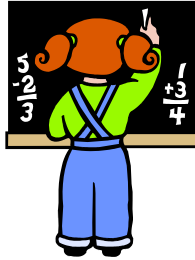


STRAND A, Session 3: RTI and Problems in Arithmetic and Mathematics

**Three-Tier RTI Mathematics
Assessment and Intervention Model**

See www.texasreading.org to download a copy of this presentation.

[Give us a week :-)]



**Diane Pedrotty Bryant, Ph.D.
Brian R. Bryant, Ph.D.
The University of Texas @ Austin
Vaughn Gross Center, College of Education
*Funded by the Texas Education Agency***

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Web Cast Procedures

Those wishing to access the web cast will need Real Player (available free at www.real.com). **Follow the steps listed below to access the web cast:**

1. Once Real Player is open, go to "File" -- then "Open location" -- and paste the following url:

<http://realaudio.cc.utexas.edu:8080/ramgen/redundant/channel1.rm>.

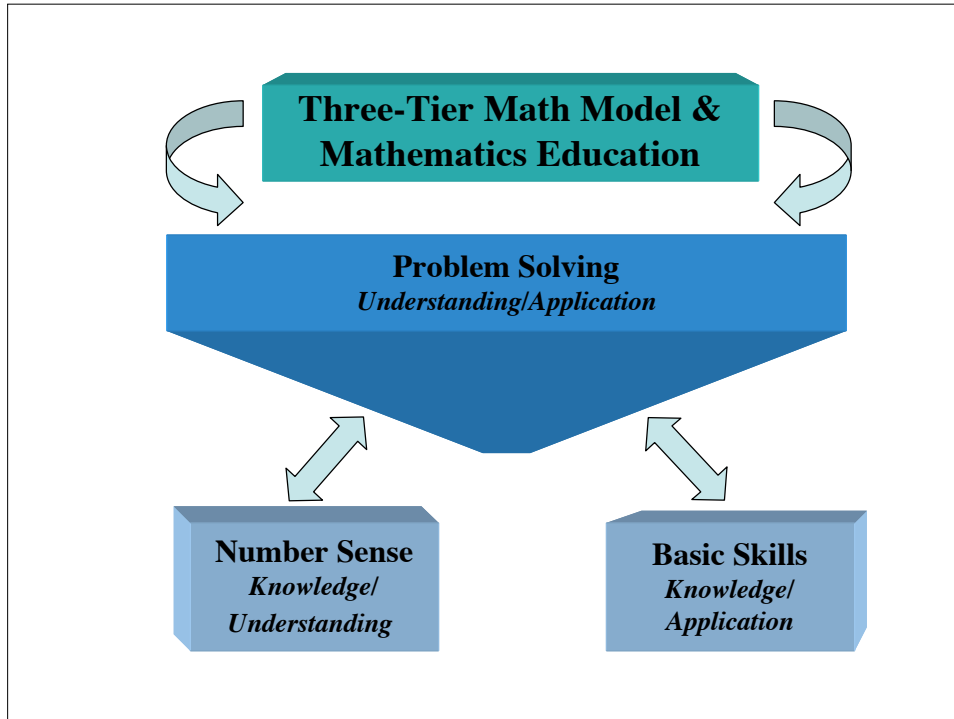
2. If the web cast is not yet airing, you will see weather-related information.

RSVP

Please respond to Dr. Minyi Shih (minyi@mail.utexas.edu) if you plan on joining the web cast.

Advance Organizer

- Overview of 3-Tier RTI Mathematics Assessment & Intervention Project
- Intervention: Overview of tiered instruction
- Assessment: Overview of modes of assessment
- Thoughts about RTI
- Future Directions



NCTM Curriculum Focal Points & Connections, Sept. 2006

<http://www.nctm.org/focalpoints/downloads.asp>

Kindergarten:

Number & Operations: Representing, comparing, and ordering whole numbers and joining and separating sets (Geometry, Measurement)

First Grade:

Number & Operations & Algebra: Developing understandings of addition & subtraction and strategies for basic addition facts and related subtraction facts

Number & Operations: Developing an understanding of whole number relationships including grouping in tens & ones (Geometry)

Second Grade:

Number & Operations: Developing an understanding of the base-ten numeration system and place-value concepts

Number & Operations & Algebra: Developing quick recall of addition facts and related subtraction facts & fluency with multidigit addition and subtraction (Measurement)

What is the 3-Tier RTI Mathematics Assessment & Intervention Model?

- Is an assessment & intervention model designed to meet the instructional needs of students in grades K - 2 who are identified as struggling with mathematics
- Provides a framework for providing instruction and using assessment data to inform decision-making
- Is a response-to-intervention model (developing)
- Focuses on standards-based intervention (number & operation, algebra, problem solving [computation, time, money])

What does Tier 1 instruction look like? Findings from Focus Groups & Observations

- Core instruction based on state standards, National Science Foundation instructional recommendations, NCTM *Standards* (teacher created lessons, basal-based instruction)
- Time
 - Average 90 minutes
- Groupings
 - Whole/small grouping; Mixed-level grouping
- Assessment in TEKS-based math instruction
 - Daily assessment (checking for understanding/ observation)
 - Teacher-developed check lists
 - Chapter tests
 - Use of District benchmarks
 - Student's math journal

What does Tier 1 instruction look like? Findings from Focus Groups & Observations (continued)

- **Instructional practices**
 - **Modeling/examples**
 - **Math center activities**
 - **Practice opportunities**
 - **Use of math journal**
 - **Cognitively Guided Instruction (CGI)**
- **Adapted instruction for low achieving students**
 - **One-on-one instruction/reteaching**
 - **Changing difficulty level**
 - **Use of various strategies, materials & tasks**
 - **Increase error correction/immediate feedback**
 - **More manipulatives**

What does Tier 2 intervention look like?

Tier 2 Participants being **tutored by project staff**

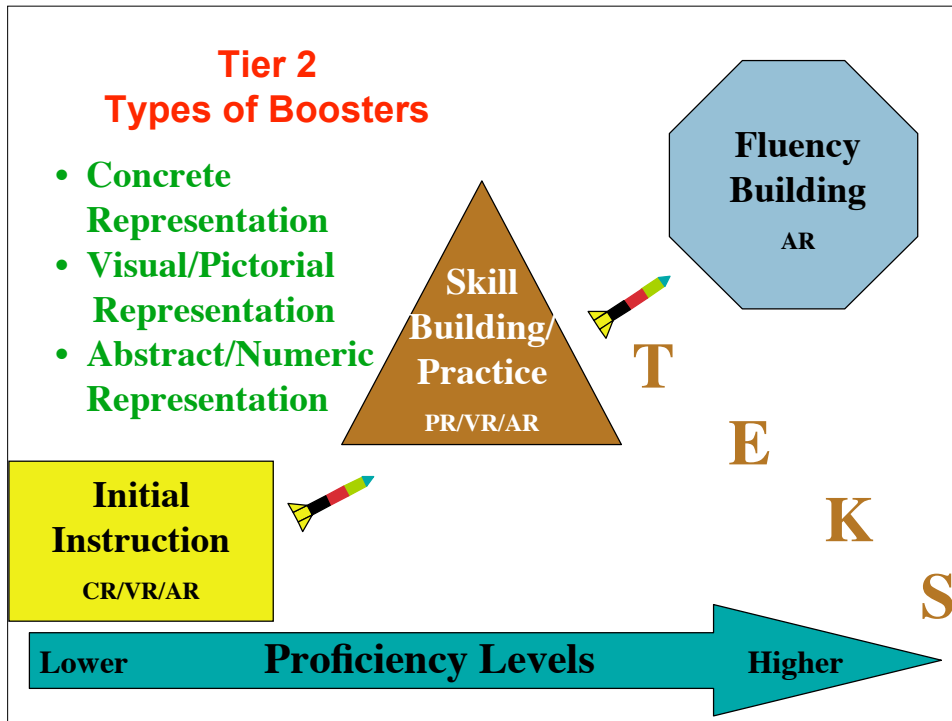
- Approximately 80 K - 2 students received tutoring in one year and approximately 160 K - 2 students in two schools received tutoring the second year in a central Texas school district; 40 1st graders at the UTES.

Tier 2 Participants being taught by **general education teachers**

- Approximately 90 1st grade students in one school district and 30 1st graders in a second district.

Focus of Intervention

- Development and implementation of **booster lessons**
- Supplemental to core mathematics instruction
- Content based on the number, operation, and quantitative reasoning skills and concepts, problem solving



What content is important for Tier 2 instruction?

Word Problem Solving: types of problems, information, multiple steps, contextualized

Number Knowledge and Relationships

Counting: Rote, Rational, Counting Up/Back, Skip (2, 5, 10)

Number Recognition & Writing: 0 – 99 (1st grade); 0 – 999 (2nd grade)

Comparing & Grouping Numbers

Number Relationships of more, less

Relationships of one and two more than/less than

Anchoring Numbers to 5 & 10 frames

Part-part-whole Relationships (e.g., ways to represent numbers)

Numeric Sequencing

**What content is important for Tier 2 instruction?
(continued)**

Base 10 & Place Value

Making and counting: groups of tens and ones (1st grade); groups of hundreds, tens, and ones (2nd grade)

Using base-ten language (3 hundreds, 0 tens, 6 ones) and standard language (306) to describe place value

Reading and writing numbers to represent base ten models

Naming the place value held by digits in numbers

**What content is important for Tier 2 instruction?
(continued)**

Addition & Subtraction Combinations

Identity Element and Properties

Fact Families

Counting & Decomposition Strategies (e.g.,

**Addition: count on [+ 0, + 1, + 2],
doubles, doubles +1, make 10 + more;**

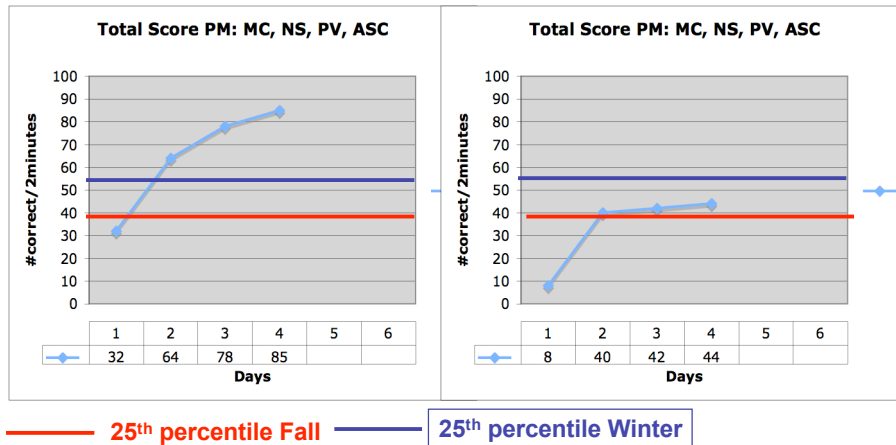
**Subtraction: count down [-0, -1, -2, -3],
count up; Number Bonds)**

- (1) Groupings: homogeneous grouping with 4 - 5 students per group
- (2) Duration: 4 times per week for 20 minutes
- (3) Lesson Design: sequential & mixed (instructional content), scripted interventions; explicit, strategic, “think aloud;” error correction; factual and procedural learning
- (4) Instructional Content: IC ranges focusing on difficult numbers (teens, 3-digit #s with 0 place holder or teens); mathematics vocabulary (e.g., greater than/less than); number/operation, algebra, problem solving
- (5) Representations: physical (concrete), visual (pictorial), abstract (numbers)
- (6) Materials: number charts (100s), 5- and 10-frames, counters, cubes, number lines (horizontal/vertical), base-ten materials, dot cards (subitizing)
- (7) Stages of Learning-acquisition (control materials); generalization: IP to probes to TEMI-PM
- (8) Progress monitoring: activity level-daily (independent practice: 1-2 minutes depending on grade level and difficulty of content); bi-weekly (probes or TEMI-PM)

Examples of Fidelity of Implementation

Teacher Behavior	Most of the time	Some of the time	Rarely	Not at all
	3	2	1	0
Intervention				
Teacher follows script sufficiently to ensure fidelity of implementation.				
Teacher implements each step (modeling, GP, IP) sufficiently to ensure fidelity of implementation.				
Teacher implements self -correct/EC following IP to ensure students learn IC.				
Instruction				
Teacher maintains brisk pace.				
Teacher provides corrective feedback immediately as needed.				
Teacher talk is kept to a minimum and is characterized with short requests “What answer?” “How many?”				
Teacher engages students throughout lesson with a response that is verbal, written, or hands -on.				
Teacher models using “think aloud.”				

Bi-Weekly Progress Monitoring: 1st Grade Group Example (fall, 2006)



Future Directions with Tier 2 Intervention program based on “lessons learned”

1. Focus on ways to promote generalization (materials, ways to respond - verbal, written)
2. Structure materials and included different materials to represent and practice concepts (pictorial)
3. Focus on difficult numbers/concepts (teens, 0 as place holder)
4. Provide more opportunities to practice
5. Focus on fact families; number bonds
6. Focus on behavioral interventions (redirecting, points)
7. Focus on problem solving
8. Developing benchmarks
9. Examining Tier 3

Findings Fall to Winter

- Regression Discontinuity Analysis
- Significant program effect for 1st and 2nd grade

What are the modes of assessment that local education agencies can use to assess whether students are making sufficient progress in primary grades mathematics instruction?

Assessment In Mathematics RTI



Basically, it all falls under the umbrella of progress monitoring.



Assessment: Identification & Levels of Progress Monitoring

progress monitoring:
a set of techniques for
assessing student
performance on a
regular and frequent
basis (*R. Quenemoen,
M. Thurlow, R. Moen,
S. Thompson, A.
Blount Morse*)

What was learned
bi-weekly; was it
maintained and
can it generalize
to a testing
format?
*Booster Probes;
Continuous PM*

What was
learned bi-
weekly, and can
it generalize to
the larger
instructional
content?
*Different Forms
of Measures;
Continuous PM*

What was learned
this trimester?
*Pre-, Mid-, and
Post-testing
Forms F, W, and S
of Measures; Fall
and Winter testing
used for Entry to
and Exit from
intervention*

**Content II
Level**

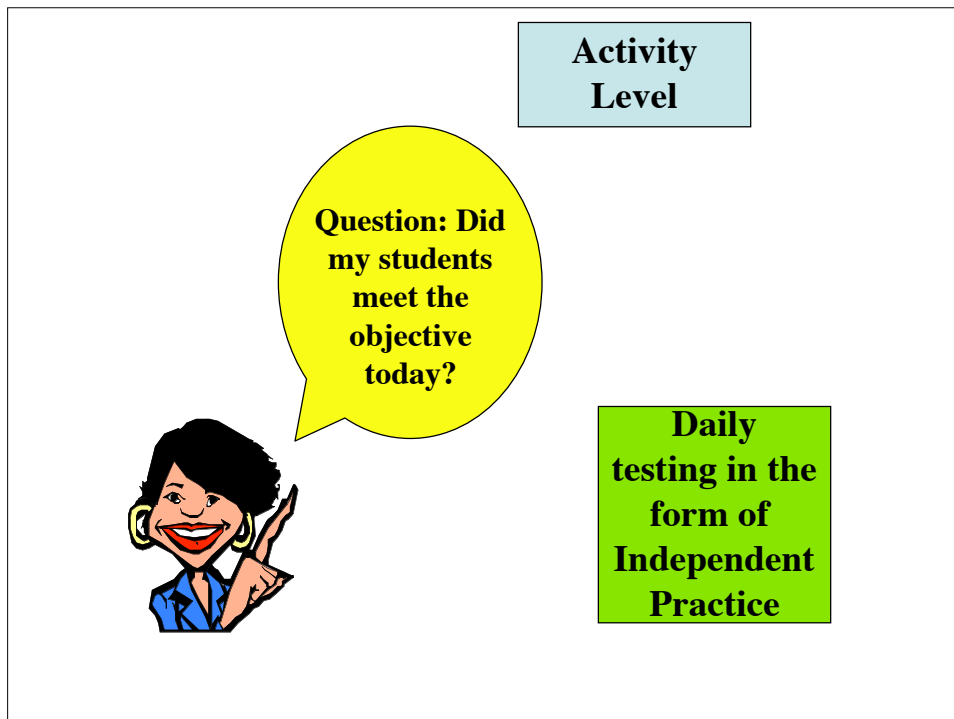
**Content I
Level**

*Texas Early
Mathematics
Inventory-
TEMI-O
TEMI-PM*

What was
learned today?
*Independent
Practice;
Continuous PM*


**Probes: Maintenance/
Generalization
Level**

**Activity
Level**



**Maintenance/
Generalization
Level**


Question: Did my students maintain what they learned over 2 weeks, and can they generalize their learning to a testing format?



**Bi-weekly
(fortnight)
testing with
Probes**

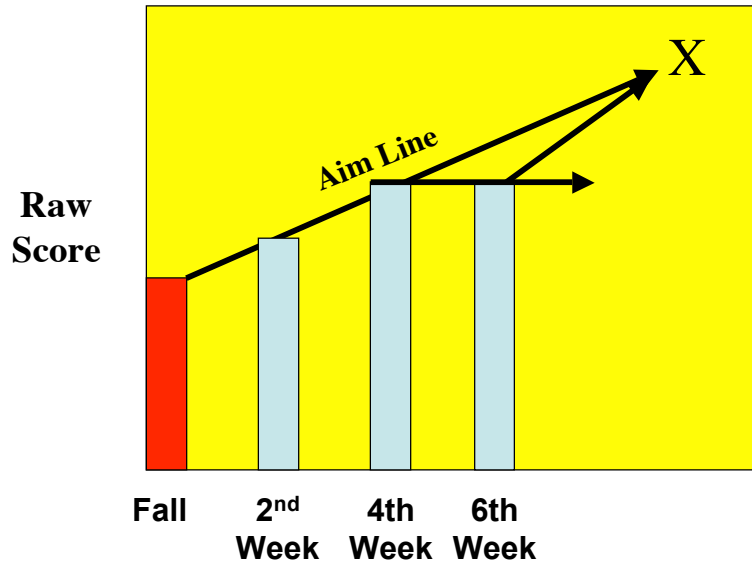
**Content I
Level
(Forms A, B, C, & D)**

Are my students making overall gains so they can reach their end of year goals?



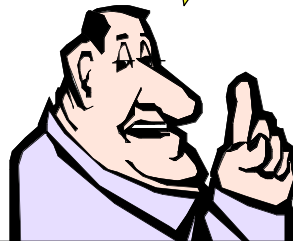
**Bi-weekly
(fortnight)
testing
with
TEMI-PM**

Keep on Track



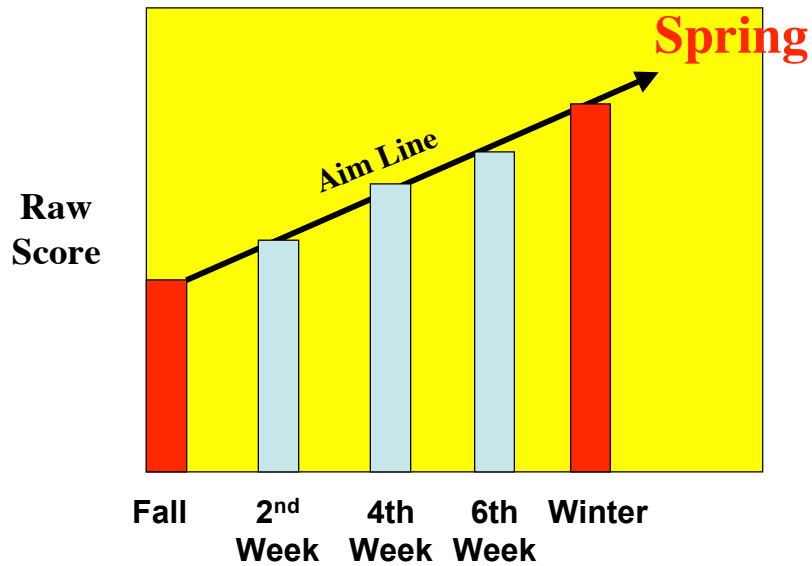
Content II
Level
(Forms F, W, & S)

Are my students
on track this
semester to meet
their end of year
goals?



Fall/Winter/Spring
Testing with
TEMI-PM/O

Keep on Track



RTI Mathematics Assessments Texas Early Mathematics Inventories: Progress Monitoring, Outcome, Probes

TEMI-PM

- Group-administered fluency measures
- Identify struggling students
- Determine areas of remediation needs
- Monitor progress

The TEMI-PM serves as
Both Universal Screener,
Identification Measure, and
Intervention Baseline score

TEMI-O

- Group-administered assessments
- Identify strengths and struggles across skills
- Identify global performance struggling students

The TEMI-O serves as
an outcome measure
monitor yearly
progress across the
TEKS.

TEMI-P

- Maintenance/Generalization progress monitoring
- In-depth analysis of TEMI-O Computation

The TEMI-P are Probes that are administered every 2 weeks to ensure that the students have mastered the content they have been taught in the most recent lessons.

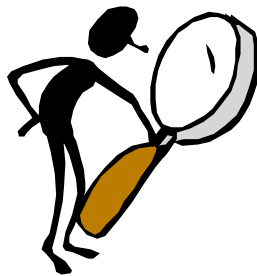
Future Directions in Assessment

Spring '07 testing

Establish Preliminary Benchmarks

Fall/Winter/Spring Texas Scale-up

Create Dynamic Assessment Protocol

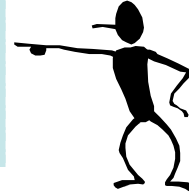


Step-by-Step Guide to RTI Mathematics

Note: There are SEVERAL RTI models available. This is just one; the one we have selected to use in our 2007-2008 research.

Step 1. Conduct Fall Testing

**Administer the TEMI-PM and TEMI-O (Form F)
Identify students who qualify for Tier 2 and Tier 3
intervention**

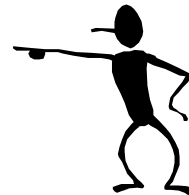


Step 1. Conduct Fall Testing

**Administer the TEMI-PM and TEMI-O (Form F)
Identify students who qualify for Tier 2 and Tier 3
intervention**

Step 2. Intervene (continuous)

**Target areas of need
Conduct Booster Sessions
Implement Peas Make Great ICE
Packs
Conduct Fidelity Checks**



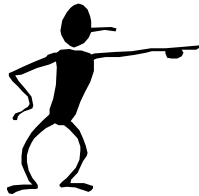
Step 1. Conduct Fall Testing

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**Target areas of need
Conduct Booster Sessions
Implement *Frozen Peas Make
Great ICE Packs**
Conduct Fidelity Checks**

***Contact us for
more information**

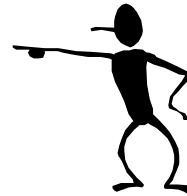


Step 3. Conduct Activity Level PM

**Determine whether the student
learned the objective
Apply the *ADAPT Framework****

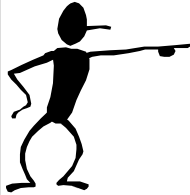
Step 4. Conduct Bi-weekly Testing with Probes

**Has the student maintained learning?
Can the student generalize knowledge to a
testing format?**



Step 4. Conduct Bi-weekly Testing with Probes

Has the student maintained learning?
Can the student generalize knowledge to a testing format?



Step 5. Conduct Bi-weekly Testing (Content Level I) with TEMI-PM, Forms A-D

Chart progress
Is the student making gains toward yearly goal?

Step 4. Conduct Bi-weekly Testing with Probes

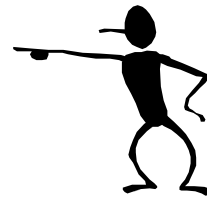
Has the student maintained learning?
Can the student generalize knowledge to a testing format

Step 5. Conduct Bi-weekly Testing (Content Level I) with TEMI-PM, Forms A-D

Chart progress
Is the student making gains toward yearly goal?

Step 6. Conduct Winter/Spring Testing (TEMI-D/O Forms W & S)

Can the student EXIT the program?
Do other students enter the program?
LD Identification?



Who is then identified as qualifying for LD services?

That is up to you (LEA/SEA).



Questions to consider:

1. Does RTI make a valid contribution to LD ID?
2. Does the student have general learning disabilities or a specific learning disability?
3. Is it important to identify all areas of learning disabilities or just one? (e.g., Rdg. & Math? Wtg?)
4. Does the student remain a candidate after exclusionary criteria have been applied?
5. Is IQ to be a determining factor in the identification of a specific learning disability? (IQ=65, non-MR)
6. Does a student with a learning disability have to be a Tier 3 student? (Revolving Door Students)

Final Thoughts

We want to keep our eyes on the students with LD. We want to guard against allowing ourselves, our work, and our energies to be diverted. We want to advocate for those non-Tier 3 students with LD, and advocate for teachers of students with LD to help them meet these students' needs.

We are concerned that students who do not respond to instruction that is “scientifically-based” may be directed to life skills and away from college prep. We want to keep our energies and research focused on assistive technology adaptations to help students with severe problems be successful across environments.

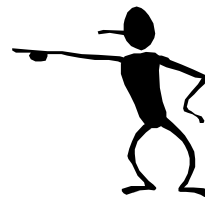
It is not our goal to “fix” general education. As special educators, we see our role as supporting classroom teachers as they meet the needs of their students with disabilities in inclusive settings.

We want to continue to monitor advances in technology that will reinforce the founding notion that LD is a CNS-based dysfunction -- it is real.

We want to continue to prepare qualified professionals to engage in “specialized, individualized, iterative, intensive, relentless, instruction*” and to “never give up!”

***Doug Fuchs; James Kaufman; Daniel Hallahan**

For information about field testing the assessment instruments in the fall, winter, and spring of 2007-2008, log onto an informational web cast (see next slide for details).



That's all folks!

Feel free to contact us for more information.

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Thanks for coming!