

# Technical Issues in Using Progress Monitoring for Instruction

*Advances in Progress Monitoring: Curriculum-Based  
Measurement Research and Innovations*  
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# Overview

- Research Supporting Use of CBM as a Progress Monitoring Method for Increasing Student Achievement
  - Information taken from: Stecker, P.M., Fuchs, L.S., & Fuchs, D. (2005). Using curriculum-based measurement to improve student achievement: Review of research. *Psychology in the Schools, 42*(8), 795-819.
- Enhancing Achievement for Students with Disabilities
  - Data-based decision rules
  - Skills analysis feedback
    - For individual students
    - Teacher recommendations
- Enhancing Achievement for Students in General Education
  - Classwide analysis and instructional recommendations
  - Connections to intervention: Peer-Assisted Learning Strategies
- Conclusions
- Future Research

# Curriculum-Based Measurement

- Original intent (1970s at IRLD) was to develop measures that were technically sound, simple to use, and efficient
- Purpose was to document student growth and determine necessity for modification of instructional programs
- Goal: Enhance student achievement

# CBM Research to Enhance Student Achievement

- Evaluating experimental-contrast studies that assessed student achievement:
  - Early research of the IRLD failed to demonstrate increased student achievement for students whose teachers used CBM (King, Deno Mirkin, & Wesson, 1983; Skiba, Wesson, & Deno, 1982; Tindal, Fuchs, Christenson, Mirkin, & Deno, 1981)
  - Teachers had collected data correctly but failed to comply with standard data-utilization rules

# CBM Research to Enhance Student Achievement (cont'd)

- First large experimental-contrast study to document increased student achievement among students whose teachers used CBM: Fuchs, Deno, & Mirkin, 1984
  - Monitored student progress in reading (1-min. ORF) at least twice weekly
  - Every 7-10 data points, trend of current performance was compared to the goal line of anticipated progress
  - Teachers (experimental and contrast) met weekly with consultants to review data or discuss strategies for instructional and behavioral difficulties
  - ANCOVA revealed significant growth on posttest reading passages and on two subtests of the SDRT

# CBM Research to Enhance Student Achievement (cont'd)

- What was different about Fuchs, Deno, & Mirkin, 1984?
  - Teachers appeared to comply with decision rules
  - Weekly meetings also occurred with contrast teachers, so consultation alone was not the contributing factor
- These systematic procedures prescribed by CBM appeared to affect student achievement significantly and powerfully

# CBM Research to Enhance Student Achievement (cont'd)

- L. S. Fuchs and Fuchs (1986) conducted a meta-analysis of systematic formative evaluation and its effect on student achievement.
- Findings appear robust for students whose teachers employed systematic formative evaluation procedures over conventional methods of progress monitoring.
  - However, only 1/3 of the studies utilized CBM (all in rdg)
  - Largest effect sizes were associated with
    - Teachers' use of behavior modification
    - Data-decision rules
    - Graphed displays of student data

# Enhancing Achievement for Students with Disabilities—Using Data-Based Decision Rules

- Data collection alone is not powerful enough to effect greater student achievement—**teachers need to use the data to enhance instructional effectiveness!**
  - Special education teachers need to compare graphed data to the goal line on a regular basis and use the information to make instructional modifications (L.S. Fuchs et al., 1984; Jones & Krouse, 1988)
  - Concerns expressed regarding time and effort involved in test development, administration, and interpretation (Wesson, King, & Deno, 1984)

# Enhancing Achievement for Students with Disabilities—Using Data-Based Decision Rules (cont'd)

- Data-management software helps teachers to be more efficient and increases satisfaction with CBM (L. S. Fuchs, Fuchs, & Hamlett, 1988)
  - Software aids in compliance with data-based decision rules (L. S. Fuchs, Fuchs, & Hamlett, 1988)
  - Compliance with data-decision rules does effect achievement--higher rates of improvement for students whose teachers made at least one program modification (L.S. Fuchs, Fuchs, & Hamlett, 1989b)
  - Built-in prompts to raise students' goals (based on data vs. goal line) produces greater achievement than teachers raising goals on their own (L.S. Fuchs, Fuchs, & Hamlett, 1989a)

# Using Data-Based Decision Rules:

Which Rules and How  
Often?

# Data-Based Decision Rules Built into Current Software

- Trend-Line Rule--compare trend of student current performance to goal line of expected student performance
- 4-Point Rule--may apply earlier than trend-line rule, when applicable, by comparing the most recent 4 points to the goal line

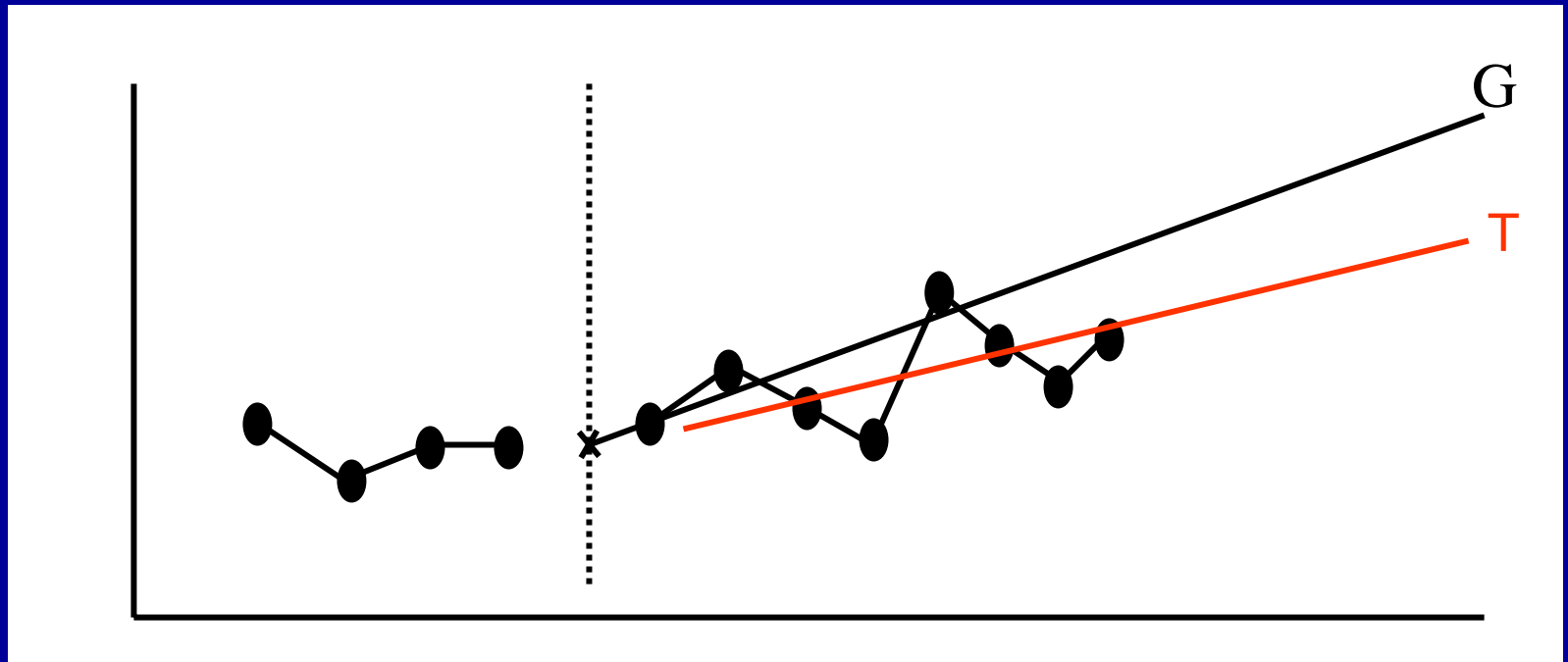
Software is L. S. Fuchs, Hamlett, & Fuchs' Monitoring Basic Skills Progress: Basic Reading and Basic Math (Computation and Concepts/Applications). Available: <http://www.proedinc.com>

# General Decision-Making Framework in Fuchs and Fuchs Studies

## Trend-Line Rule

- If 4 weeks of instruction have occurred AND at least 8 data points have been collected, figure trend of current performance and compare to goal line.
  - If trend of student progress is steeper than goal line, raise goal.
  - If trend of student progress is less steep than goal line, make a teaching change.

# What Is the Data-Based Decision Rule?

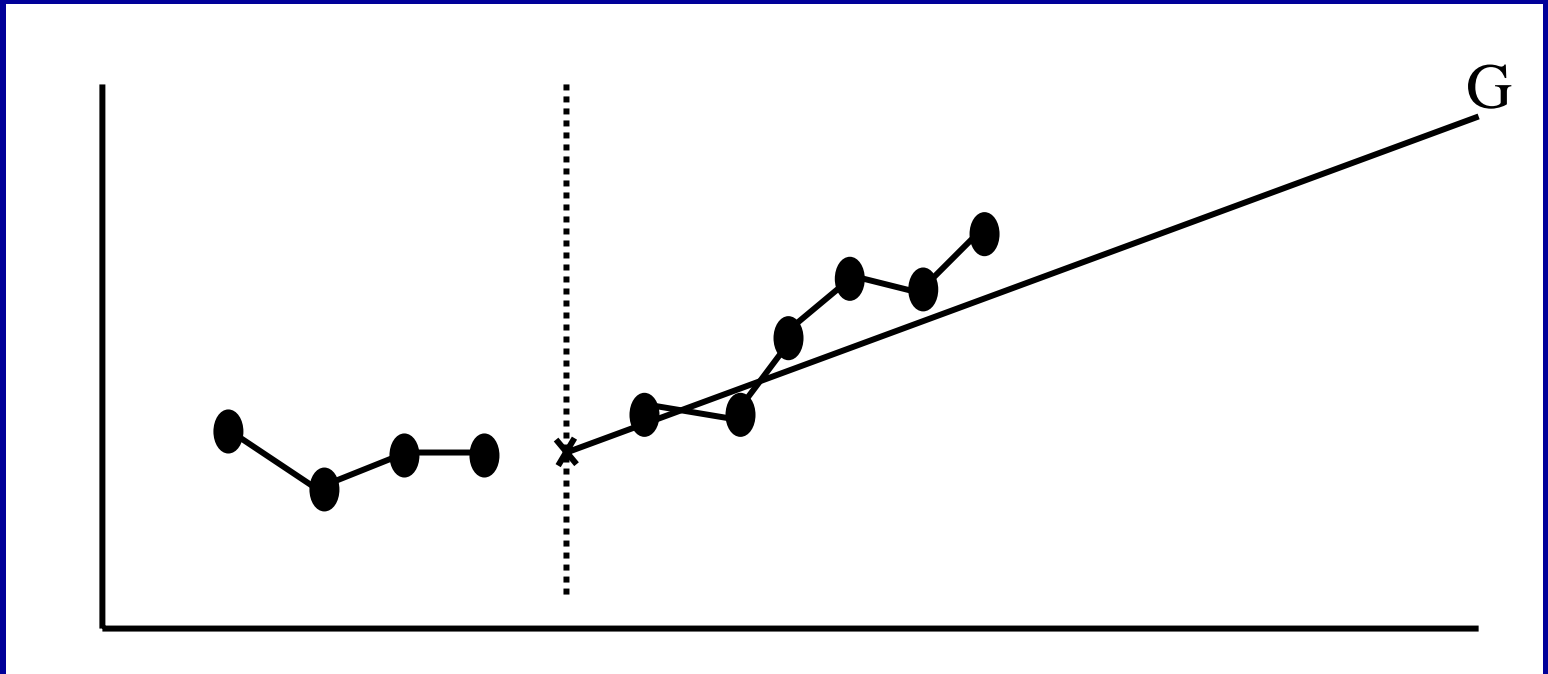


# General Decision-Making Framework

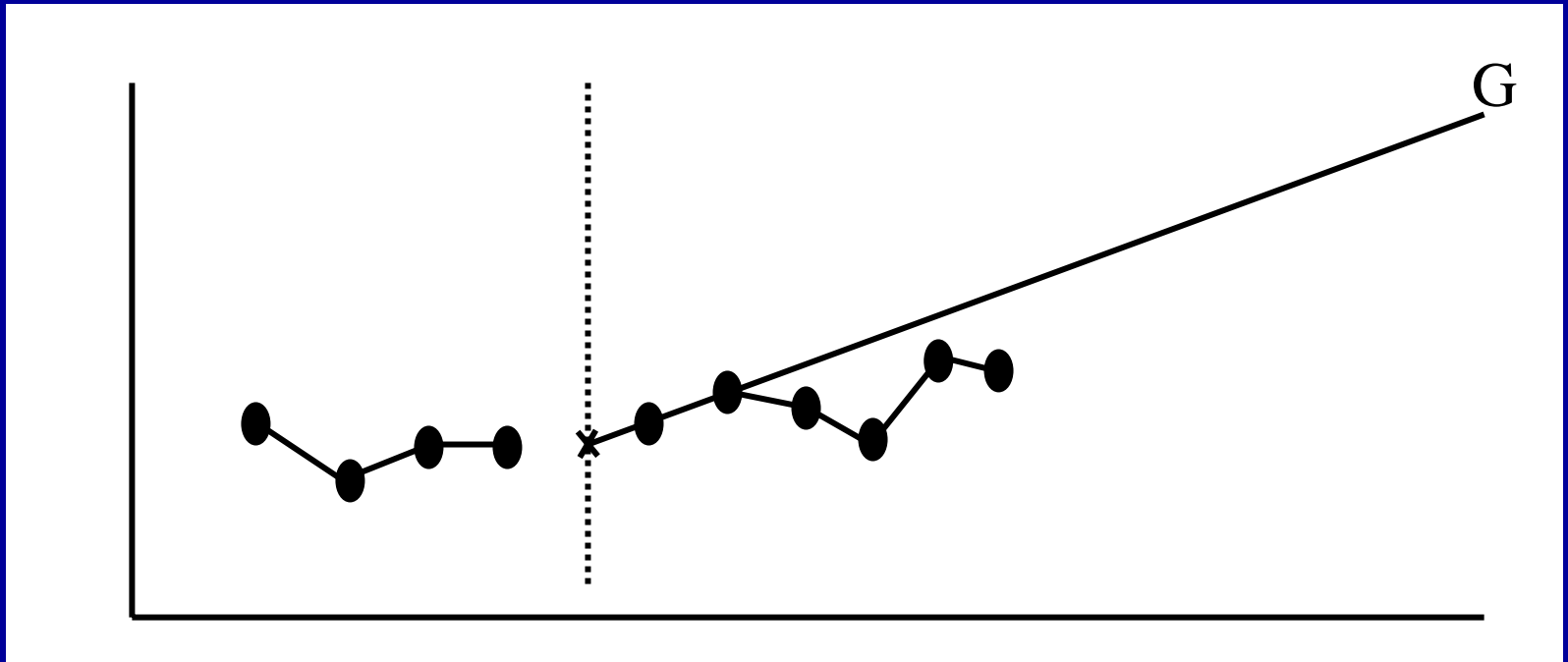
## 4-Point Rule

- If 3 weeks of instruction have occurred AND at least 6 points have been collected, examine the 4 most recent data points.
  - If all 4 are above goal line, increase goal.
  - If all 4 are below goal line, make a teaching change.
  - If the 4 data points are both above and below the goal line, keep collecting data until trend-line rule or 4-point rule can be applied.

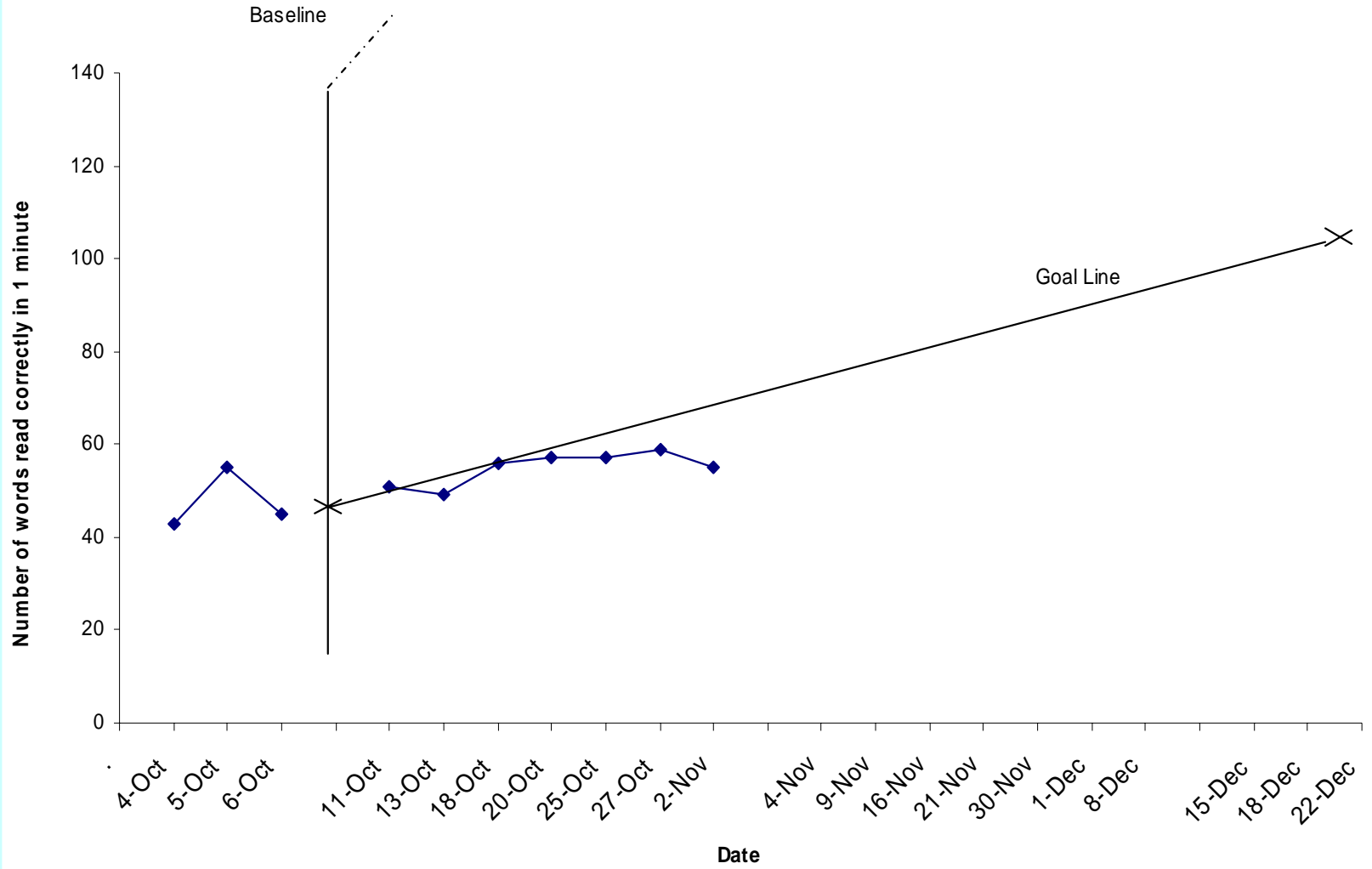
# What Is the Data-Based Decision Rule?



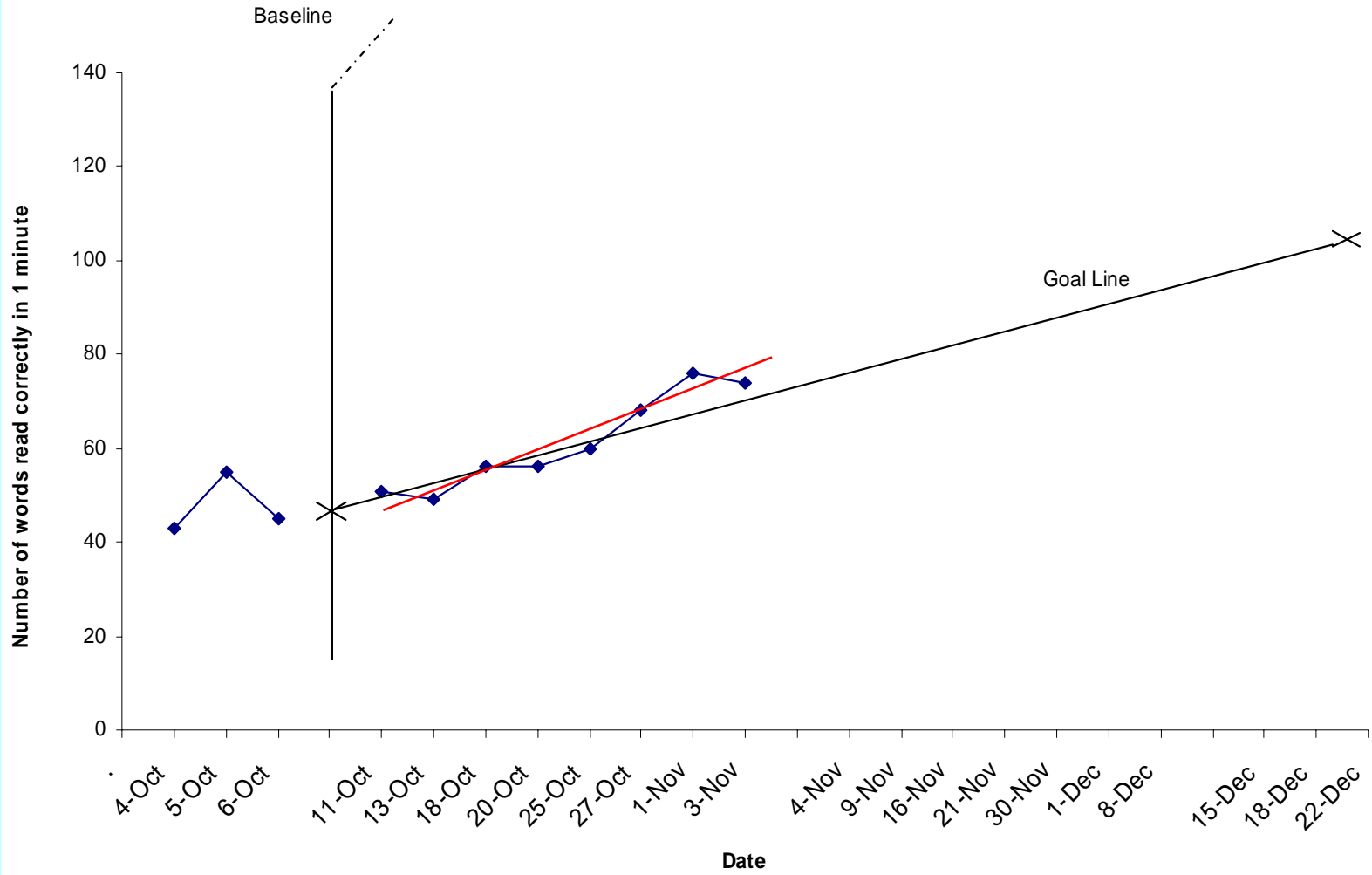
# What Is the Data-Based Decision Rule?



# Reading Graph for Sam



# Reading Graph for Sam



# Research to Practice: Data-Based Decision Making

- For each student or group of students, determine what the decision-making rule(s) will be prior to regularly scheduled decision making
- Determine who will support the teacher, prompting them to examine the data and to formulate instructional changes

# Enhancing Achievement for Students with Disabilities: Skills Analysis Feedback

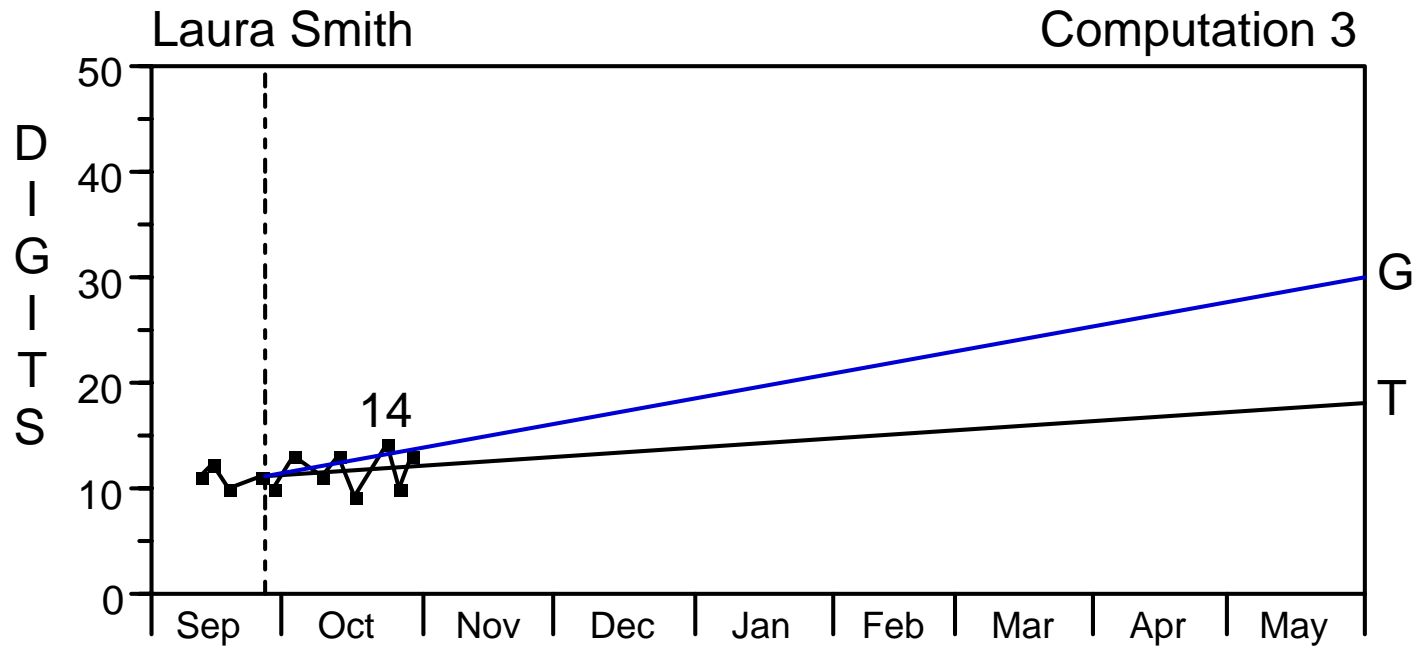
- Satisfaction also increases with student data-collection software (L. S. Fuchs, Fuchs, Hamlett, Stecker, & Ferguson, 1988)
- Individual students—qualitative information about level of skills mastery resulted in greater student performance (L.S. Fuchs, Fuchs, Hamlett, & Stecker, 1990)
- Teacher consultation—instructional consultation or ongoing recommendation system may effect greater achievement. Research demonstrated more changes in programs and more substantive changes (L.S. Fuchs, Fuchs, Hamlett, & Ferguson, 1992; L.S. Fuchs, Fuchs, Hamlett, & Stecker, 1991).
- Pairs of students receiving same interventions—greater achievement is attained when instructional changes are implemented based on individual students' graphs (Stecker & Fuchs, 2000)

# Research to Practice: Using Skills Analysis Feedback

- Use data-based rules to determine when to make instructional changes or to increase a goal
- Use qualitative database to identify potential areas of weakness for remediation

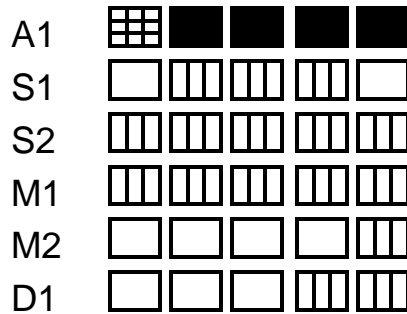
Student data trend < goal line:

Make a teaching change.



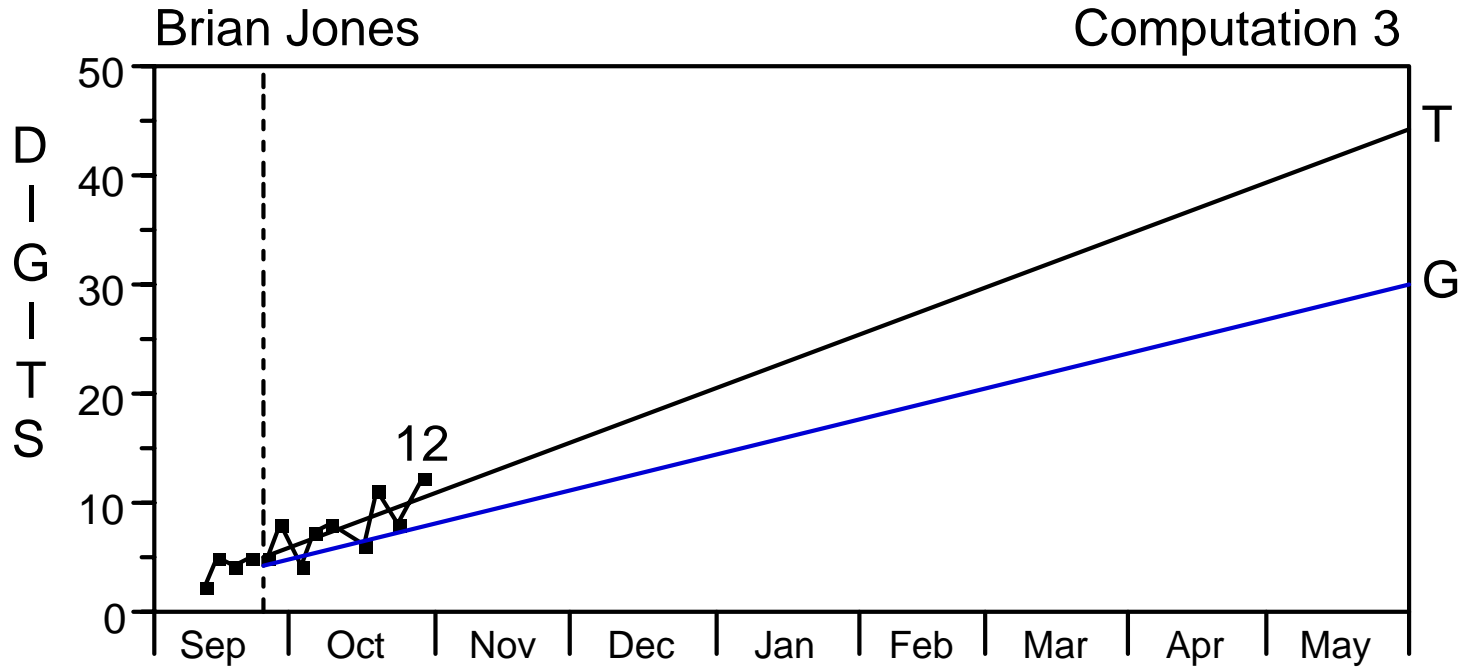
Uh-oh! Make a teaching change.

Student's rate of progress is less than the goal line.



Student data trend > goal line:

Raise the goal.

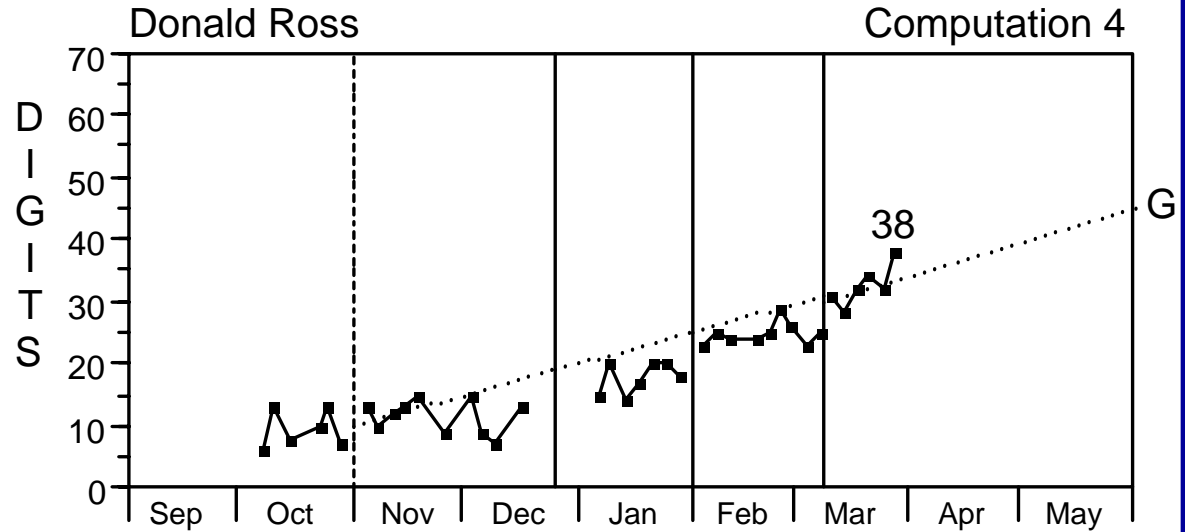


**OK!! Raise the goal.**

Student's rate of progress exceeds the goal line

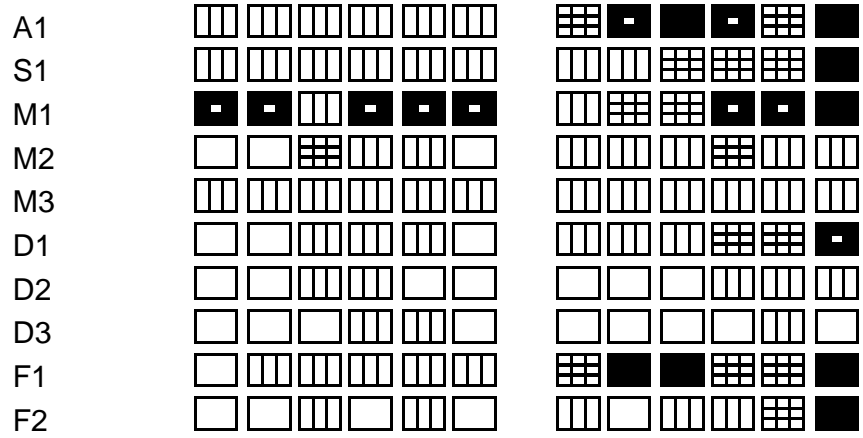
A1					
S1					
S2					
M1					
M2					
D1					

# Using CBM to test effectiveness of adaptations to class instruction



**Wait. Not enough scores for decision.**

You need at least 8 scores to make a decision.



# Enhancing Achievement for Students in General Education

- Classwide analysis and instructional recommendations
- Use of Peer-Assisted Learning Strategies (PALS) as way to enhance instructional practice for *all* students

# Classwide Analysis and Instructional Recommendations

- General education teachers (Grades 2-5) received classwide feedback along with instructional recommendations or just classwide skills feedback without instructional recommendations (L. S. Fuchs, Fuchs, Hamlett, Phillips, & Bentz, 1994)
  - CBM implemented with fidelity across the classes and teacher satisfaction was high
  - Teachers receiving both classwide analysis and instructional recommendations effected greater growth than teachers receiving only classwide feedback and contrast teachers
  - Average-achieving and low-achieving students grew more than did students with disabilities
  - Teachers addressed more computational skills, taught more one to one or used peers, and used more systematic motivational systems than the other two groups

# Connections to Intervention: PALS

- Peer-Assisted Learning Strategies (PALS)
  - Teachers implementing PALS (Grades 2-4) changed student pairings every 2 weeks using CBM data. Every child served as a coach at least once every 6 weeks.
    - PALS students grew more than students in the contrast group, and low-achieving students and those with disabilities grew more on computational skills (which had been tutored) than on concept/applications (which was a transfer measure).
    - However, average-achieving peers grew comparably on both types of measures (L.S. Fuchs, Fuchs, Phillips, Hamlett, & Karns, 1995)

# Connections to Intervention: PALS

Another study extended PALS work: PALS plus elaborated feedback (e.g., paying attention to the partner's work, explanation of how the answer was attained, asking for help) was contrasted with PALS plus elaborated feedback and conceptual explanations (e.g., using manipulatives to demonstrate problems, building number sentences to incorporate real-life scenarios, discussing why problems need to be worked a certain way).

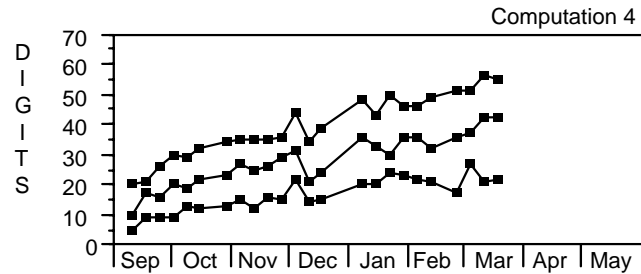
- Both PALS groups performed better than the contrast group, but PALS students in the elaborated feedback + conceptual explanations group grew the most, with differential effects for high and low performers approaching significance (L. S. Fuchs et al., 1997)

In general education, the focus is on the class report to enhance instruction for all students and to identify which students are in need of more help.

## CLASS SUMMARY

Teacher: Mrs. Smith

Report through 3/17



### Students to Watch

Jonathan Nichols  
Amanda Ramirez  
Anthony Jones  
Erica Jernigan  
Icon

### Most Improved

Icon  
Michael Elliott  
Jonathan Nichols  
Michael Sanders  
Matthew Hayes

### Areas of Improvement: Computation

M1 Multiplying basic facts  
M2 Multiplying by 1 digit  
M3 Multiplying by 2 digits  
D1 Dividing basic facts

### Whole Class Instruction: Computation

M3 Multiplying by 2 digits

58% of your students are either COLD or COOL on this skill.

### Small Group Instruction: Computation

S1 Subtracting

Cindy Lincoln                      Michael Sanders  
Icon  
Kaitlin Laird  
Michael Elliott

# Class Skills Profile-- by problem type for each student

## CLASS SKILLS PROFILE - Computation

Teacher: Mrs. Smith

Report through 3/17

Name	A1	S1	M1	M2	M3	D1	D2	D3	F1	F2
Adam Qualls	■	■	■	▤	▤	▤	▤	▤	■	▤
Amanda Ramirez	■	▤	■	▤	▤	▤	▤	□	■	□
Anthony Jones	▤	▤	■	▤	▤	▤	▤	▤	□	□
Aroun Phung	■	■	■	■	■	■	▤	▤	■	■
Becca Jarrett	■	■	■	■	▤	■	▤	▤	■	■
Charles McBride	■	■	■	■	▤	■	▤	▤	■	■
Cindy Lincoln	▤	▤	■	■	▤	■	■	□	▤	■
David Anderson	▤	▤	■	■	▤	▤	▤	▤	■	■
Emily Waters	■	■	■	■	▤	■	■	▤	■	■
Erica Jernigan	■	▤	■	▤	▤	▤	▤	□	□	□
Gary McKnight	■	■	■	■	▤	■	▤	▤	■	■
Icon										
Jenna Clover	■	■	■	■	▤	■	▤	□	■	■
Jonathan Nichols	■	▤	■	■	▤	■	□	□	▤	▤
Jung Lee	■	■	■	■	■	■	■	■	■	■
Kaitlin Laird	■	▤	■	▤	▤	▤	▤	□	■	■
Kathy Taylor	■	■	■	■	■	▤	▤	▤	■	■
Matthew Hayes	■	■	■	■	■	▤	▤	▤	■	■
Michael Elliott	■	□	■	■	▤	■	▤	▤	▤	■
Michael Sanders	▤	▤	■	▤	▤	▤	▤	□	■	▤
Samantha Spain	▤	■	■	■	▤	■	■	■	■	■
Vicente Gonzalez	■	■	■	■	■	▤	□	□	■	□
Victoria Dillard	■	▤	■	■	▤	■	▤	▤	■	▤
Yasmine Sallee	■	■	■	■	■	■	■	■	■	□

□ COLD. Not tried	0	1	0	0	0	0	2	8	2	5
▤ COOL. Trying these.	3	8	0	5	14	3	16	10	3	3
▤ WARM. Starting to get it.	2	1	0	1	3	6	0	2	0	1
■ VERY WARM. Almost have it.	5	3	8	4	0	4	0	1	1	0
■ HOT. You've got it!	13	10	15	13	6	10	5	2	17	14

**Ranked  
Scores--  
Average  
of Last  
Two  
CBM  
Scores  
and the  
Slope--  
Average  
Weekly  
Increase**

**RANKED SCORES - Computation**

Teacher: Mrs. Smith

Report through 3/17

<u>Name</u>	<u>Score</u>	<u>Growth</u>
Samantha Spain _____	57 _____	+1.89
Aroun Phung _____	56 _____	+1.60
Gary McKnight _____	54 _____	+1.14
Yasmine Sallee _____	53 _____	+1.34
Kathy Taylor _____	53 _____	+1.11
Jung Lee _____	53 _____	+1.23
Matthew Hayes _____	51 _____	+1.00
Emily Waters _____	48 _____	+1.04
Charles McBride _____	43 _____	+1.12
Michael Elliott _____	42 _____	+0.83
Jenna Clover _____	42 _____	+0.78
Becca Jarrett _____	41 _____	+1.14
David Anderson _____	38 _____	+0.79
Cindy Lincoln _____	36 _____	+1.04
Kaitlin Laird _____	35 _____	+0.71
Victoria Dillard _____	34 _____	+0.64
Vicente Gonzalez _____	29 _____	+0.28
Adam Qualls _____	26 _____	+0.60
Michael Sanders _____	25 _____	+0.70
Jonathan Nichols _____	25 _____	+2.57
Amanda Ramirez _____	23 _____	+0.85
Anthony Jones _____	19 _____	+0.05
Erica Jernigan _____	18 _____	+0.23
Icon _____	0 _____	+0.00

## PEER TUTORING ASSIGNMENTS

Teacher: Mrs. Smith

Report through 3/17

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M2 Multiplying by 1 digit

First Coach

Second Coach

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■ Samantha Spain  
■ Kathy Taylor  
■ Aroun Phung  
■ Emily Waters  
■ Charles McBride  
■ David Anderson

Icon  
☐☐☐ Erica Jernigan  
☐☐☐ Adam Qualls  
☐☐☐ Michael Sanders  
☐☐☐ Amanda Ramirez  
☐☐☐ Anthony Jones

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M3 Multiplying by 2 digits

First Coach

Second Coach

---

■ Matthew Hayes  
☐☐☐ Cindy Lincoln  
■ Jung Lee  
■ Yasmine Sallee  
■ Vicente Gonzalez  
☐☐☐ Jenna Clover

☐☐☐ Becca Jarrett  
☐☐☐ Kaitlin Laird  
☐☐☐ Victoria Dillard  
☐☐☐ Gary McKnight  
☐☐☐ Michael Elliott  
☐☐☐ Jonathan Nichols

**Possible Peer Tutoring Assignments based on students' recent CBM scores and Skills Profile**

# Overall Class Scores

and ID of  
students  
whose  
progress  
is poor  
compared  
to peers

## CLASS STATISTICS: Computation

Teacher: Mrs. Smith

Report through 3/17

### **Score**

Average score	39.5
Standard deviation	12.6
Discrepancy criterion	26.9

### **Slope**

Average slope	+0.98
Standard deviation	0.53
Discrepancy criterion	+0.45

### **Students identified with dual discrepancy criterion**

	<u>Score</u>	<u>Slope</u>
Anthony Jones	19.0	+0.05
Erica Jernigan	18.0	+0.23

# Research to Practice—Peer-Assisted Learning Strategies (PALS):

<http://kc.vanderbilt.edu/pals/>

- Classwide peer tutoring program to supplement classroom instruction for practicing important reading and mathematics skills
- Validated instructional practices that strengthen general education's capacity to meet academic needs of increasingly diverse population in classrooms

# PALS Research

- Based on Juniper Gardens ClassWide Peer Tutoring model
- Has over 10 years of experimental research
- Used in Title 1 and Non-Title 1 Schools
- Implemented in urban and suburban schools
- Includes high, average, and low achievers as well as students with disabilities

# Critical Features of PALS

- Supplemental reading and mathematics practice several times per week (30-45 min. each session, depending on grade level and activities)
- Structured activities
- Reciprocal roles (Coaches and Players)
- Individualized support--corrective feedback
- More time on task with active engagement
- Inclusion of all students with built-in opportunities for success
- Facilitation of positive peer interactions
- Opportunities to monitor student progress
- Practical AND effective strategies

# Conclusions

- CBM has a positive impact on student achievement when teachers respond to patterns of student data: modifying instruction or raising goals when indicated
- Teachers (both general and special education) appear to benefit from consultation or CBM system recommendations when devising instructional modifications
- General education teachers appear to benefit from PALS as a first-tier approach to accommodating diversity within the classroom

# Future Research

- Examination of Web-based CBM systems
- Application of CBM within an RTI framework
- Continuing examination of the achievement effects garnered for students at each level of an RTI system (using CBM)
- Examining instructional interventions systematically to determine which interventions effect the greatest growth in students at varying academic levels