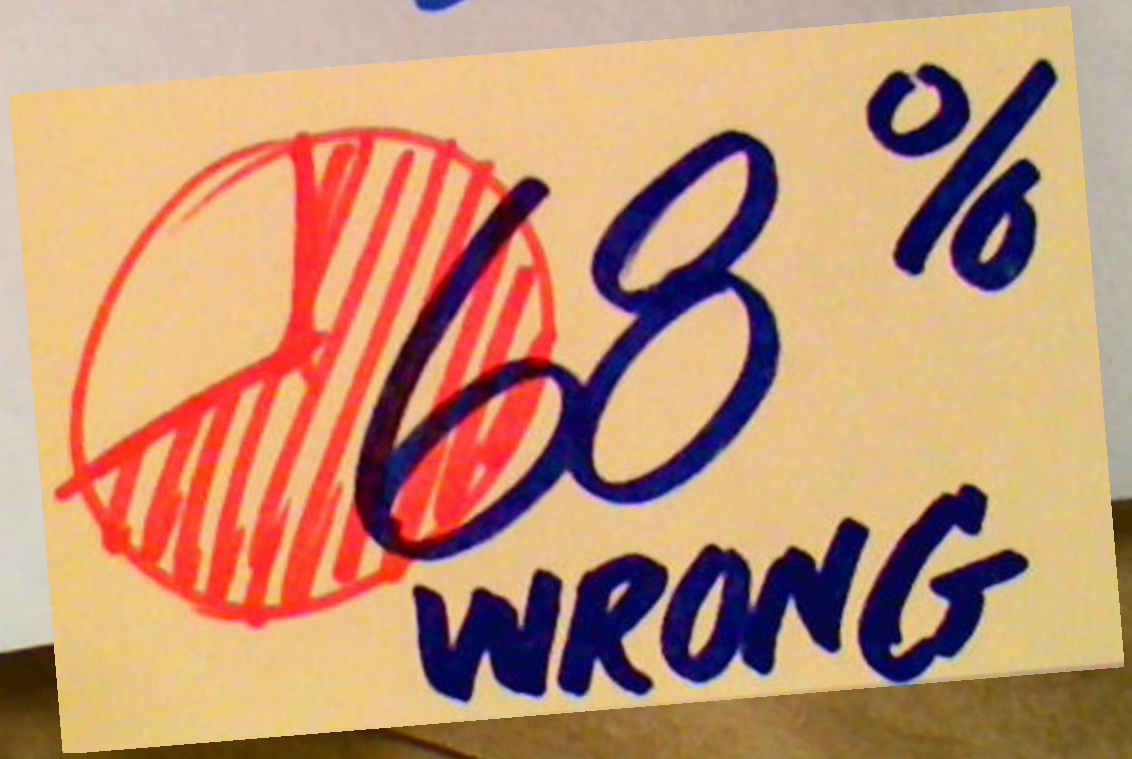
$$\frac{1}{2} + \frac{2}{3} = \frac{3}{5}$$



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Painful Scar Tissue

By 8th grade,
for 20% or more urban kids,
math is a fact of failure

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I'm Outta Here…

…continues into high school

one out of four

dropout nationwide.

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#1

What is Math Intervention?

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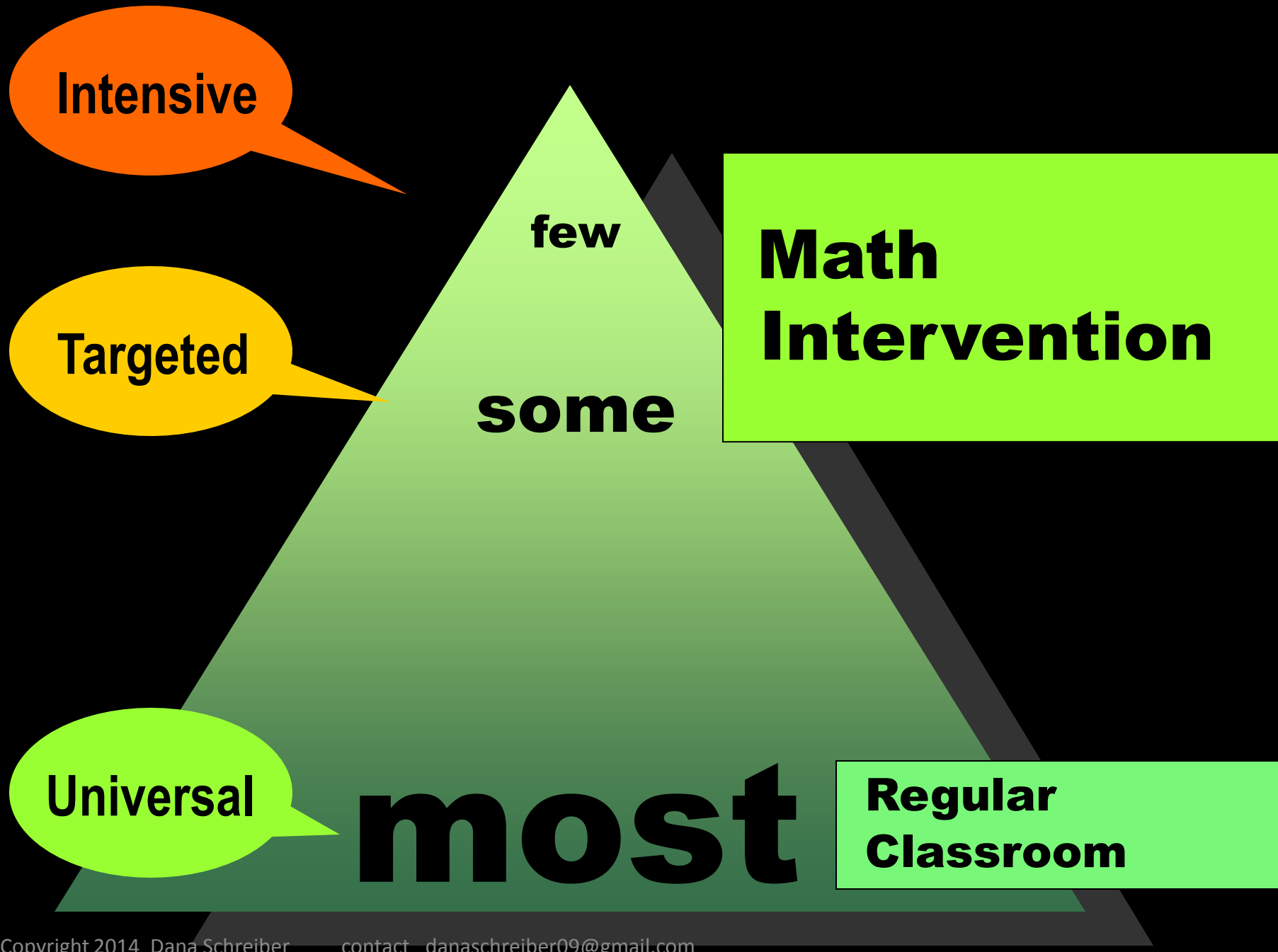

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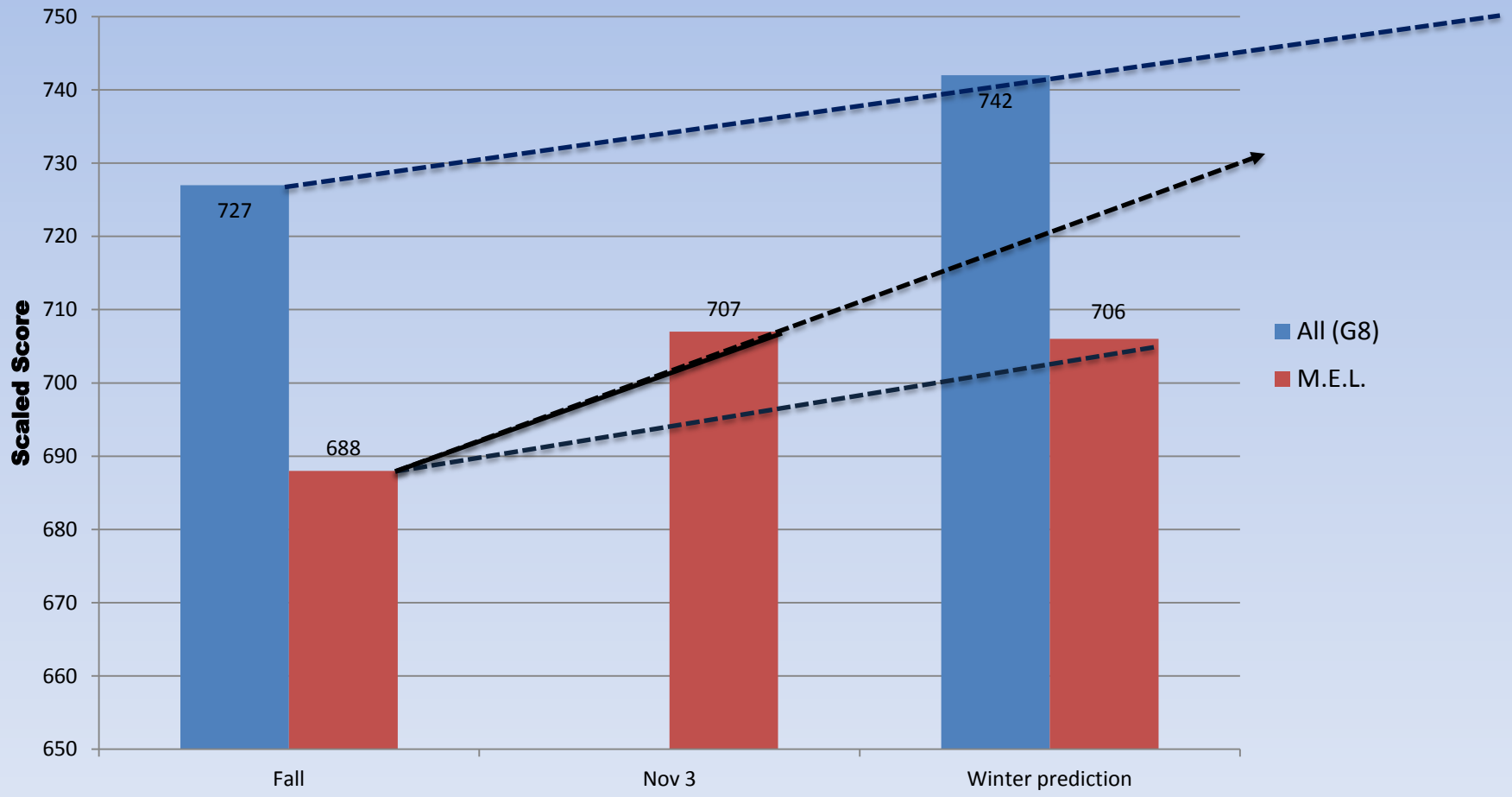
MEL Intervention STAR data: Value Added



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Current RTI Process

- *Universal Assessment of All Students*
- *Data Analysis & Cut-Offs*
- *Diagnostics & Grouping*
- *Intervention*
- *Progress Monitoring for Growth Rate*
- *Decision Making (6 - 20 week review)*

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Possible RTI Lesson Format

- 5 min. Warm-up
- 10 min. Explicit Instruction
- 10 min. Practice

  (guided/independent)
- 5 min. Closure

  (progress monitoring, summarizing, & journal)

Plus optional online software for 15 min.

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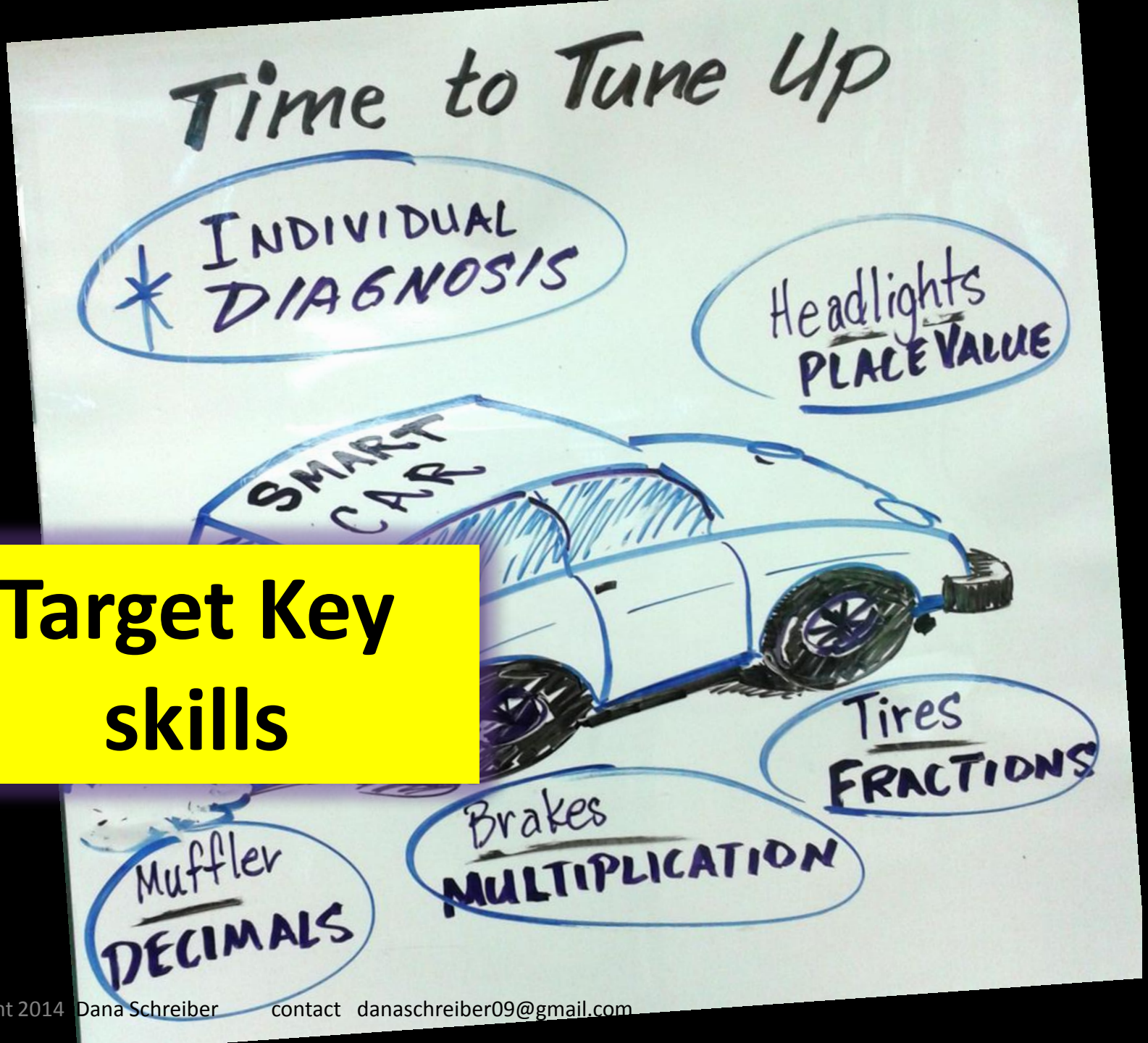

Target Key skills

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#2

A **holistic** approach

- Social & Cognitive psychology
- Neuroscience
- Conceptual Mathematics

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Plus Empowerment

- Growth Mindset
- Emotional Intelligence
- Step-by-Step Success

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For example…

GROWTH MINDSET

VS.

FIXED MINDSET

(Dweck, 2007)

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"It's not just whether or not you think you have the ability that matters. . ."

- "In fact, what seems to be most important is whether or not you **think you can get** the ability."

- Heidi Halvorson, 2011

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High Achievement

I take on more higher challenges

I use new concepts & processes

I persist, feel stronger, try harder

My efforts get better results

I can improve & learn

Low Achievement

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Growth Mindset Sequence

Hope & Possibilities

This is easy

Mastery

I could'a had a 90

I can remember

I am getting better

I can do it

I can improve

Maybe

I can figure it out

I'm stupid

I'm Outta Here!

Hopeless & Impossible

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Can you imagine what a growth mindset looks like in the classroom?

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High expectations
(different than standards)

Risk-Tolerant Environment

High confidence in growth

Frame as opportunity to stretch

Mistakes are expected & valuable

Progressive improvement is our goal

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Plus we must address

Emotional Intelligence

Struggling math students are often ***emotionally hijacked*** *and often feel the following…*

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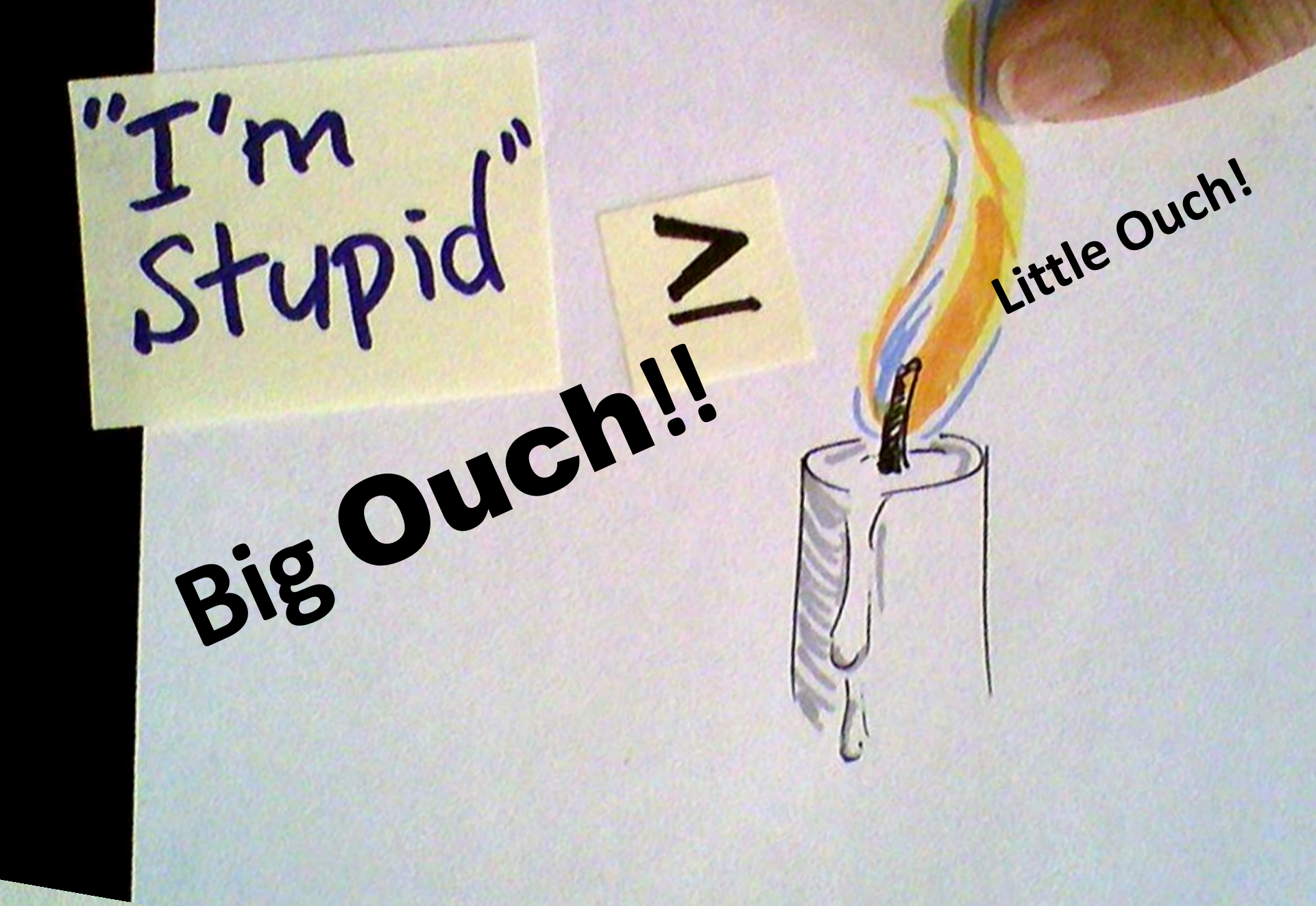

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How can we help 8th grade students **remember** 5th grade math?

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Try adding "**meaning**"

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What is "Meaning" to our primal brain?

- *Why (valuable) ?*
- *Feelings (valued) ?*
- *Belonging (safe) ?*

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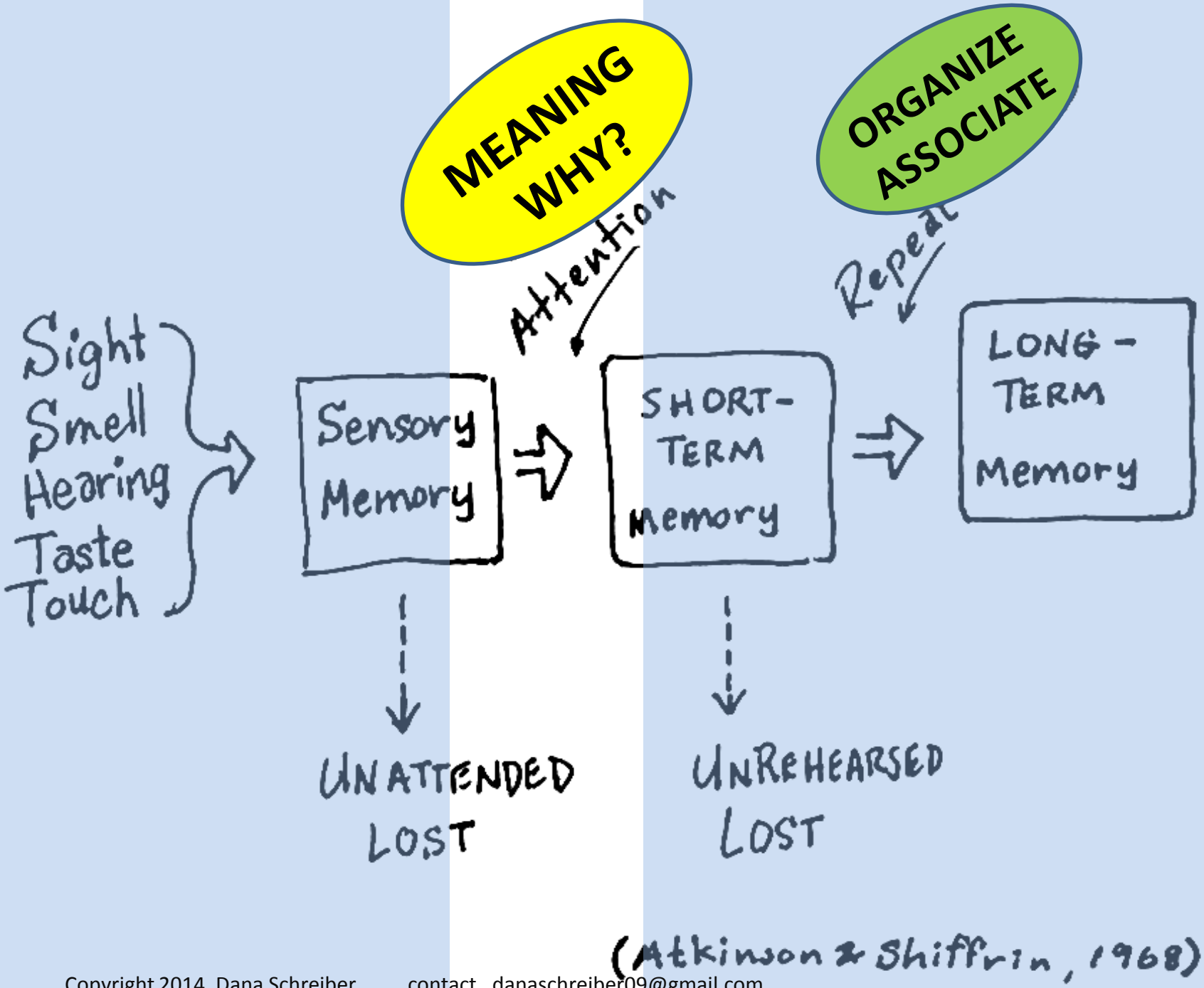

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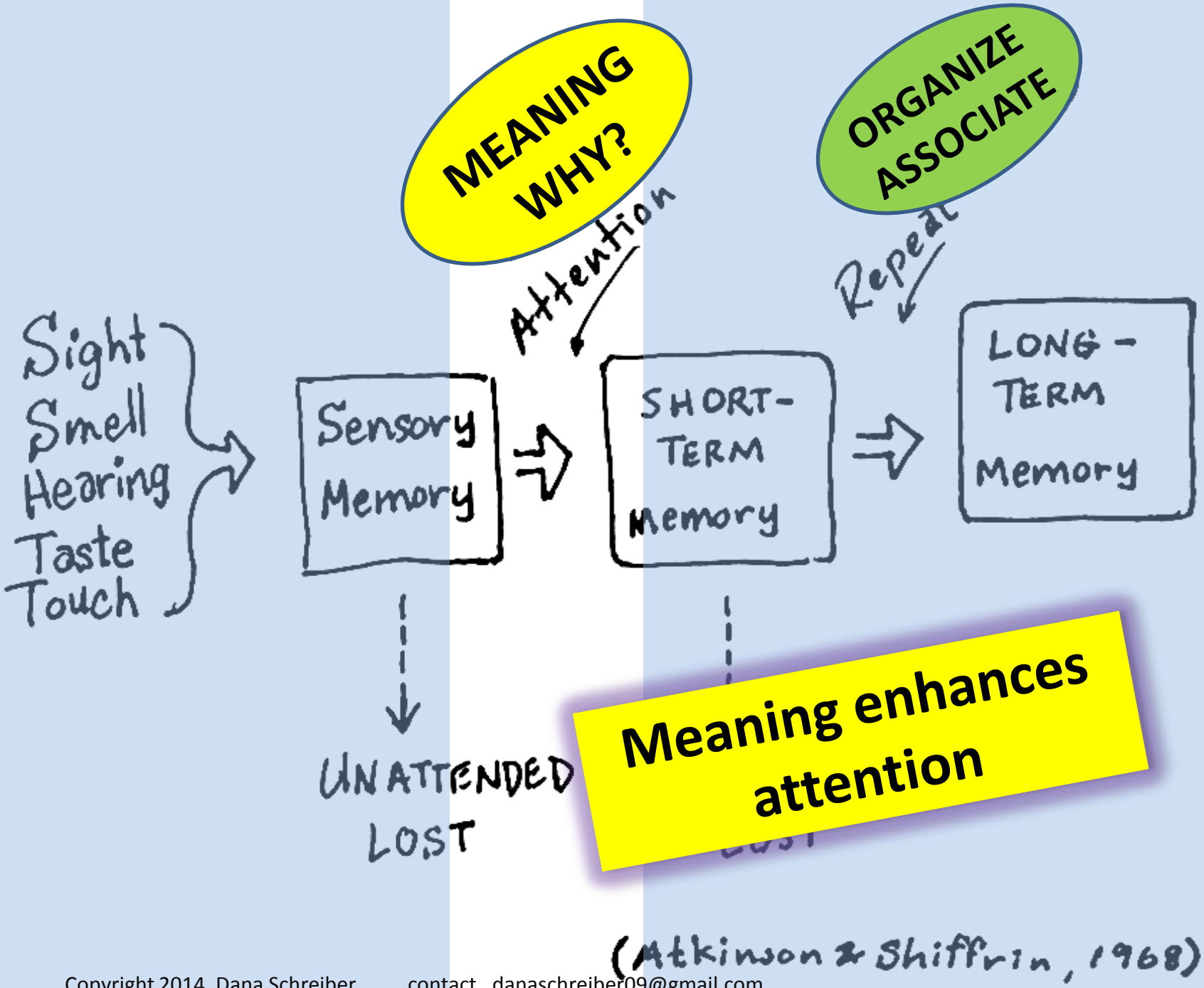

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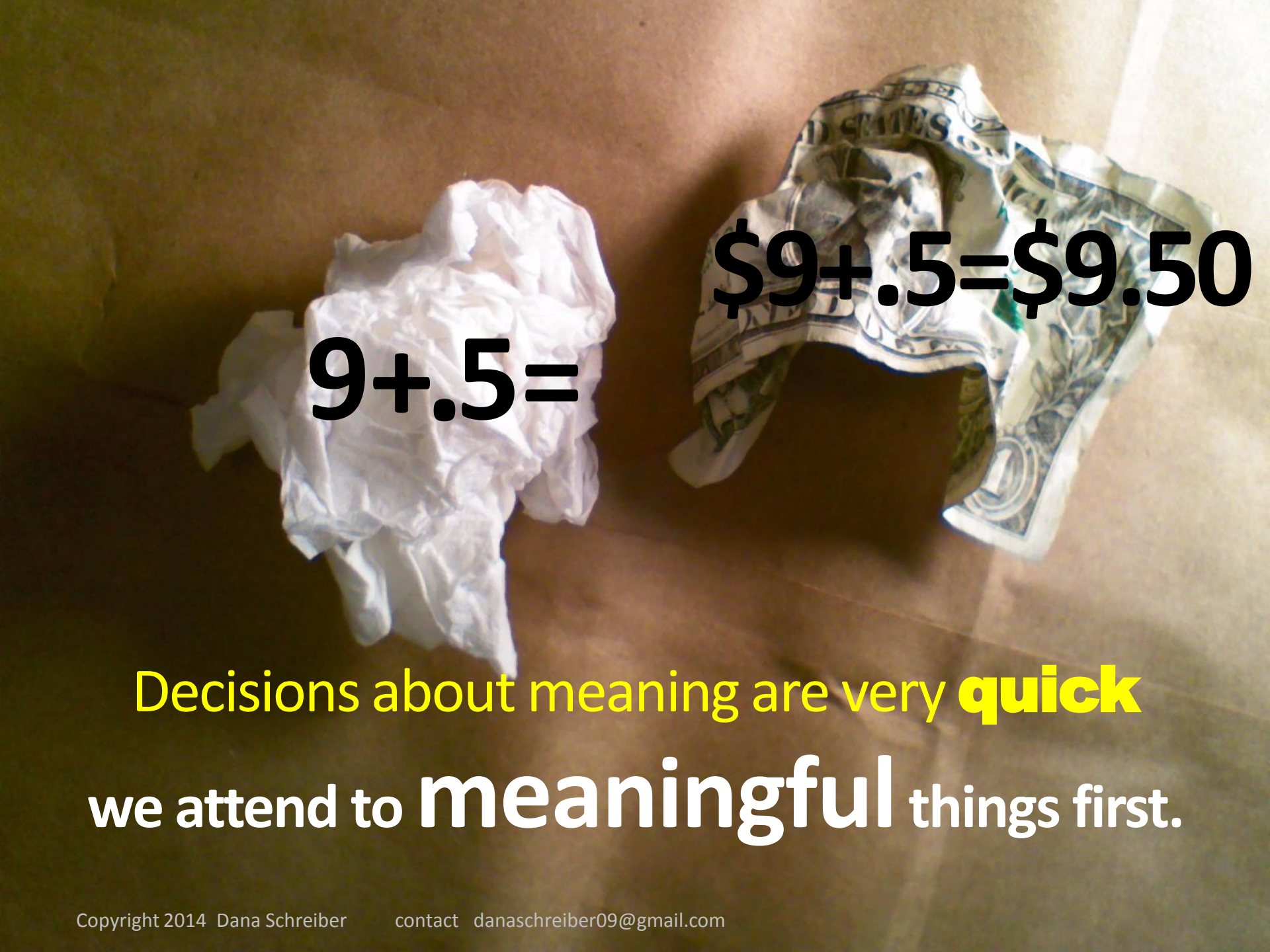

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How can we reduce anxiety and **validate** our kids?

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Mistakkes honored

(and used as a diagnostic tool)

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What does some of the neuroscience tell us?

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Chemistry

Success triggers **dopamine**.

Dopamine is addictive
and helps memory.

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Chemistry

Stress triggers **cortisol**

Cortisal interferes with memory.

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#3

What does effective Progress Monitoring look like?

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One example of Progress Monitoring

Feedback and Progress Monitoring in a one-sheet format

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The World Rewards Effort

thatquiz.org

Fall 2013

Grade#Te MathTeacherPeriod

1st Score

Student Name

In-6	2M[redacted]I	Integers 6					
In-5	7C[redacted]O	Integers 5					
In-4	JID[redacted]2	Integers 4					
In-3	GY[redacted]TC	Integers 3					
In-2	PRK9[redacted]	Integers 2					
In-1	[redacted]	Integers 1					

Starting Point

Integer Pretest

Feedback & Monitoring sheet for assigning & recording quiz scores

I need

3 Quizzes

70%

or Greater

in each area:

Goal is 3 scores 70% or better in each area

F9	IX[redacted]6F	Fraction 9					
F8	NNO[redacted]	Fraction 8					
F7	[redacted]	Fraction 7					

Fraction Pretest

HR-### H

TeamLeader TeamCode

D9	WI[redacted]D	Decimal 9					
D8	N6M[redacted]KT	Decimal 8					
D7	O[redacted]BA	Decimal 7					
D6	9U[redacted]K7	Decimal 6					
D5	312[redacted]E	Decimal 5					
D4	[redacted]IL	Decimal 4					
D3	8[redacted]UK8	Decimal 3					

- [ ] Integers
- [ ] Fractions
- [ ] Decimals
- [ ] Multiplication
- [ ] Place Value

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Completed Feedback and Monitoring sheet showing quiz scores reaching goal of 3 quizzes scoring 70% or greater

The World Rewards Effort

thatquiz.org

Group 7GS[redacted]

[redacted]

		1st Score	Date	2nd Score	Date
		80	6/15		
		80	6/15		
		73	6/13		
		67	6/13		
	Pretest	40			

I need 3 scores > 70% in each of the following areas

			50	6/13		
	82792		80	6/13		
	NQKU2609		40	6/15		
	BVKH8746		50	6/15		
	LEJE0091		50	6/13		
F4	[redacted]		[redacted]	6/4		
F3	LWUX8034		40	5/31	70	6/19
F2	XGEB6712		40	6/1	40	6/18
F1	HEYB2744		20	5/25	60	6/18
Starting Point		Fraction Pretest	70			

Integers

Fractions

Decimals

Multiplication

Place Value

DONE

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D9	AVAS0395					
D8	PTOG8679					

Decimal 1 [redacted]

2012.12.10 11:52

Individual quiz data for a 10 minute decimal online quiz

Percentage	[Edit]	60%
Points		6/10
Completed		10
Unanswered		0
Right		6
Wrong		4
Time		5:21
Seconds per problem		32.10

5:21 used of allotted 10 minutes suggests rushing and not attending to precision

( ) is student's incorrect answer

Incorrect Answers

1. 0.9 ÷ 0.3 = 3 (0.33)
5. 8.01 – 6.79 = 1.22 (2.22)
6. 7.8 – 1.74 = 6.06 (6.14)
9. 6.65 + 10 = 16.65 (6.75)

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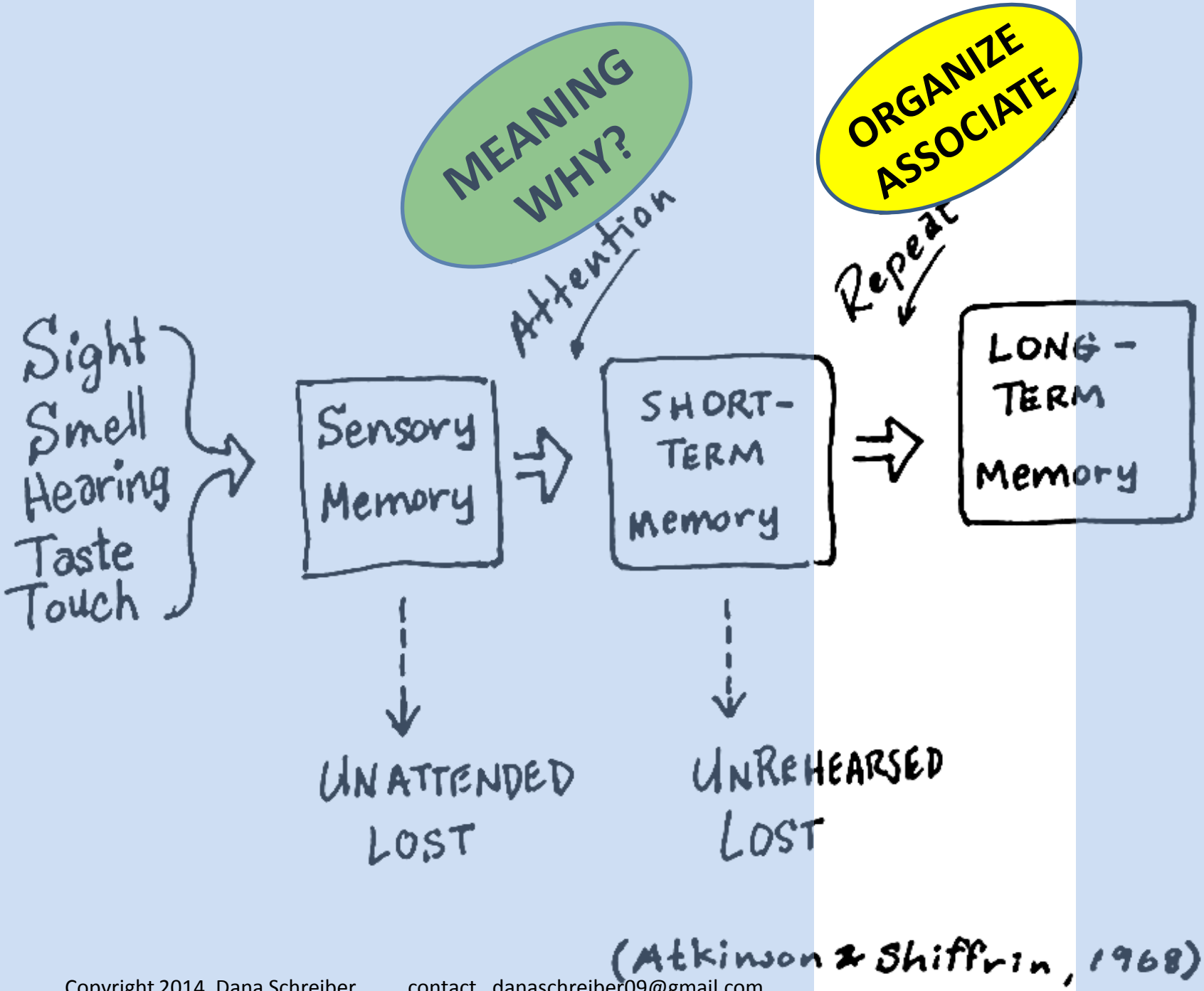

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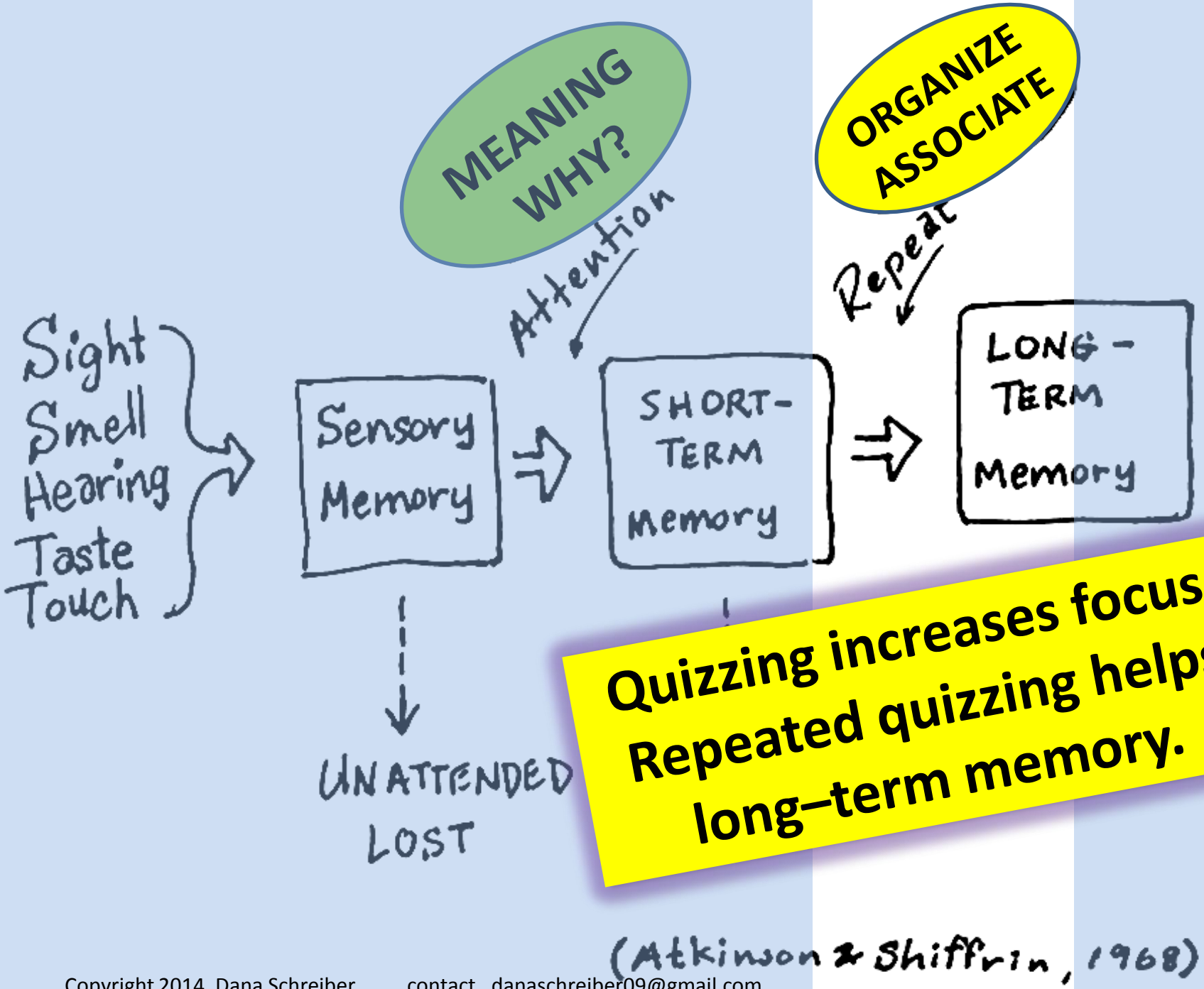

Quizzing increases focus.
Repeated quizzing helps long–term memory.

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MEL SnapShot Data

ThatQuiz Data

% Percent of Students

TQ Score Summary		P	R	M	D	F	I
SRBI Goal: 3 Quizzes @ 70%+ Score	3	98	54	100	77	63	52
1 or more > 70%+ Score	1	98	67	100	90	69	52

Semester summary showing % of students reaching goal in all categories

Grade	Place Value	Rounding	Multiplication	Decimals	Fractions	Integers
7	3		3	3	3	
7	3	1	3	3	3	3
8	3	3	3	3	3	3
8	3					

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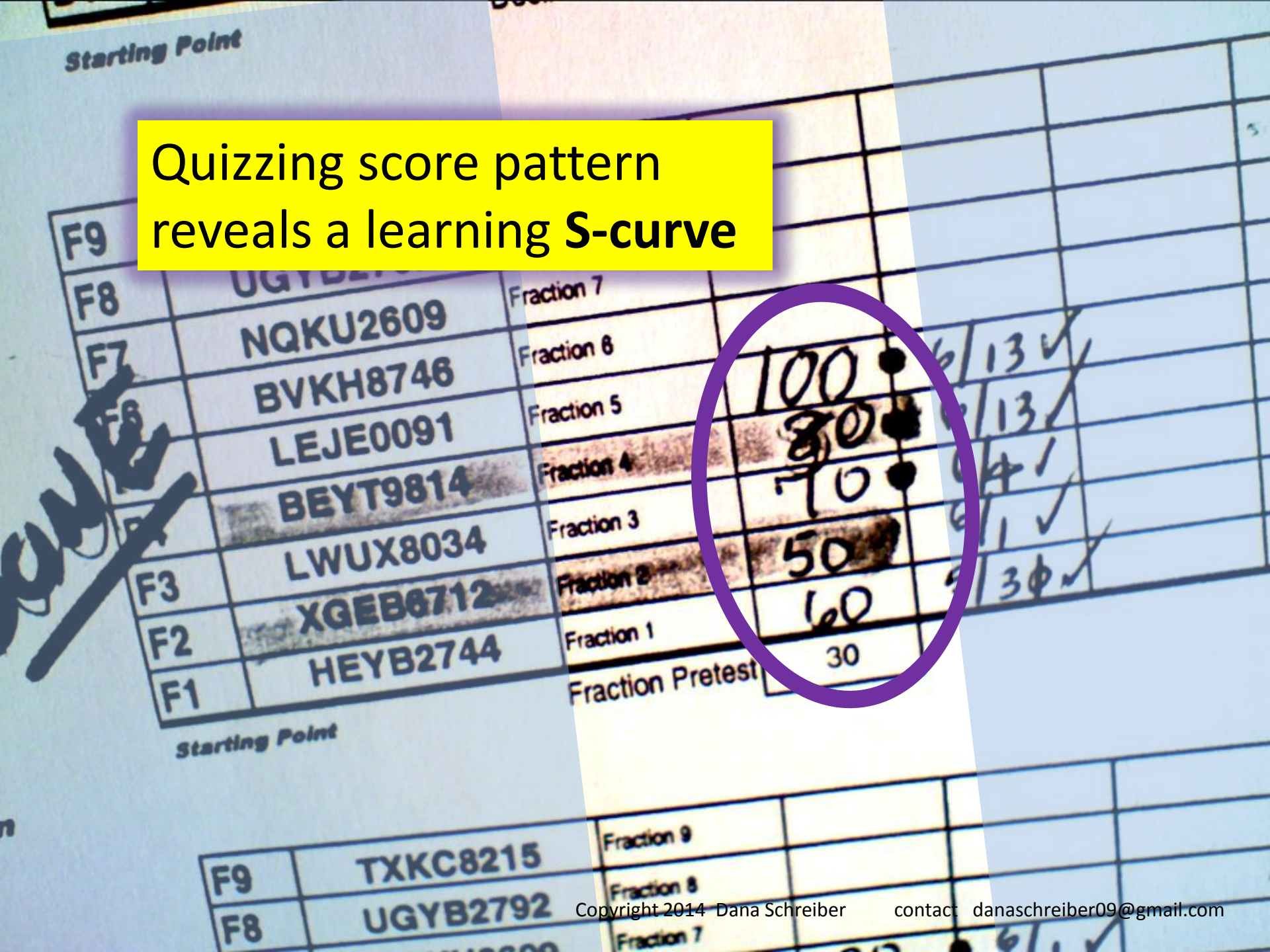
Quizzing score pattern reveals a learning **S-curve**



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"I could'a had a 90%"

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I'm Outta Here! becomes….

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"Mr. Schreiber,
Can I take
another Quiz?"

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#4

Lesson Plans?

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Lesson Plans May Include…

Three Conceptual Stages

1. Concrete
2. Representational
3. Abstract

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Concrete

The “doing” stage uses concrete objects to model problems.

Manipulatives: chips, pennies, blocks, cut out paper, fraction bars/rods…

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Representational

The “seeing” stage uses
visual representations of the objects
to model problems.

Pictures, hash marks, diagrams, drawings
Uses paper, whiteboards, cards,
sticky notes, etc.

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Abstract

The “symbolic” stage uses abstract symbols to model problems.

“Naked” numbers and symbols and symbolic mental math.

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“Students who use manipulatives in their mathematics classes usually outperform those who do not. . .”

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"…This benefit holds across grade level, ability level, and topic, given that use of a manipulative "**makes sense**" for that topic."

- Douglas Clements, 1999

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Examples that **Explain**

- Connecting expanded notation to multi-digit array multiplication
- One more visual way to explain decimal multiplication
- What happens when our divisor gets smaller?

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To learn more

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