Where should I sit?

If you have a K-2 Student, please find a seat at a K-2 table.

If you have a 3 -5 student, then please find a seat at a 3-5 table.

If you have both☺ Lucky you, you can decide.

Math Facts through Conceptual Understanding

EMILIE SCHIFF

K-8 MATH SPECIALIST AND INSTRUCTIONAL COACH.

LAKE ORION COMMUNITY SCHOOLS

Making the Case…
Focus on number sense!

- Research indicates that **early number sense** predicts school success more than other measures of cognition like verbal, spatial or memory skills or reading ability.

Jordoan, Kaplan, Locuniak, and Ramineni, 2007

Fluency Without Fear: Research Evidence on the Best Ways to Learn Math Facts

By Jo Boaler

Each take a paragraph. What stood out. Highlight, underline, mark up…Be prepared to share your M.I.P.

Professor of Mathematics Education, co-founder youcubed
with the help of Cathy Williams, co-founder youcubed, & Amanda Confer
Stanford UNIVERSITY

What is Mastery of Basic Facts:

Multiply and divide within 100.

3.OA.C.7	Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.	See related worksheets, workbooks, games, exercises, lesson plans

Addition and subtraction by the end of 2nd grade

Multiplication and division by 3rd grade

Fact fluency leads to other math fluent skills…

Guided Intervention

https://bhi61nm2cr3mkdgk1dtaov18-wpengine.netdna-ssl.com/wp-content/uploads/2017/03/Day-3-Speed.mp4

Fact mastery will not magically happen.

- ***"Time is a poor intervention."***

Parents can help, by showing your children your active strategies, and your thinking aloud.

Developmental Nature of Basic Fact Mastery

Phase 1:

Counting Strategies

Counting strategies-

- using concrete objects
- verbal counting

Example includes:

- 5 + 1 = count on starting at 5, 6
- 5 + 2 = 5, 6, 7
- 4 +7 = 7 then 8, 9, 10, 11

Phase 2:

Reasoning Strategy

Reasoning Strategy:

- using known information to logically determine an unknown combination
- 4 + 7, student knows 3 +7 = 10 so just adds on 1 more.
- 10 x 8 is 80 half of that is 5 x 8 is 40

Phase 3:

Mastery

Producing answers efficiently

- just knows it
- 4 + 7 = 11

Retrieval within 3 seconds

Grade appropriate strategy

Efficient

Knowing Facts from Memory- "Passive Storage View"

Thinking that students will learn their facts if they just practice enough

What does this mean-

- 100 isolated addition facts
- 100 isolated multiplication facts
- Also having to memorize subtraction and division- well over 300 pieces of information to remember
- Not only having to memorize, but to keep practicing as well.

Effects of not knowing facts fluently…

Lack of basic fact automaticity has been shown:

- Limit participation in math class discussions
- Impede successful problem solving
- Severely impair the development of the standard algorithms for multiple-digit addition and subtraction, long division and fractions
- Misapply facts and not seeing reasonableness of answers
- Inflexible thinking skills

Struggling Learners and Students with Disabilities:

Have difficulty memorizing so many isolated facts (but can be successful with strategies)

Drill creates, in a majority of students, unnecessary anxiety

Undermine student interest and confidence in mathematics

Parent Supports

- Scaffold the Language, but not the mathematic strategies. Explain the vocabulary they don't know, in simpler terms, but don't "dumb down" the mathematics.
- Subitizing
- Use Realia and Models
- Use Graphic Organizers
- Use gestures for together, take apart, groups etc.
- As long as they understand the concept (arrays, etc.) allow them to use a tool for homework at home. Multiplication chart, calculator. The fluency will come.

Explicit Strategy Instruction:

Strategies can be effective to learning math facts.

Supports students thinking rather than give the students something new to remember.

Key: Help students see possibilities and let them choose strategies that help them get to a solution without counting.

Addition FACT Strategies

Count On

- Count On 1
- Count On Turnarounds
- Count On 2
- Count On 3
- Count On 0

Use Doubles

- Double
- Double Plus 1
- Double Plus 2

Bridge to 10

All Facts

Prepare…
Before teaching strategies students need to know…

Subitizing

Subitizing

Subitizing

Subitizing

The ability to instantly recognize the total quantity of objects in a group without counting

1. Introduce Concept Through Real Objects Transitioning to Model

Counting bottles

Cubes in a cup

Addition stories

Count on 1 Cards

2. Reinforce Through Models

Count on Cards

Cube Trains

Count on Cards with Numeral Cards

Does This Make Sense?

Moving from physical models to semi-abstract models to symbolic models (with numbers)

3: Practice through Games

01

Spin, Count On 1, Record Fact

02

Reinforce with Count On Flash Cards

03

Count On 1 Bingo

- Total and Expression
- Subitizing games/Other resources: Youcubed.org
- http://teachmath.openschoolnetwork.ca/grade-1/number-sense/subitizing/
  https://www.pinterest.com/explore/subitizing/?lp=true

Multiplication Strategies

Use Tens
- Five Facts

Doubling
- Two's Facts
- Four's Facts
- Eight's Facts

Use a Rule
- One's Facts
- Zero's Facts

Build Down and Build Up
- Nine's Facts
- Six's Facts

Last Facts

What to Do When Teaching Basic Math Facts

Ask students to self-monitor

Focus on self-improvement

Drill in short time segments

Work on facts over time

Use technology

Did we?

Identify fact fluency is a developmental process.

Identify research based strategies that help develop fact fluency

Understand strategies that are ineffective for fact fluency development

Learn specific strategies that help develop fact fluency

Contact Information

Emilie Schiff: Elementary and Middle Level Math Specialist

Office (Main Office Hallway) is at Waldon Middle School

email: emilie.schiff@lok12.org