

**MTSS MATH
2012-13 UPDATES**

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-Education Secretary Arne Duncan
Education Week, December 9, 2009

“If we can dramatically increase high school graduation rates, if we can dramatically increase the number of graduates who are college and career ready, that’s what this is about. Everything’s a means to that end. That’s the Holy Grail here. Are our students being prepared to be successful?”

**WHAT IS THE PROBLEM WITH
MATH?**

Classic PEANUTS
Featuring "Good of Charlie Brown" by Schulz

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THE DIFFERENCE BETWEEN CLASSES IN THE U.S. AND CHINA

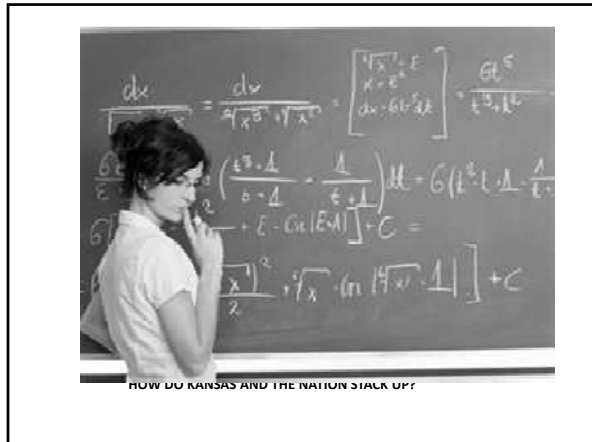
COLLEGE PREPAREDNESS
28% to 42% of incoming freshmen place in remedial math classes nationwide

Good students in remedial math: Why? Community Colleges Spotlight, downloaded 6/2/2012 from http://communitycollegespotlight.org/content/good-students-in-remedial-math-why_5420

About 65 percent of all community college students nationwide need some form of remedial education, with **students' shortcomings in math outnumbering those in reading by 2 to 1.**

Thomas R. Bailey, Director
Community College Research Center
Teacher's College at Columbia University

(CUNY Adjusts Amid Tide of Remedial Students, L. Federaro, NY Times, March 3, 2011)



Kansas

Remediation Rates¹

- Between 2003 and 2008, 28 percent of students tested into remediation in reading.
- Between 2003 and 2008, 40 percent of students tested into remediation in English.
- Between 2003 and 2008, 58 percent of students tested into remediation in mathematics.

1 Kansas Board of Regents. (2007). *Research performance agreements*. Retrieved January 30, 2008, from http://www.kansasregents.org/download/aca_affairs/5/6/2008round%202A_1.pdf

(Diploma to Nowhere, 2008, p.24)

NAEP MATH RESULTS

According to the 2009 National Assessment of Educational Progress (NAEP) only 39% of fourth-grade students and only 32% of eighth-grade students scored at the proficient level in mathematics.

(National Center for Educational Statistics, 2009)

TIMSS MATH RESULTS

- By grade 4, American students only score in the middle of 26 countries reported. (12/26)
- By grade 8 they are in the bottom third. (28/33)
- By grade 12, we are near dead last. (19/21)

(National Center for Educational Statistics, 2009)



TEACHER PREPAREDNESS ... INSTRUCTION ... CURRICULUM

(Good students in remedial math: Why? Community Colleges Spotlight, downloaded 6/2/2012 from http://www.comcog.org/content/good-students-in-remedial-math-why_5820)

Teachers (2007 stats)

- ~3.7 million elementary and secondary teachers in the U.S.
- ~53.1% of elementary teachers are generalists
- ~1.1% have mathematics as their main assignment

(Common Standards and the Mathematical Education of Teachers – Recommendations from the October 2010 Forum on Content-Based Professional Development, Conference Board of the Mathematical Sciences, January 1, 2011, pg. 5)

Teachers Sense of Preparedness to Teach CCSSM Topics

- Grades 1-5: About ½ feel well prepared to teach their math topics
- Grades 6-8: Around 60% feel well prepared to teach their math topics
- High School: Around 70% feel well prepared to teach their math topics

-William H. Schmidt, Michigan State University

Supporting Differentiated Math Instruction in a Common Core World, Addressing Rural Education Issues: A State Conversation May 30-June 1, 2012
Kansas City, KS, Malbert Smith III, Ph.D., downloaded 6-25-12

Instruction

- Instructing or intervening without assessment data is akin to driving without a map: You are wasting your time, you will get lost, and you will probably have no idea when you arrived or if you are even in the right place.

(Keeping RI On Track: How to Identify, Repair and Prevent Mistakes That Derail Implementation, VanDerHeyden, A., 2010)

Instruction & Curriculum

- Increasing the productivity of our mathematics programs and instruction requires deliberate shifts in what mathematics we expect our students to master, shifts in when we expect them to master it, and most important, shifts in how we teach it.

-Steven Leinwand

(Accessible Mathematics-10 Instructional shifts That Raise Student Achievement, Leinwand, S., 2009)

MTSS RESPONSE TO RESEARCH

What's new with MTSS?

THE MATH WARS . . .

"The truth is that in mathematics, **skills** and **understanding** are completely intertwined. In most cases, the precision and fluency in the execution of the skills are the requisite vehicles to convey the conceptual understanding. There is not "conceptual understanding" and "problem-solving skill" on the one hand and "basic skills" on the other. Nor can one acquire the former without the latter."

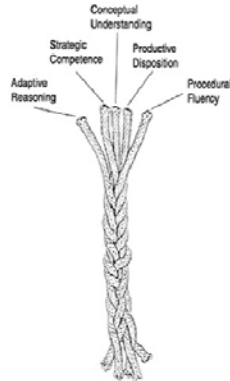
(Basic Skills Versus Conceptual Understanding, A Bogus Dichotomy in Mathematics Education, Hung-His Wu, American Educator/American Federation of Teachers, Fall 1999)

- A growing body of promising research shows that if initial instruction focuses exclusively on procedural skills, then students may have difficulty developing an understanding of math concepts.

(Accessible Mathematics-10 Instructional shifts That Raise Student Achievement, Leinwand, S., 2009)

MATHEMATICAL PROFICIENCY: LEARNING

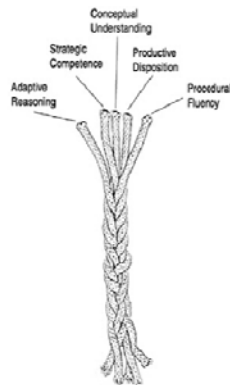
- The **five strands** provide a framework for discussing the knowledge, skills, abilities, and beliefs that constitute mathematical proficiency.
- The five strands are **interconnected** and must all work together for students to be mathematically proficient.



(Source: National Research Council (2001))

MATHEMATICAL PROFICIENCY: TEACHING

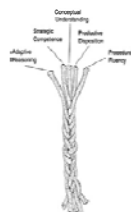
- Just as teaching for mathematical proficiency involves interwoven strands, teaching for mathematical proficiency requires similarly interrelated components.



(Source: National Research Council (2001))

MATHEMATICAL PROFICIENCY: TEACHING

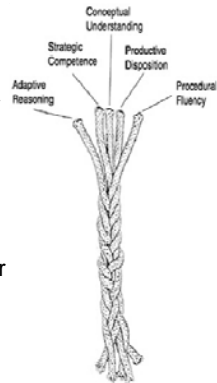
- **Conceptual understanding** of the core content;
- **Fluency** in carrying out basic instructional routines;
- **Strategic competence** in planning effective instruction and solving problems that arise during instruction;
- **Adaptive reasoning** in justifying and explaining one's instructional practices and reflecting on those practices to improve teaching and learning; and a
- **Productive disposition** toward mathematics, teaching, learning, and the improvement of practice.



MATHEMATICAL PROFICIENCY: CURRICULUM

Mathematical proficiency is not a one-dimensional trait, and it cannot be achieved by focusing on just one or two of these strands.

Helping children acquire mathematical proficiency calls for instructional programs that address all its strands.



(Adding It Up: Helping Children Learn Mathematics, 2001, p116, Center for Education)

The MTSS Mathematical Proficiencies Model

- Utilizes a diagnostic assessment process to create small homogenous groups for supplemental and intensive instruction.
- Enables the use of the protocol piece of the hybrid model, and ensures the remediation of missing skills/concepts that were taught in earlier grades.

GROUPING PROCESS FOR MTSS MATH



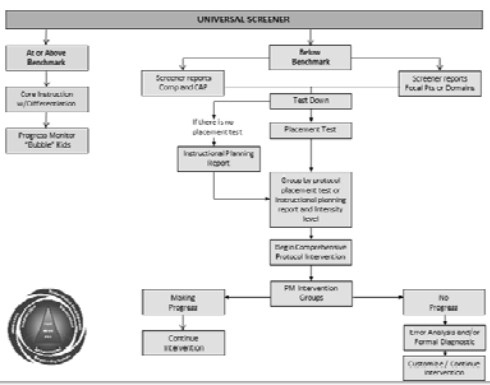
Universal Screeners

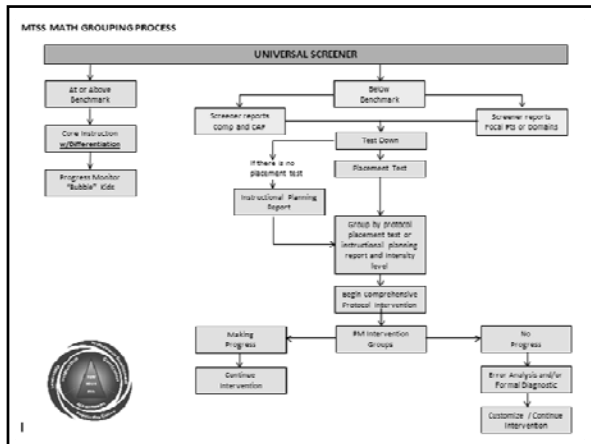
FOR EARLY NUMERACY (KDG-1 ST)	FOR GRADES 2 AND ABOVE
AIMSweb	AIMSweb
Early Numeracy Indicators	STEEP
easyCBM	easyCBM
STAR Math Enterprise	STAR Math Enterprise

Universal Screening Preschool Assessments

- Available for purchase at this time:
 - STEEP preschool measures
 - AIMSweb Tests of Early Numeracy, pre-K norms
- In development, may be available from authors:
 - Preschool Numeracy Indicators (PNIs)
 - Early Arithmetic, Reading, and Learning Indicators (EARLI)

MTSS MATH GROUPING PROCESS





Initial Grouping

- Math experts' most recent research and recommendations have initiated revisions to the MTSS math grouping process for intervention.
- To group students for intervention, universal screening data are used to conduct the initial sorting of students into two groups: (1) at or above benchmark and (2) below benchmark.

Skills and Concepts

- When using AIMSweb, the lowest score (MCOMP or MCAP) is used to identify student's need for Tier 2 or Tier 3 intervention.
- Ten minutes of every intervention session is devoted to basic fact instruction.
- The remainder of intervention time is devoted to teaching the identified missing skills/concepts simultaneously or intertwined.

The Grouping Process for Math

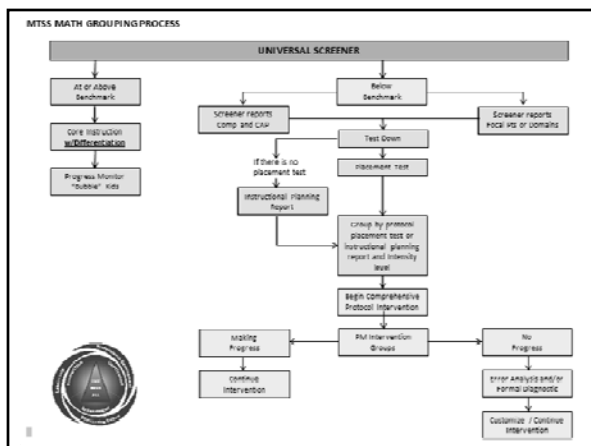
Determine Student's **Instructional Focus**

- Below Benchmark:
 - Take the placement test from the comprehensive protocol intervention.
 - If no placement test is available, consult the Individual Student Report from the universal screener to identify the student's lowest skill(s)/concept(s).

The Grouping Process for Math

Finalize Instructional Groups

- Students are sorted into homogenous intervention groups based on:
 - Individual student report or placement test results
 - Instructional level
 - Intensity level



COMPREHENSIVE PROTOCOL INTERVENTIONS

Appendix: Potential Math Intervention Curricula

Listed below are some of the interventions that have been independently researched, show promise, or are being used successfully in Kansas schools implementing MTSS. This is by no means an all inclusive list. In an attempt to help schools be savvy consumers, the headings of each column are features which are considered "best practices" in curricula selection and can be used by schools to evaluate their current materials or potential Tier 2 and 3 curricula. An asterisk (*) indicates a comprehensive curricula.

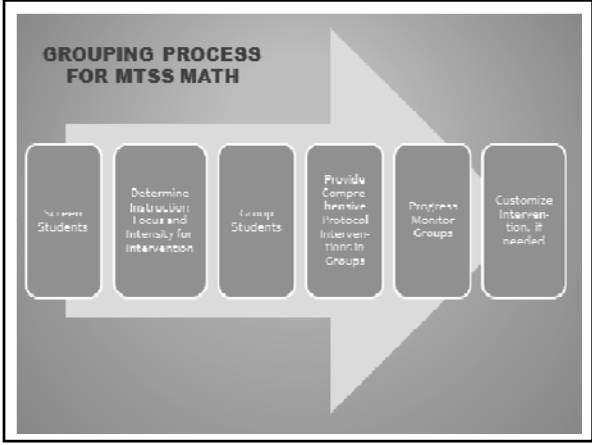
Name	Grade Level	Most Appropriate Tier Use	Research Base or Promising Practice	Placement Test	Currently used in Kansas by MTSS school	Publisher Information	Technology based?
Algebra Ready	6-10	Tier 2 & 3	Promising practice	Yes		Sopris West	No
Computation of INTENT	3-Algebra	Tier 2	Research-based	Yes	Yes	Pearson	No
*Do the Math	1-6	Tier 2	Promising practice	Yes	Yes	Scholastic	No
Fast Math (incl. fluency)	1-12	Tier 2 or 3	Promising practice	Yes-adjunctive	Yes	Scholastic	Yes
Fraction Nation	MS-Algebra	Tier 2	Research-based	Yes-adjunctive		Scholastic	yes
Go solve (schema based SE)	2-8	Tier 2	Promising practice	Yes-adjunctive		Scholastic	Yes
*Inside Algebra	6-12	Tier 2	Promising practice	Yes		Voyager	both
*Inside math	5-8	Tier 2	Promising practice	Yes-end of book test result be used		Sopris West	No
Math Facts in a Flash	1-12	Tier 2 or 3	Research-supported (Assessment for Effective Intervention)	Adaptive		Renaissance Learning	Yes
*Number Worlds	PreK-6	Tier 1 (being used with some)	Research-supported	Yes	Yes	SIA	No

Name	Grade Level	Most Appropriate Tier Use	Research Base or Promising Practice	Placement Test	Currently used in Kansas by MTSS school	Publisher Information	Technology based?
		Tier 2 in KS	(Center on Instruction)				
Peer Assisted Learning Strategies (PALS)	K-6	Tier 2	Research-supported (study completed by Gresham et al.)	No, by grade level		Vanderbilt	No
Pirate Math	2-3	Tier 2	Research-supported	No		Vanderbilt	No
Skillbuilder	1-8	Tier 3	Research-based	Yes		SIA	No
Solving Equations	MS-algebra	Tier 2	Research-supported (ETS)	Yes	Yes	Pearson	No
TransMath	5-10	Tier 2	Research-supported (NRP 2008 report)	Yes	Yes	Sopris West	No
*Math	2-8	Tier 2	Research-based	Yes		Voyager	both
*Voyager Math	2-8	Tier 2	Research-based	Yes	Yes	Corbin	No

Diagnostic Process

For students who do not make progress:

- Use error analysis of the probes, especially the probe at the students’ instructional level, to identify specific skill/concept weaknesses and instructional needs, or
- Consider conducting formal diagnostic assessment to obtain more information about skill/concept weaknesses
- Consider the need for individual student problem solving



About remedial math classes

- Most students have serious challenges remembering the basic rules of arithmetic. The course is really a refresher, but they aren’t ready for a refresher. They need to learn how to learn.

Dr. Jerry G. Ianni
LaGuardia Community College
Queens, NY

(CUNY Adjusts Amid Tide of Remedial Students, L. Foderaro, NY Times, March 3, 2011)

- If what we've always done is no longer working then we have no choice but to change some of what we do and some of how we go about doing it.

(Accessible Mathematics-10 Instructional shifts That Raise Student Achievement, Leinwand, S., 2009)

What can you do?

Mathematics teachers can take simple and immediate steps to put the gist of recent research into place.

1. Promote students' discussion of making meaning by posing open-ended questions: Why do you think that? Can you explain your reasoning? How do you know that?
2. Make explicit connections and incorporate pictures, concrete materials, and role playing as part of instruction so that students have multiple representations of concepts and alternative paths to developing understanding.
3. Avoid instruction focused on teaching a single correct approach to arrive at a single correct answer.

(Accessible Mathematics-10 Instructional shifts That Raise Student Achievement, Leinwand, S., 2009)

What mathematics do we focus on?

- Core mathematical concepts
- Key skills with understanding
- Facility with terms, vocabulary, and notation
- Ability to apply the mathematics and solve problems.

(Accessible Mathematics-10 Instructional shifts That Raise Student Achievement, Leinwand, S., 2009)

How do we teach it?

- Ask “Why?”
- Alternative approaches
- Multiple representations
- Language-rich classroom
- Contexts
- Connections
- Ongoing cumulative review

(Accessible Mathematics-10 Instructional shifts That Raise Student Achievement, Leinwand, S., 2009)
