Interventions for Math-Challenged Students in Middle and High School: The Full Toolkit

Jim Wright
www.interventioncentral.org

INTERVENTION CENTRAL

Response to Intervention/Multi-Tier System of Supports

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Handout 1
(40 pages)

RTI Toolkit: A Practical Guide for Schools

Interventions for Math-Challenged Students in Middle and High School: A Toolkit

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Southern Westchester BOCES
Harrison, NY

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Workshop Downloads at: http://www.interventioncentral.org/math_toolkit

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Handout 2
(7 pages)

IES Practice Guide (May 2012): Improving Mathematical Problem Solving in Grades 4 Through 8

Recommendation 1. Prepare problems and use them in whole-class instruction.

1. Include both routine and non-routine problems in problem-solving activities.

2. Ensure that students will understand the problem by addressing issues students might encounter with the problem's context or language.

3. Consider students' knowledge of mathematical content when planning lessons.

Recommendation 2. Assist students in monitoring and reflecting on the problem-solving process.

1. Provide students with a list of prompts to help them monitor and reflect during the problem-solving process.

2. Model how to monitor and reflect on the problem-solving process.

3. Use student thinking about a problem to develop students' ability to monitor and reflect.

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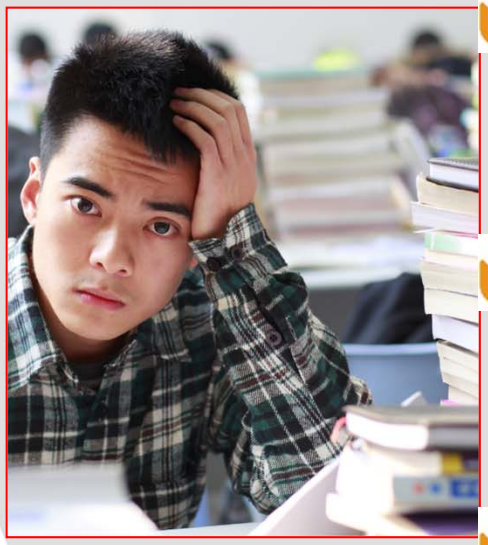
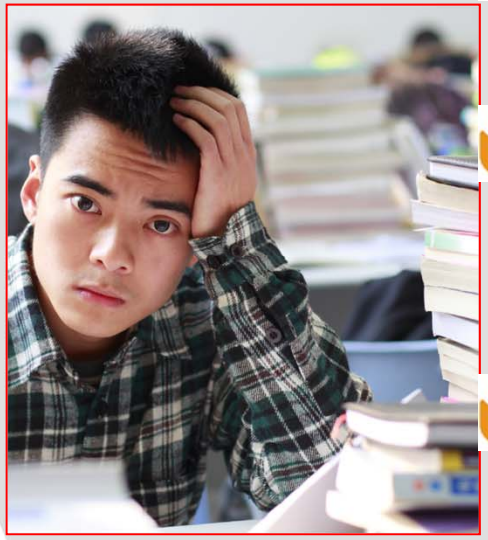
Workshop Agenda: 8 Topics



1. **RTI/MTSS and Mathematics.** What is the RTI/MTSS model and how can it address needs of math-challenged students?
2. **Strong Math Instruction.** What elements of strong math instruction optimize learning for diverse students?
3. **Defining the (Math) Problem.** What are short-cuts to help teachers to identify the primary obstacle(s) to a student's math performance?
4. **Interventions for Math.** What are examples of classroom interventions to address math deficits?
5. **Individualizing Math Supports.** What are examples of differentiation and scaffolding to make math assignments accessible to students?

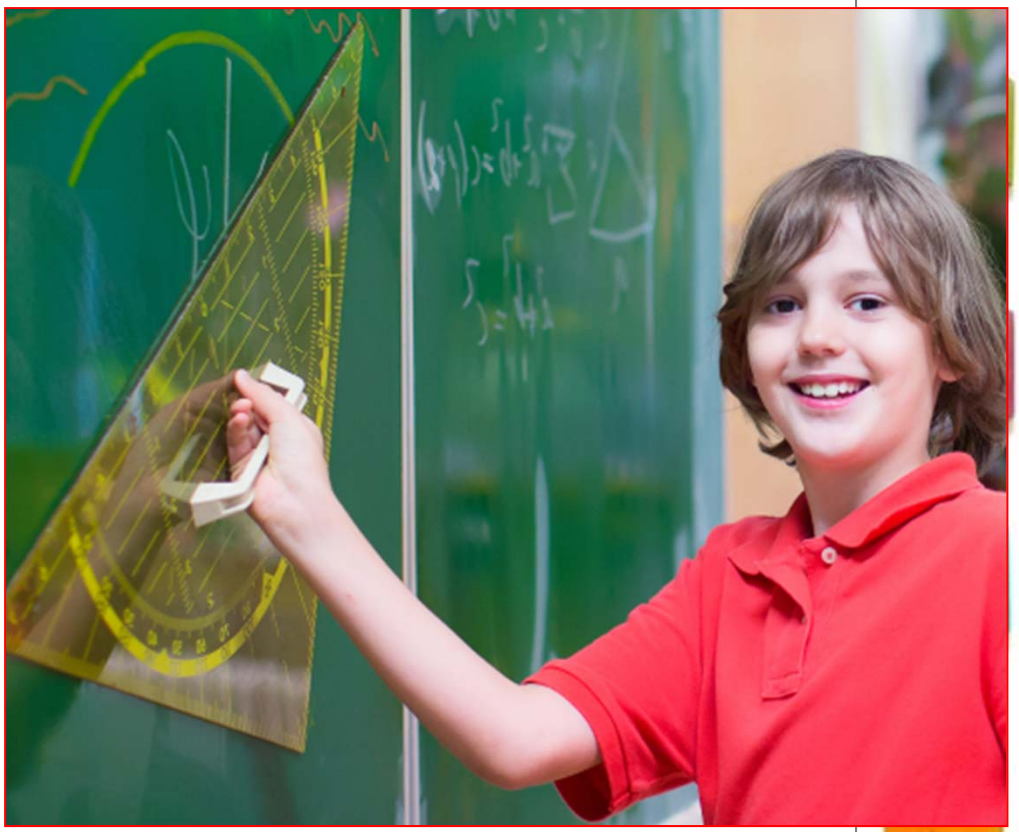
Workshop Agenda: 8 Topics (Cont.)



6. **Math and Data.** What are ways to collect data to monitor math interventions?
7. **Motivation and Math.** What teacher communication tools can promote student optimism and engagement in math?
8. **Documenting Math Interventions.** How can a teacher write down a math intervention in a streamlined way to share with others?

RTI/MTSS and Mathematics.

What is the RTI/MTSS model and how can it address needs of math-challenged students?



RTI vs. MTSS: What is the Difference?

Many schools use the terms Response to intervention (RTI) and Multi-Tier System of Supports (MTSS) interchangeably. However, there is a difference.

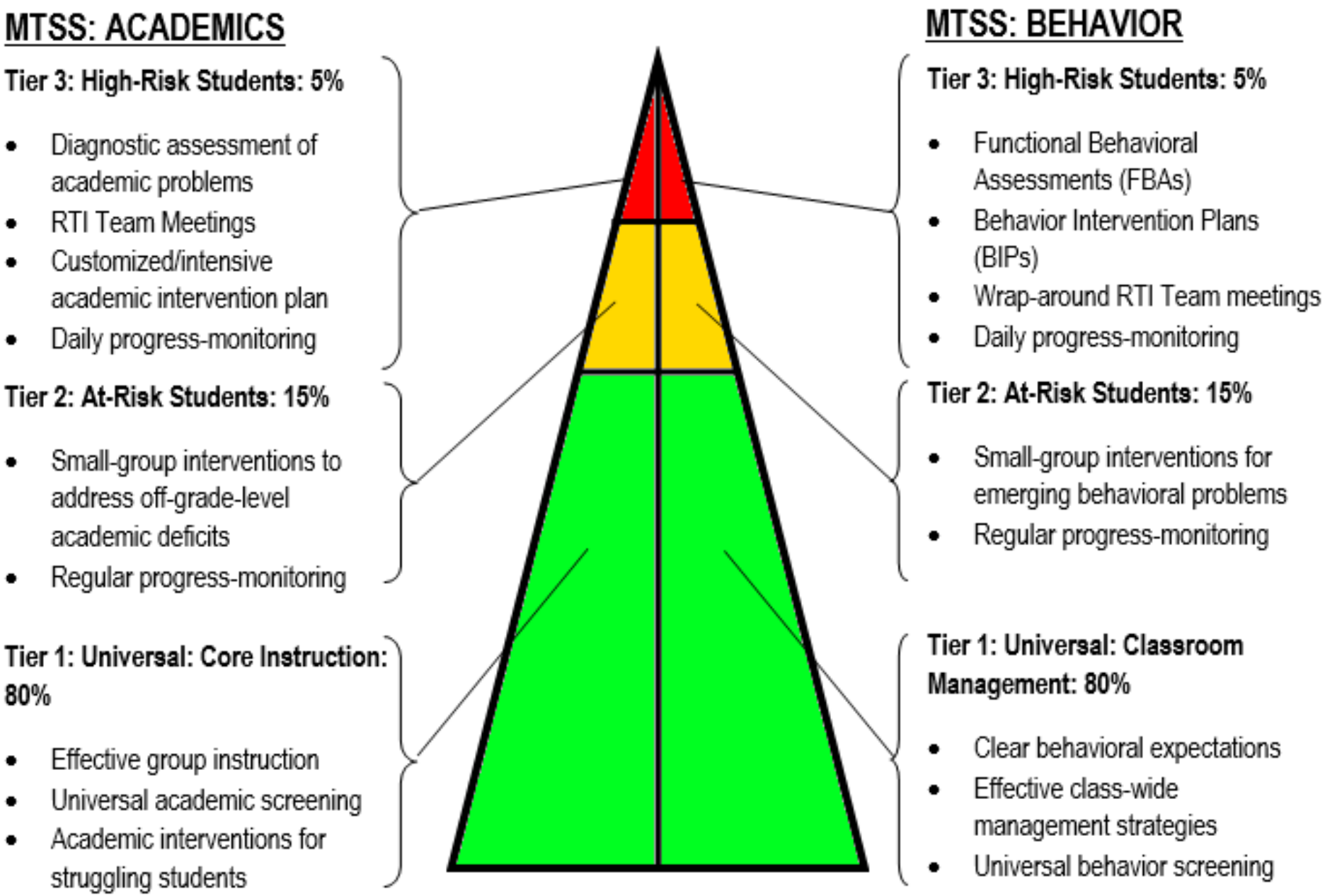
- RTI usually refers to a school's academic support system only.
- MTSS is more expansive, describing the systems set up in a school to provide coordinated support for both academic and behavioral/social-emotional needs.
- However, RTI and MTSS are similar in that each offers several levels of intervention support, uses data to identify students requiring services, and employs research-based strategies to help at-risk learners.

RTI/MTSS for Mathematics: Demonstrating the Need…

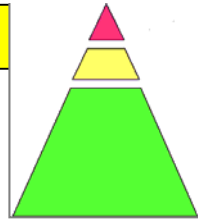
The NAEP is a math-achievement assessment given to a national student sample every 2 years. Here are results for 2015:

	Tier 1	Tier 2	Tier 3
National Assessment of Educational Progress (NAEP): Mathematics: 2015	Proficient: Demonstrated Competency over Challenging Subject Matter	Basic: Partial Mastery of Fundamental Skills	Below Basic
Grade 4	40%	42%	18%
Grade 8	33%	38%	29%
Grade 12	25%	37%	38%

Source: McFarland, J., Hussar, B., de Brey, C., Snyder, T., Wang, X., Wilkinson-Flicker, S., Gebrekristos, S., Zhang, J., Rathbun, A., Barmer, A., Bullock Mann, F., and Hinz, S. (2017). The Condition of Education 2017 (NCES 2017-144). U.S. Department of Education. Washington, DC: National Center for Education Statistics. Retrieved 16 June 2017 from https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2017144.



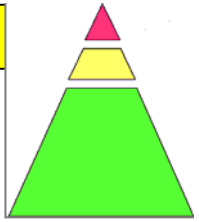
Source: Grosche, M., & Volpe, R. J. (2013). Response-to-intervention (RTI) as a model to facilitate inclusion for students with learning and behaviour problems. *European Journal of Special Needs Education, 28*, 254-269. http://dx.doi.org/10.1080/08856257.2013.768452



RTI: 6 Essential Elements for Mathematics

1. Educators believe that every student has the ability to learn challenging mathematics when given effective instruction and regularly monitored
2. All students are screened 3 times per year, using a math assessment battery that can identify those students who may need additional supplemental assistance to fill in skill gaps.
3. Students on math interventions have their progress monitored regularly to verify that interventions are working and to move students across Tiers as needed.

Source: Lembke, E. S., Hampton, D., & Beyers, S. J. (2012). Response to intervention in mathematics: Critical elements. Psychology in the Schools, 49(3), 257-272.



RTI: 6 Essential Elements for Mathematics (Cont.)

4. Research-based instructional practices and programs are used in core instruction and during interventions.
5. The school has a multi-Tier system set up that provides increasingly intensive math intervention support matched to student need.
6. The school regularly evaluates its Math RTI model (including measurements of intervention integrity) to verify the quality of the model.

Source: Lembke, E. S., Hampton, D., & Beyers, S. J. (2012). Response to intervention in mathematics: Critical elements. Psychology in the Schools, 49(3), 257-272.

Tier 1 Academic Intervention: The Mathematics Teacher is Able to:

1. Provide Strong Core Instruction to the Whole Class

2. Understand & Accept Role as Intervention 'First Responder'

3. Define the Math-Related Problem(s) in Clear & Specific Terms

4. Develop an Appropriate Intervention Plan Matching the Identified Problem(s)

5. Write Down the Intervention Plan Before Implementing

6. Collect Data to Monitor & Judge Student Progress

Response to Intervention/Multi-Tier System of Supports

Five Components of Reading

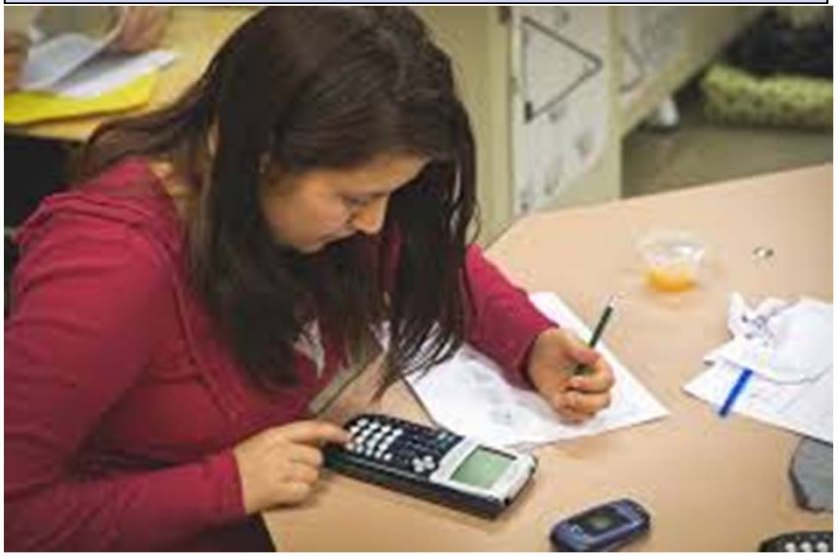
1. **Phonemic Awareness:** The ability to hear and manipulate sounds in words.
2. **Alphabetic Principle:** The ability to associate sounds with letters and use these sounds to form words.
3. **Fluency with Text:** The effortless, automatic ability to read words in connected text.
4. **Vocabulary:** The ability to understand (receptive) and use (expressive) words to acquire and convey meaning.
5. **Comprehension:** The complex cognitive process involving the intentional interaction between reader and text to convey meaning.

Source: Big ideas in beginning reading. University of Oregon. Retrieved September 23, 2007, from http://reading.uoregon.edu/index.php

1. **Understanding.** Comprehending mathematical concepts, operations, and relations--knowing what mathematical symbols, diagrams, and procedures mean.

2. **Computing.** Carrying out mathematical procedures, such as adding, subtracting, multiplying, and dividing numbers flexibly, accurately, efficiently, and appropriately.

Five Strands of Mathematical Proficiency



3. **Applying.** Being able to formulate problems mathematically and to devise strategies for solving them using concepts and procedures appropriately.

4. **Reasoning.** Using logic to explain and justify a solution to a problem or to extend from something known to something less known.

5. **Engaging.** Seeing mathematics as sensible, useful, and doable—if you work at it—and being willing to do the work.

Source: : National Research Council. (2002). Helping children learn mathematics. Mathematics Learning Study Committee, J. Kilpatrick & J. Swafford, Editors, Center for Education, Division of Behavioral & Social Sciences & Education. Washington, DC: National Academy Press.

Lab Work: Strands of Math Proficiency

1. Look over the sheet *5 Strands of Mathematical Proficiency* (Handout 2; p. 4).
2. Discuss how you might use this general 'lens' for analyzing math skills as a means to identify areas of math weakness in an entire class or a single student.

Five Strands of Mathematical Proficiency (NRC, 2002)

1. ***Understanding***: *Comprehending mathematical concepts, operations, and relations–knowing what mathematical symbols, diagrams, and procedures mean.* [Conceptual Knowledge]

Handout 2; p. 4

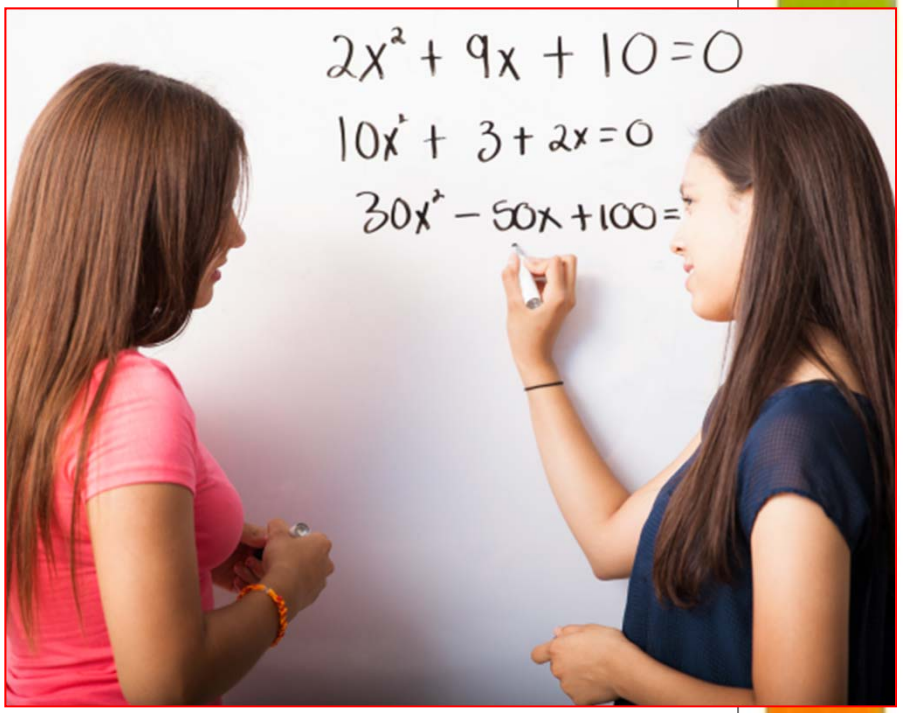
2. ***Computing***: *Carrying multiplying, and dividing numbers flexibly, accurately, efficiently, and appropriately.* [Procedural Knowledge]

3. ***Applying***: *Being able to formulate problems mathematically and to devise strategies for solving them using concepts and procedures appropriately.* [Metacognition]

4. ***Reasoning***: *Using logic to explain and justify a solution to a problem or to extend from something known to something less known.* [Synthesis]

5. ***Engaging***: *Seeing mathematics as sensible, useful, and doable—if you work at it—and being willing to do the work.* [Motivation/Self-Efficacy]

Strong Math Instruction. What elements of strong math instruction optimize learning for diverse students?



Strong Math Instruction

Guiding Points for Teachers…

- Strong core instruction is the primary classroom goal—as students who master key math concepts and skills will not require additional intervention.
- Strong math instruction includes universal elements of good teaching as well as a focus on specific areas unique to the discipline of mathematics.

Tier 1 Academic Intervention: The Mathematics Teacher is Able to:

1. Provide Strong Core Instruction to the Whole Class

2. Understand & Accept Role as Intervention 'First Responder'

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4. Develop an Appropriate Intervention Plan Matching the Identified Problem(s)

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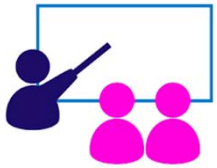
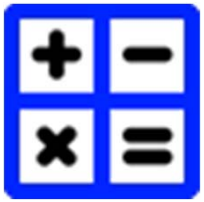
6. Collect Data to Monitor & Judge Student Progress

Core Mathematics Instruction: Overlays

There is no 'national' mathematics curriculum recommended by RTI/MTSS. However, schools can apply 'overlays' to build a model of strong instruction that benefits at-risk students. These 2 overlays include:



Direct instruction. General recommendations for teaching at-risk learners



Math-specific instruction. Elements of math instruction supported by research.

Overlay 1: Direct Instruction

General Elements to Effectively Teach At-Risk Learners

MTSS: Tier 1: Core Instruction: Direct Instruction

Teachers can strengthen their lessons by incorporating into them elements of direct instruction. (Handout 1; pp. 2-4)

How To: Implement Strong Core Instruction

Teacher: Date: Class/Lesson:

The checklist below summarizes the essential elements of a supported-instruction approach. When preparing lesson plans, instructors can use this resource as a 'pre-flight' checklist to make sure that their lessons reach the widest range of diverse learners.

1. Increase Access to Instruction

Instructional Element	Notes
☐ **Instructional Match.** Lesson content is appropriately matched to students' abilities (Burns, VanDerHeyden, & Boice, 2008).	
☐ **Content Review at Lesson Start.** The lesson opens with a brief review of concepts or material that have previously been presented. (Burns, VanDerHeyden, & Boice, 2008, Rosenshine, 2008).	
☐ **Preview of Lesson Goal(s).** At the start of instruction, the goals of the current day's lesson are shared (Rosenshine, 2008).	
☐ **Chunking of New Material.** The teacher breaks new material into small, manageable increments, 'chunks', or steps (Rosenshine, 2008).	

2. Provided 'Scaffolding' Support

Instructional Element	Notes
☐ **Detailed Explanations & Instructions.** Throughout the lesson, the teacher provides adequate explanations and detailed instructions for all concepts and materials being taught (Burns, VanDerHeyden, & Boice, 2008).	
☐ **Think-Alouds/Talk-Alouds.** When presenting cognitive strategies that cannot be observed directly, the teacher describes those strategies for students. Verbal explanations include 'talk-alouds' (e.g., the teacher describes and explains each step of a cognitive strategy) and 'think-alouds' (e.g., the teacher applies a cognitive strategy to a particular problem or task and verbalizes the steps in applying the strategy) (Burns, VanDerHeyden, & Boice, 2008, Rosenshine, 2008).	
☐ **Work Models.** The teacher makes exemplars of academic work (e.g., essays, completed math word problems) available to students for use as models (Rosenshine, 2008).	
☐ **Active Engagement.** The teacher ensures that the lesson engages the student in 'active accurate responding' (Skinner, Pappas & Davis, 2005) often enough to capture student attention and to optimize learning.	

How to: Implement Strong Core Instruction

1. Access to Instruction	2. 'Scaffolding' Support (Cont.)
❑Instructional Match	❑Group Responding
❑Content Review at Lesson Start	❑High Rate of Student Success
❑Preview of Lesson Goal(s)	❑Brisk Rate of Instruction
❑Chunking of New Material	❑Fix-Up Strategies
2. 'Scaffolding' Support	**3. Timely Performance Feedback**
❑Detailed Explanations & Instructions	❑Regular Feedback
❑Talk Alouds/Think Alouds	❑Step-by-Step Checklists
❑Work Models	**4. Opportunities for Review/ Practice**
❑Active Engagement	❑Spacing of Practice Throughout Lesson
❑Collaborative Assignments	❑Guided Practice
❑Checks for Understanding	❑Support for Independent Practice
	❑Distributed Practice

How to: Implement Strong Core Instruction

Checklist: Elements of Strong Core Instruction

Instruction optimized to reach the widest range of learners includes 'direct instruction' elements.

This 'pre-flight' checklist allows teachers to verify within seconds that their lesson-plans include effective instructional techniques that increase the odds that struggling students will master goals of the lesson.

❑Checks for Understanding

2. 'Scaffolding' Support (Cont.)

❑Group Responding

❑High Rate of Student Success

❑Brisk Rate of Instruction

❑Fix-Up Strategies

3. Timely Performance Feedback

❑Regular Feedback

❑Step-by-Step Checklists

4. Opportunities for Review/ Practice

❑Spacing of Practice Throughout Lesson

❑Guided Practice

❑Support for Independent Practice

❑Distributed Practice

Peer-Guided Pause p. 16

- Students are trained to work in pairs.
- At one or more appropriate review points in a lecture, the instructor directs students to pair up to work together for 4-8 minutes.
- During each Peer Guided Pause, students are given a worksheet that contains one or more correctly completed word or number problems illustrating the math concept(s) covered in the lecture. The sheet also contains several additional, similar problems that pairs of students work cooperatively to complete, along with an answer key.
- Student pairs are reminded to (a) monitor their understanding of the lesson concepts; (b) review the correctly math model problem; (c) work cooperatively on the additional problems, and (d) check their answers. The teacher can direct student pairs to write their names on the practice sheets and collect them to monitor student understanding.

Source: *Hawkins, J., & Brady, M. P. (1994). The effects of independent and peer guided practice during instructional pauses on the academic performance of students with mild handicaps. Education & Treatment of Children, 17 (1), 1-28.*

How to: Implement Strong Core Instruction

Peer-Guided Pause: Delivering Multiple Instructional Elements

The collaborative strategy Peer-Guided Pause illustrates how creative teaching can often provide several strong instructional practices at once.

- ❑Talk Alouds/Think Alouds
- ❑Work Models
- ❑Active Engagement
- ❑Collaborative Assignments
- ❑Checks for Understanding

2. ‘Scaffolding’ Support (Cont.)

- ❑Group Responding
- ❑High Rate of Student Success
- ❑Brisk Rate of Instruction
- ❑Fix-Up Strategies

3. Timely Performance Feedback

- ❑Regular Feedback
- ❑Step-by-Step Checklists

4. Opportunities for Review/ Practice

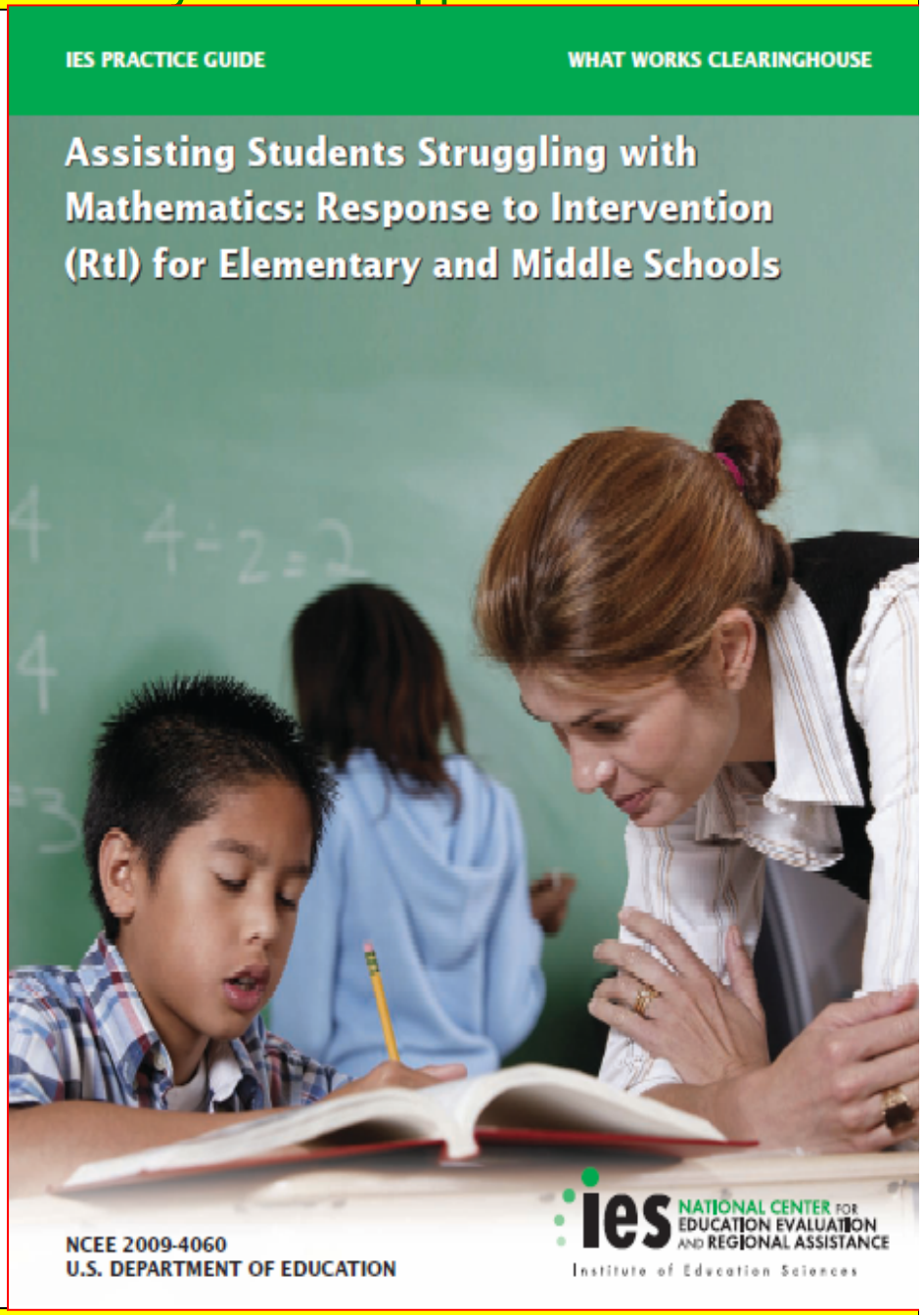
- ❑Spacing of Practice Throughout Lesson
- ❑Guided Practice
- ❑Support for Independent Practice
- ❑Distributed Practice

Overlay 2: Math-specific instruction

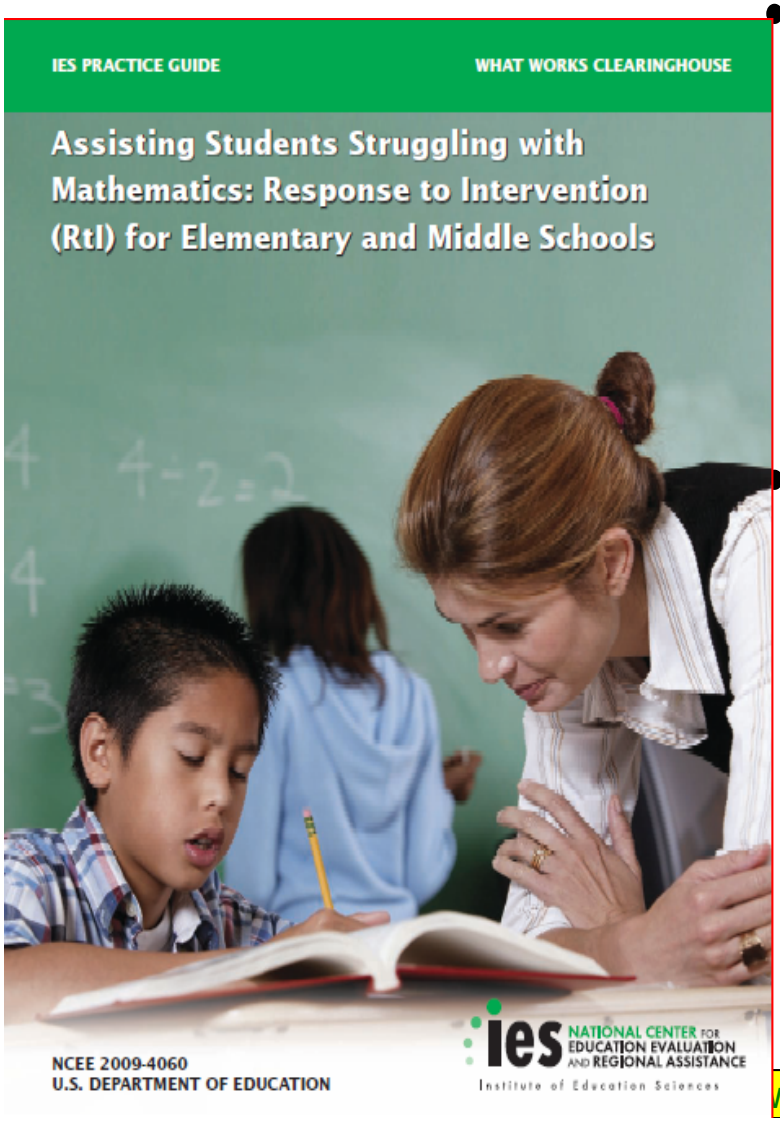
Elements of Math Instruction Supported by Research.

What Works Clearinghouse Practice Guide: *(April 2009): Assisting Students Struggling with Mathematics: Response to Intervention (RtI) for Elementary and Middle Schools*
http://ies.ed.gov/ncee/wwc/

This publication provides 8 recommendations for effective core instruction in mathematics for K-8. A link to this manual is on the conference web page.

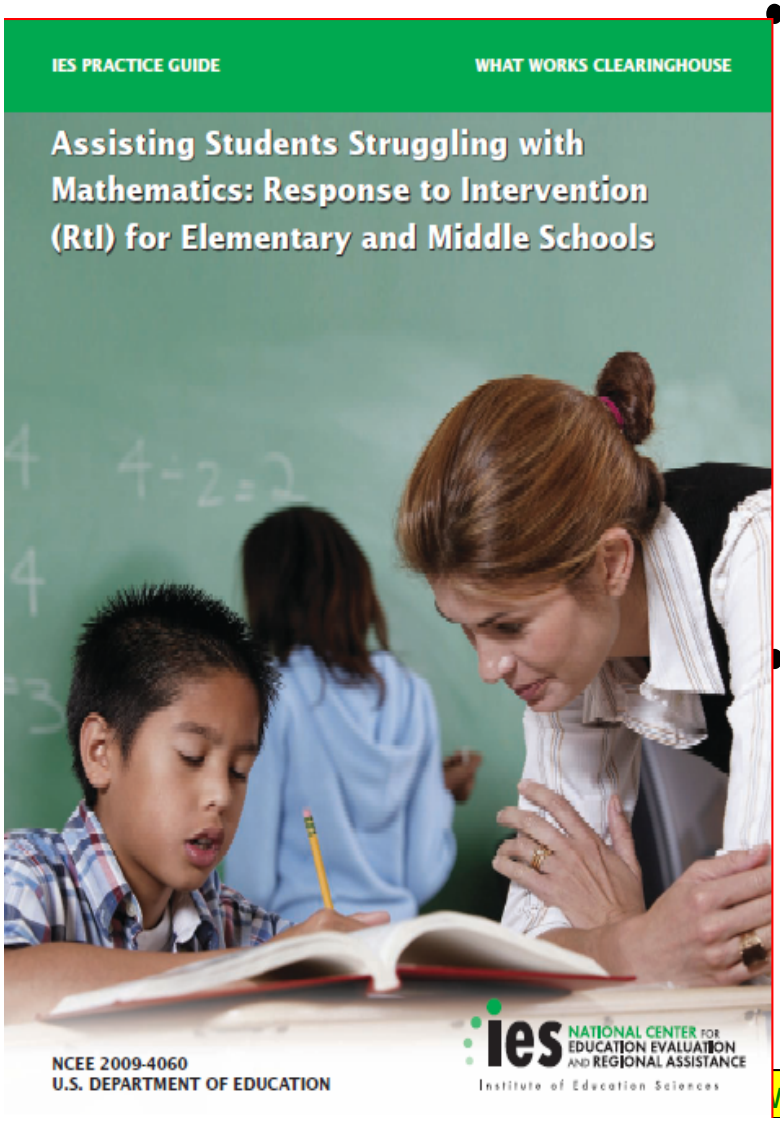


Assisting Students Struggling with Mathematics: RtI for Elementary & Middle Schools: 8 Recommendations



- **Recommendation 1.** Screen all students to identify those at risk for potential mathematics difficulties and provide interventions to students identified as at risk
- **Recommendation 2.** Instructional materials for students receiving interventions should focus intensely on in-depth treatment of whole numbers in kindergarten through grade 5 and on rational numbers in grades 4 through 8.

Assisting Students Struggling with Mathematics: RtI for Elementary & Middle Schools: 8 Recommendations (Cont.)



- **Recommendation 3.** Instruction during the intervention should be explicit and systematic. This includes providing models of proficient problem solving, verbalization of thought processes, guided practice, corrective feedback, and frequent cumulative review
- **Recommendation 4.** Interventions should include instruction on solving word problems that is based on common underlying structures.

Teach Students to Identify 'Underlying Structures' of Word Problems

Students should be taught to classify specific problems into problem-types:

- *Change* Problems: Include increase or decrease of amounts. These problems include a time element
- *Compare* Problems: Involve comparisons of two different types of items in different sets. These problems lack a time element.

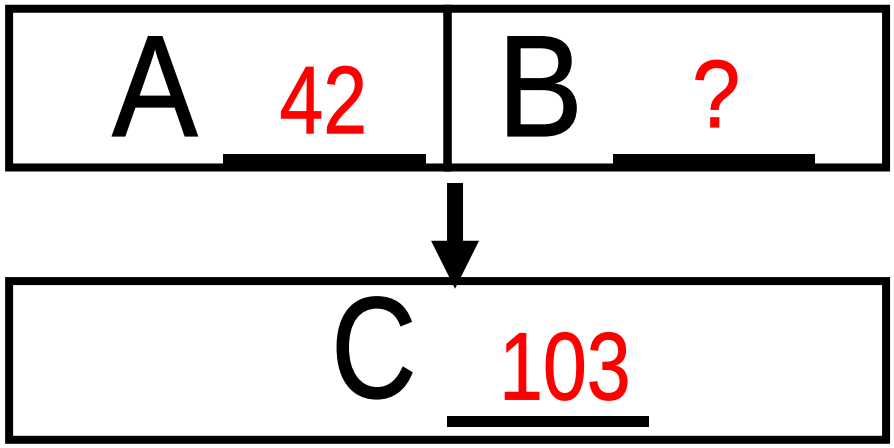
Source: Gersten, R., Beckmann, S., Clarke, B., Foegen, A., Marsh, L., Star, J. R., & Witzel,B. (2009). Assisting students struggling with mathematics: Response to Intervention RtI) for elementary and middle schools (NCEE 2009-4060). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sci ences, U.S. Department of Education. Retrieved from http://ies.ed.gov/ncee/wwc/publications/practiceguides/.

Teach Students to Identify 'Underlying Structures' of Word Problems

Change Problems: Include increase or decrease of amounts. These problems include a time element.

Example: Michael gave his friend Franklin 42 marbles to add to his collection. After receiving the new marbles, Franklin had 103 marbles in his collection.

How many marbles did Franklin have before Michael's gift?



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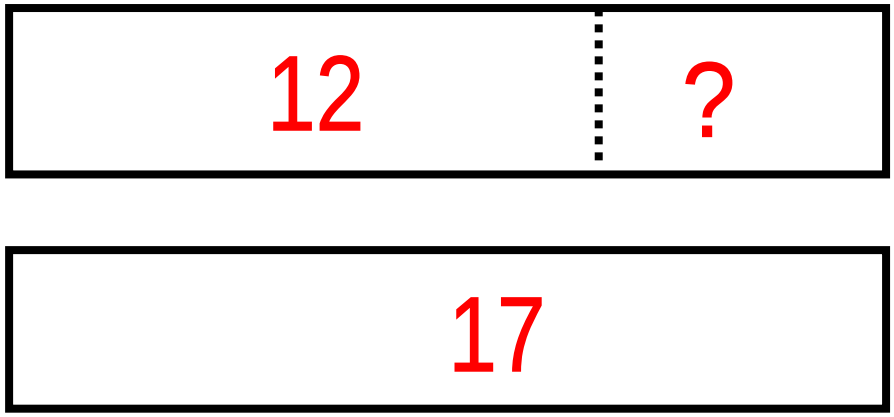
Teach Students to Identify 'Underlying Structures' of Word Problems

Compare Problems: Involve comparisons of two different types of items in different sets. These problems lack a time element.

Example: In the zoo, there are 12 antelope and 17 alligators. How many more alligators than antelope are there in the zoo?



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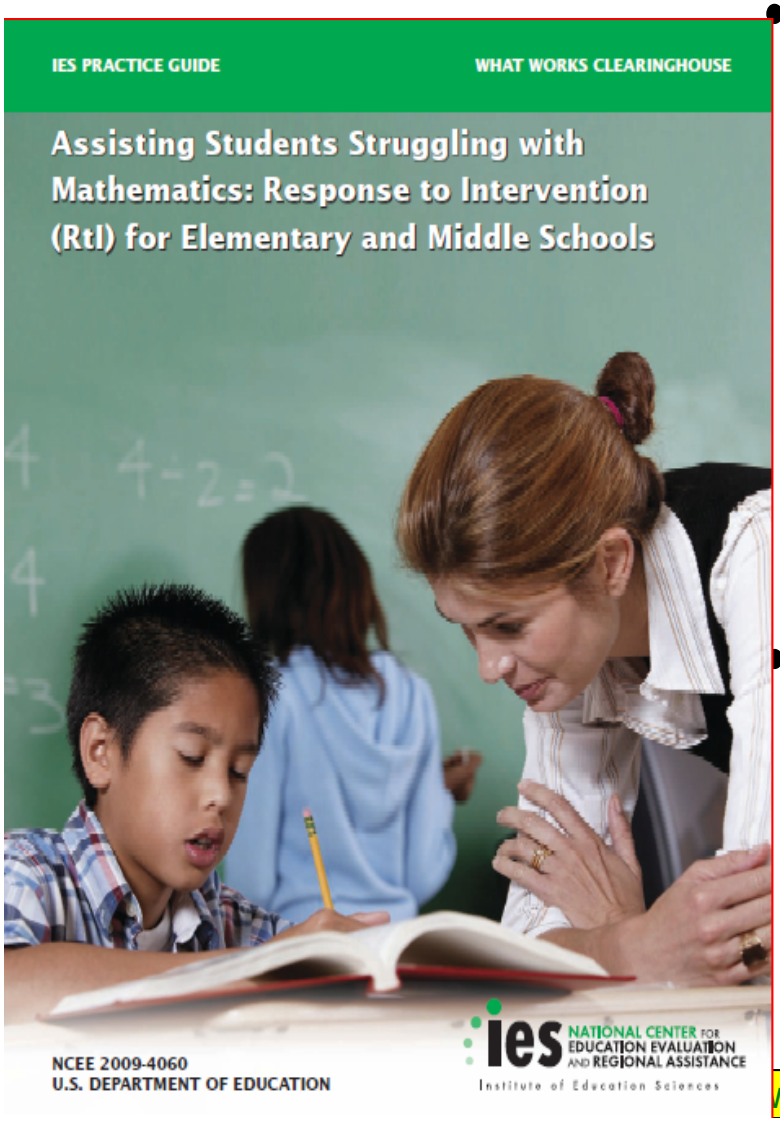
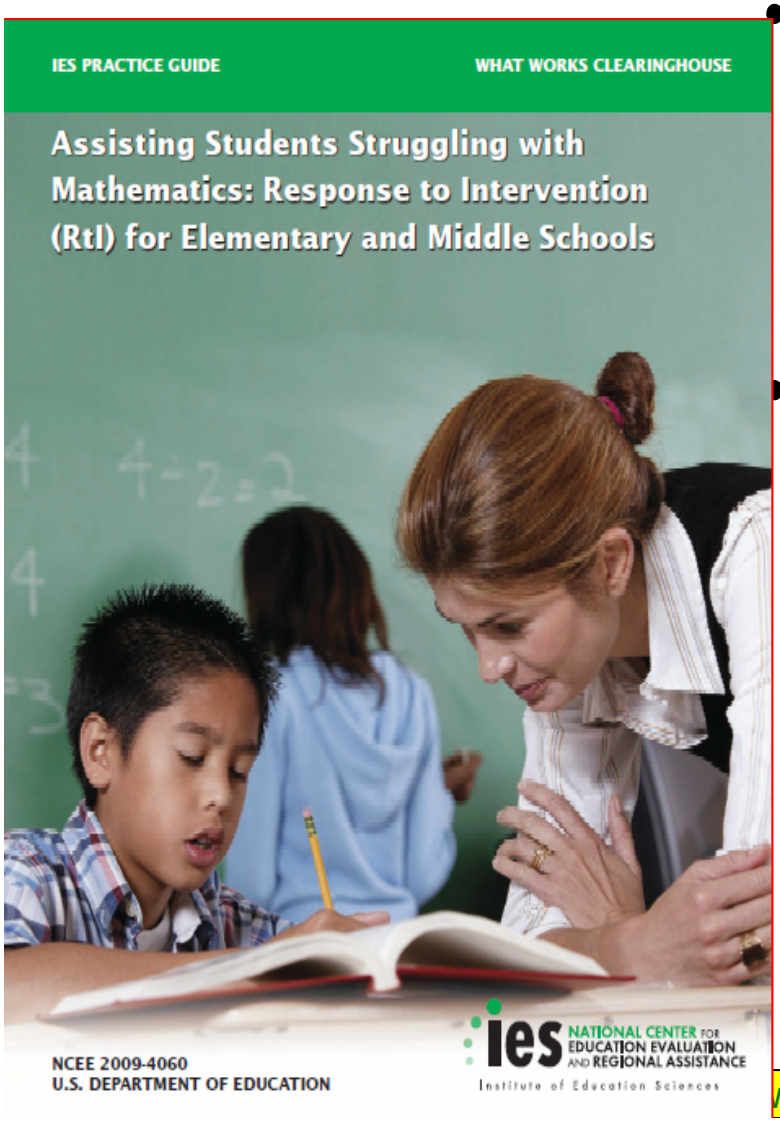
Assisting Students Struggling with Mathematics: RtI for Elementary & Middle Schools: 8 Recommendations (Cont.)



- **Recommendation 5.** Intervention materials should include opportunities for students to work with visual representations of mathematical ideas and interventionists should be proficient in the use of visual representations of mathematical ideas
- **Recommendation 6.** Interventions at all grade levels should devote about 10 minutes in each session to building fluent retrieval of basic arithmetic facts

Assisting Students Struggling with Mathematics: RtI for Elementary & Middle Schools: 8 Recommendations (Cont.)



- **Recommendation 7.** Progress should be monitored for students receiving supplemental instruction/intervention and other students who are at risk.
- **Recommendation 8.** Tier 2/3 math interventions should include motivational strategies to energize and engage reluctant learners.

How Do We Reach Low-Performing Math Students?: Instructional Recommendations Workbook p. 5

Important elements of math instruction for low-performing students:

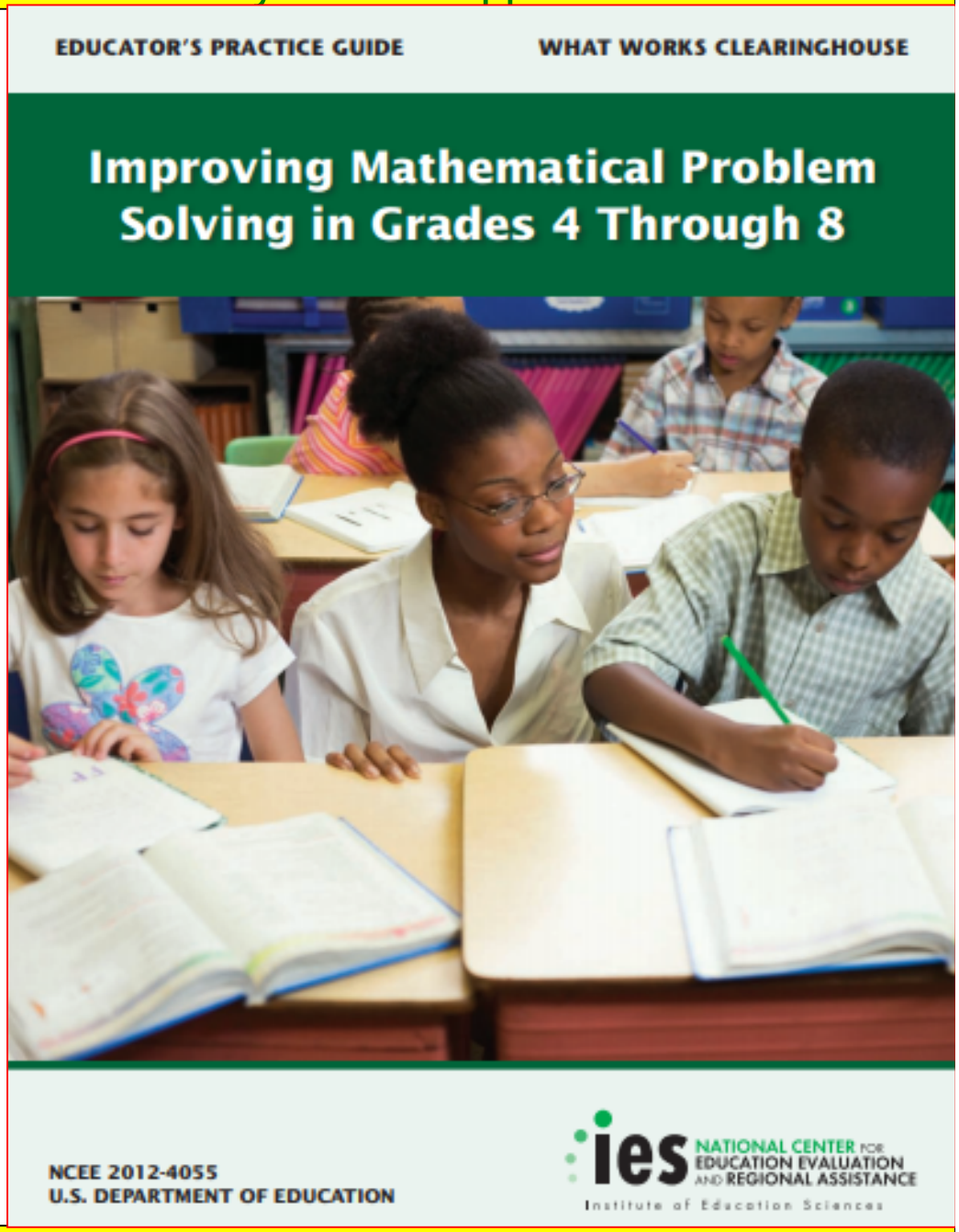
- "Providing teachers and students with data on student performance"
- "Using peers as tutors or instructional guides"
- "Providing clear, specific feedback to parents on their children's mathematics success"
- "Using principles of explicit instruction in teaching math concepts and procedures." p. 51 in article.

Source: Baker, S., Gersten, R., & Lee, D. (2002).A synthesis of empirical research on teaching mathematics to low-achieving students. *The Elementary School Journal, 103*(1), 51-73..

What Works Clearinghouse Practice Guide: *(May 2012): Improving Mathematical Problem Solving in Grades 4 Through 8*

http://ies.ed.gov/ncee/wwc/

This publication provides 5 recommendations to promote student math problem-solving in intermediate grades and middle school.. A link to this manual is on the conference web page.



Lab Work: Reviewing What Works in Math Instruction

In your groups:

- Review the main recommendations and sub-goals on math problem-solving from the *What Works Clearinghouse Practice Guide* (Handout 2; pp. 1-3).
- Identify 1-2 recommendations or sub-goals that you find MOST challenging in your math instruction.
- Use the organizer to brainstorm possible solutions to these challenges with your colleagues.

IES Practice Guide (May 2012): Improving Mathematical Problem Solving in Grades 4 Through 8

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1. Provide students with a list of prompts to help them monitor and reflect during the problem-solving process.

2. Model how to monitor and reflect on the problem-solving process.

3. Use student thinking about a problem to develop students' ability to monitor and reflect.

Defining the (Math) Problem. What is an efficient way to identify the primary obstacle(s) to a student's math performance?

Handout 1; pp. 9-10

Defining the (Math) Problem

Guiding Points for Teachers…

- Naming the specific math-related obstacle(s) to learning is important: *"If you can't name the problem, you can't fix it."*
- When a math problem can be clearly identified, often you can also name its underlying cause(s) — leading to selection of successful interventions.

Tier 1 Academic Intervention: The Mathematics Teacher is Able to:

1. Provide Strong Core Instruction to the Whole Class

2. Understand & Accept Role as Intervention 'First Responder'

3. Define the Math-Related Problem(s) in Clear & Specific Terms

4. Develop an Appropriate Intervention Plan Matching the Identified Problem(s)

5. Write Down the Intervention Plan Before Implementing

6. Collect Data to Monitor & Judge Student Progress

Handout 2; p. 6

Worksheet: Identifying a Student Academic Problem

1. **Describe the problem.** Think of a student currently or previously in your class whose academic problem(s) require significant amounts of your time, energy, and support. In 1-2 sentences, briefly describe the nature of that student's academic problem(s).

Description of student academic problem(s)

==========

2. **Write a 3-part Problem-Identification Statement.** Use this organizer to rewrite your student's academic problem in the form of a 3-part Problem ID statement. For examples, see pp. 5-6 of handout:

3-Part Academic Problem ID Statement		
Environmental Conditions or Task Demands	**Problem Description**	**Typical or Expected Level of Performance**

3. **Write a Hypothesis Statement.** Based on your knowledge of this student, write a 'hypothesis' statement that pinpoints the likely 'root cause' of the academic problem. See the next page for a listing of possible hypotheses.

Hypothesis Statement

Problem Identification: Activity

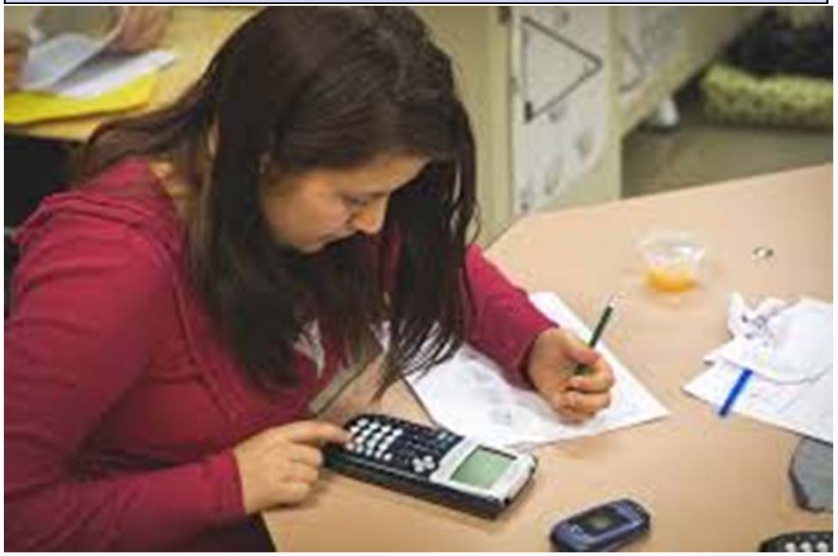
1. **Describe the problem.** Think of a student currently or previously in your class whose math challenge(s) require significant amounts of your time, energy, and support. In 1-2 sentences, briefly describe the nature of that student's most significant math problem(s).

Description of student academic problem(s)

1. **Understanding.** Comprehending mathematical concepts, operations, and relations--knowing what mathematical symbols, diagrams, and procedures mean.

2. **Computing.** Carrying out mathematical procedures, such as adding, subtracting, multiplying, and dividing numbers flexibly, accurately, efficiently, and appropriately.

Five Strands of Mathematical Proficiency (Handout 2; p. 4)



Source: : National Research Council. (2002). Helping children learn mathematics. Mathematics Learning Study Committee, J. Kilpatrick & J. Swafford, Editors, Center for Education, Division of Behavioral & Social Sciences & Education. Washington, DC: National Academy Press.

3. **Applying.** Being able to formulate problems mathematically and to devise strategies for solving them using concepts and procedures appropriately.

4. **Reasoning.** Using logic to explain and justify a solution to a problem or to extend from something known to something less known.

5. **Engaging.** Seeing mathematics as sensible, useful, and doable—if you work at it—and being willing to do the work.

Academic Problem Identification: The Goal…

The goal is for the teacher to describe clearly and accurately the nature of a student's academic problem. Here is a simple "short-cut" approach

- that guides instructors to develop a descriptive 3-part 'problem ID' statement, and
- that links that student problem to a likely underlying cause.

Academic Problem Identification: 3 Steps

Format the problem description as a 3-part problem-identification statement.

The process of writing this statement can help to make the **description** of the academic behavior more specific and also prompts the teacher to think about an appropriate performance **goal**.

3-Part Problem ID Statement: Examples

Conditions	Problem Description	Typical/Expected Level of Performance
When shown flashcards with multiplication math facts 0 to 12 for 3 seconds	Annika can answer 57 of 169 correctly	while most peers in her class can name all facts correctly.

Informal local (classroom) norms

General Problem: *Annika does not know all of her multiplication facts.*

3-Part Problem ID Statement: Examples

Conditions	Problem Description	Typical/Expected Level of Performance
When completing a beginning-level algebra word problem	Dennis is unable to translate that word problem into an equation with 1 variable	although this is a prerequisite skill for the course.

Entry-level/pre-requisite skills

General Problem: *Dennis cannot convert an algebra word problem into an equation.*

3-Part Problem ID Statement: Examples

Conditions	Problem Description	Typical/Expected Level of Performance
Given a 2-term addition or subtraction problem with proper fractions	Franklin (grade 7) cannot correctly solve	although this skill is a Grade 5 Common Core Learning Standard.

Common Core Learning Standard

General Problem: *Franklin cannot add or subtract fractions.*

3-Part Problem ID Statement: Examples

Conditions	Problem Description	Typical/Expected Level of Performance
On math homework	Neda attempts an average of 60 % of assigned items	while classmates typically attempt 90% or more of items.

Local (classroom) norms: Teacher homework log

General Problem: *Neda turns in incomplete math homework.*

Handout 1; p. 26

Worksheet: Identifying a Student Academic Problem

1. **Describe the problem.** Think of a student currently or previously in your class whose academic problem(s) require significant amounts of your time, energy, and support. In 1-2 sentences, briefly describe the nature of that student's academic problem(s).

Description of student academic problem(s)

2. **Write a 3-part Problem-Identification Statement.** Use this organizer to rewrite your student's academic problem in the form of a 3-part Problem ID statement. For examples, see pp. 5-6 of handout:

3-Part Academic Problem ID Statement		
Environmental Conditions or Task Demands	**Problem Description**	**Typical or Expected Level of Performance**

3. **Write a Hypothesis Statement.** Based on your knowledge of this student, write a 'hypothesis' statement that pinpoints the likely 'root cause' of the academic problem. See the next page for a listing of possible hypotheses.

Hypothesis Statement

Data-Collection Worksheet: Activity

2. **Write a 3-part Problem-Identification Statement.** Use this organizer to rewrite your student's academic problem in the form of a 3-part Problem ID statement. For examples, see Handout 1; p. 9:

3-Part Academic Problem ID Statement		
Environmental Conditions or Task Demands	Problem Description	Typical or Expected Level of Performance

Academic Problem Identification: 3 Steps

Choose a hypothesis for what is the most likely cause of the problem.

Academic Problems: Hypotheses & Recommendations

(Adapted from the 'Instructional Hierarchy'; Haring et al., 1978; Martens et al, 2004)

Hypothesis	Recommendation
• *Skill Deficit.* The student has not yet acquired the skill(s).	• Provide direct, explicit instruction to acquire the skill. Reinforce the student for effort and accuracy.

Sources: Haring, N.G., Lovitt, T.C., Eaton, M.D., & Hansen, C.L. (1978). The fourth R: Research in the classroom. Columbus, OH: Merrill.

Martens, B. K., & Witt, J. C. (2004). Competence, persistence, and success: The positive psychology of behavioral skill instruction. Psychology in the Schools, 41(1), 19-30.

Academic Problems: Hypotheses & Recommendations

(Adapted from the 'Instructional Hierarchy'; Haring et al., 1978; Martens et al, 2004)

Hypothesis	Recommendation
• *Fluency Deficit.* The student has acquired the skill(s) but is not yet proficient.	• Provide opportunities for the student to practice the skill and give timely performance feedback. Reinforce the student for fluency as well as accuracy.

Academic Problems: Hypotheses & Recommendations

(Adapted from the 'Instructional Hierarchy'; Haring et al., 1978; Martens et al, 2004)

Hypothesis	Recommendation
• *Generalization Deficit.* The student possesses the skill(s) but fails to use across appropriate situations or settings.	• Enlist adults to prompt and remind the student to use the target skills when needed. • Train the student to identify relevant characteristics of situations or settings when the skill should be used—and to self-monitor skill use. • Provide incentives (e.g., praise, rewards) for the student to use the skill in the appropriate settings.

Academic Problems: Hypotheses & Recommendations

Hypothesis	Recommendation
• *Learned Helplessness. The student lacks confidence to undertake the academic task. He or she also may seek to escape or avoid that task.*	• Adjust the work to student ability level. • Use scaffolding and accommodation strategies to make the academic work more manageable, e.g., breaking larger tasks into smaller increments ("chunking"), allowing the student to take brief breaks during work sessions, etc. • Communicate using techniques to instill a sense of optimism and to engage the student (e.g., growth-mindset and wise-feedback statements).

Worksheet: Identifying a Student Academic Problem

1. **Describe the problem.** Think of a student currently or previously in your class whose academic problem(s) require significant amounts [illegible] briefly describe the nature of that student's academic pr[illegible]

Description of student acade

Handout 2, p. 6

==========

2. **Write a 3-part Problem-Identification Statement.** Use this organizer to rewrite your student's academic problem in the form of a 3-part Problem ID statement. For examples, see pp. 5-6 of handout:

3-Part Academic Problem ID Statement		
Environmental Conditions or Task Demands	**Problem Description**	**Typical or Expected Level of Performance**

3. **Write a Hypothesis Statement.** Based on your knowledge of this student, write a 'hypothesis' statement that pinpoints the likely 'root cause' of the academic problem. See the next page for a listing of possible hypotheses.

Hypothesis Statement

Handout 1, p. 10

Listed below are common reasons for academic problems. Note that occasionally more than one hypothesis may apply to a particular student (e.g., a student may demonstrate a skill deficit as well as a pattern of escape/avoidance).

Academic Problems: Possible Hypotheses & Recommendations

• *Skill* [illegible] not y[illegible]	[illegible]endation [illegible]o acquire the skill. Reinforce [illegible].
• *Flue*[illegible] has acquired the skill(s) but is not yet proficient.	[illegible]nt to practice the skill and give timely performance feedback. Reinforce the student for fluency as well as accuracy.
• *Generalization Deficit.* The student possesses the skill(s) but fails to use across appropriate situations or settings.	• Enlist adults to prompt and remind the student to use the target skills when needed. • Train the student to identify relevant characteristics of situations or settings when the skill should be used—and to self-monitor skill use. • Provide incentives (e.g., praise, rewards) for the student to use the skill in the appropriate settings.
• *Learned Helplessness.* The student lacks confidence to undertake the academic task. He or she also may seek to escape or avoid that task.	• Adjust the work to the student's ability level. • Use scaffolding and accommodation strategies to make the academic work more manageable, e.g., breaking larger tasks into smaller increments ("chunking"), allowing the student to take brief breaks during work sessions, etc. • Communicate using techniques to instill a sense of optimism and to engage the student (e.g., growth-mindset and wise-feedback statements).

References

Batsche, G. M., Castillo, J. M., Dixon, D. N., & Forde, S. (2008). Best practices in designing, implementing, and evaluating quality interventions. In A. Thomas & J. Grimes (Eds.), *Best practices in school psychology V* (pp. 177-193). Bethesda, MD: National Association of School Psychologists.

Bergan, J. R. (1995). Evolution of a problem-solving model of consultation. *Journal of Educational and Psychological Consultation, 6(2),* 111-123.

Foorman, B. R., & Torgesen, J. (2001). Critical elements of classroom and small-group instruction promote reading success in all children. *Learning Disabilities Research & Practice, 16,* 203-212.

Howell, K. W., Hosp, J. L., & Kurns, S. (2008). Best practices in curriculum-based evaluation. In A. Thomas & J. Grimes (Eds.), *Best practices in school psychology V* (pp.349-362). Bethesda, MD: National Association of School Psychologists.

Upah, K. R. F. (2008). Best practices in designing, implementing, and evaluating quality interventions. In A. Thomas & J. Grimes (Eds.), *Best practices in school psychology V* (pp. 209-223). Bethesda, MD: National Association of School Psychologists.

Data-Collection Worksheet: Activity

3. **Write a Hypothesis Statement.** Based on your knowledge of this student, write a 'hypothesis' statement that pinpoints the likely 'root cause' of the academic problem.

Hypothesis Statement

Lab Work: Describe the Math Problem

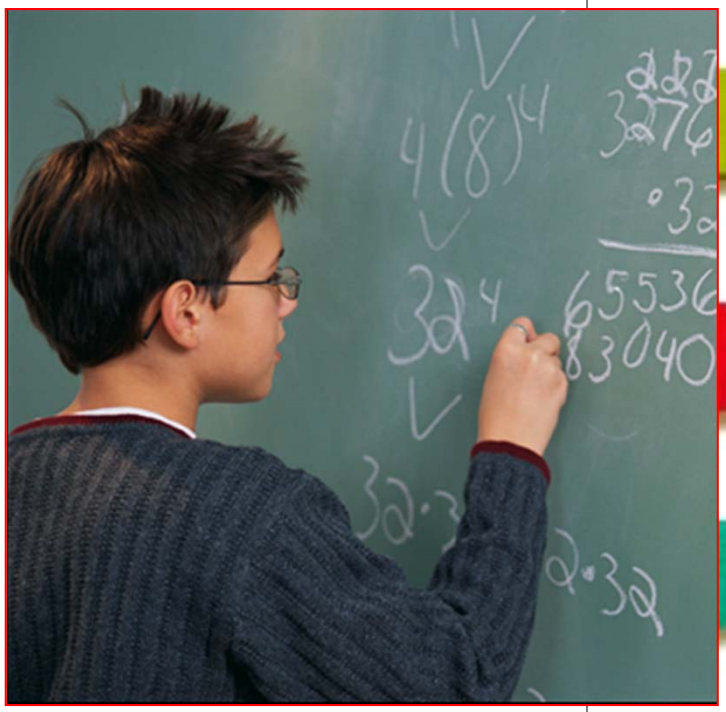
Review the framework presented here (3-part problem-ID statement/hypothesis).

Discuss how you might use this framework to define math problems requiring classroom interventions.

Conditions	Problem Description	Typical/Expected Level of Performance
When completing a beginning-level algebra word problem	Dennis is unable to translate that word problem into an equation with 1 variable	although this is a prerequisite skill for the course.

Hypotheses for Academic Problems
Skill Deficit
Fluency Deficit
Generalization Deficit
Learned Helplessness

Interventions for Math.
What are examples of classroom interventions to address math deficits?



Interventions for Math

Guiding Points for Teachers…

- Math interventions should be matched to the student's identified area(s) of need.
- Some intervention ideas could instead be used with *all* students—an efficient approach that does not require individualized documentation.

Handout 2; p. 7

The Math-Challenged Student: Profile

Use this list of common challenges of students who struggle with mathematics to identify specific obstacles faced by learners in your classroom.

Area of Math Challenge: The student…	NOTES
1. has problems with short-term memory.	
2. has difficulty understanding math concepts/abstractions.	
3. possesses a limited attention span (difficulty remaining on-task).	
4. has difficulty with spatial awareness.	
5. fails to apply previously learned knowledge.	
6. is unable to apply math concepts/reasoning to real-life situations.	
7. struggles with visual sequencing—the ability to see objects in a sequential order (e.g., copying from the board, sequencing numbers, etc.)	
8. confuses various math signs and symbols.	
9. has deficits in math-related vocabulary.	
10. has limited reading skills.	
11. has difficulty following directions.	
12. easily becomes overwhelmed with new learning	

Reference

National Council for Curriculum and Assessment [Dublin, Ireland]. (n.d.). Mathematics Guidelines for teachers of students with mild general learning disabilities. Retrieved from http://www.ncca.ie/uploadedfiles/P_Mild_Maths.pdf

The Math-Challenged Student: 12-Pt Profile

1. Problems with short-term memory.
2. Difficulty understanding math concepts/abstractions.
3. Limited attention span (difficulty remaining on-task).
4. Difficulty with spatial awareness.
5. Failure to apply previously learned knowledge.
6. Unable to apply math concepts/reasoning to real-life situations.
7. Struggle with visual sequencing—the ability to see objects in a sequential order (e.g., copying from the board, sequencing numbers).
8. Confusion of various math signs and symbols.
9. Deficits in math-related vocabulary.
10. Limited reading skills (e.g., comprehension).
11. Difficulty following directions.
12. Easily overwhelmed with new learning.

Source: National Council for Curriculum and Assessment [Dublin, Ireland]. (n.d.). Mathematics Guidelines for teachers of students with mild general learning disabilities. Retrieved from http://www.ncca.ie/uploadedfiles/P_Mild_Maths.pdf

Lab Work: Understanding Math Challenges

1. Review the profile of math-challenged students.
2. Select 1-2 areas of challenge that you believe MOST impacts your math instruction.
3. Brainstorm with your colleagues about ways to help students overcome your selected math challenges.

The Math-Challenged Student: Profile

Use this list of common challenges of students who struggle with mathematics to identify specific obstacles faced by learners in your classroom.

Area of Math Challenge: The student...	NOTES
1. has problems with short-term memory.	
2. has difficulty understanding math concepts/abstr	
3. possesses a li (difficulty rema	
4. has difficulty with spatial awareness.	
5. fails to apply previously learned knowledge.	
6. is unable to apply math concepts/reasoning to real-life situations.	
7. struggles with visual sequencing—the ability to see objects in a sequential order (e.g., copying from the board, sequencing numbers, etc.)	
8. confuses various math signs and symbols.	
9. has deficits in math-related vocabulary.	
10. has limited reading skills.	
11. has difficulty following directions.	
12. easily becomes overwhelmed with new learning	

Handout 3

Reference

National Council for Curriculum and Assessment [Dublin, Ireland]. (n.d.). Mathematics Guidelines for teachers of students with mild general learning disabilities. Retrieved from http://www.ncca.ie/uploadedfiles/P_Mild_Maths.pdf

Math Interventions

Math Fact Fluency

- Explicit Time Drill
- Incremental Rehearsal
- Cover-Copy-Compare
- Peer Tutoring: Math Facts

Math Graphics

- QARs to Interpret Math Graphics

Timely Work Completion

- Problem-Interspersal Technique

Math Word Problems

- Tracing Geometry Worked Problems
- STAR Self-Guided Strategy: Search-Translate-Answer-Review

Student Self-Monitoring

- Math Self-Correction Checklist

Sample Strategies to Promote… Acquisition/Fluency of Math Facts

- Explicit Time Drill
- Incremental Rehearsal
- Cover-Copy-Compare
- Peer Tutoring/Constant Time Delay

Computation Fluency: Benefits of Automaticity of 'Arithmetic Combinations' (Gersten, Jordan, & Flojo, 2005)

- There is a strong correlation between poor retrieval of arithmetic combinations ('math facts') and global math delays
- Automatic recall of arithmetic combinations frees up student 'cognitive capacity' to allow for understanding of higher-level problem-solving
- By internalizing numbers as mental constructs, students can manipulate those numbers in their head, allowing for the intuitive understanding of arithmetic properties, such as *associative property* and *commutative property*

Source: *Gersten, R., Jordan, N. C., & Flojo, J. R. (2005). Early identification and interventions for students with mathematics difficulties. Journal of Learning Disabilities, 38, 293-304.*

Math Fact Fluency: Explicit Time Drill

The teacher hands out a math-fact worksheet. Students are told that they will have 3 minutes to work on problems on the sheet. The teacher starts the stop watch and tells the students to start work. At the end of the first minute, the teacher 'calls time', stops the stopwatch, and tells the students to underline the last number written and to put their pencils in the air. Then students are told to resume work and the teacher restarts the stopwatch. This process is repeated at the end of minutes 2 and 3. At the conclusion of the 3 minutes, the teacher collects the student worksheets (Rhymer et al., 2002).

Math Review: Incremental Rehearsal of 'Math Facts'

Step 1: The tutor writes down on a series of index cards the math facts that the student needs to learn. The problems are written without the answers.

4 x 5 =__	2 x 6 =__	5 x 5 =__
3 x 2 =__	3 x 8 =__	5 x 3 =__
6 x 5 =__	9 x 2 =__	3 x 6 =__
8 x 2 =__	4 x 7 =__	8 x 4 =__
9 x 7 =__	7 x 6 =__	3 x 5 =__

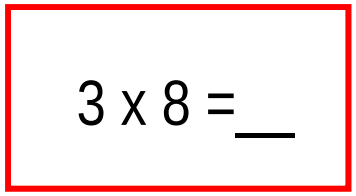
Math Review: Incremental Rehearsal of 'Math Facts'

Step 2: The tutor reviews the 'math fact' cards with the student. Any card that the student can answer within 2 seconds is sorted into the 'KNOWN' pile. Any card that the student cannot answer within two seconds—or answers incorrectly—is sorted into the 'UNKNOWN' pile.

'KNOWN' Facts		'UNKNOWN' Facts
4 x 5 =__	2 x 6 =__	3 x 8 =__
3 x 2 =__	5 x 3 =__	9 x 2 =__
3 x 6 =__	8 x 4 =__	5 x 5 =__
6 x 5 =__	4 x 7 =__	8 x 2 =__
9 x 7 =__	7 x 6 =__	3 x 5 =__

Math Review: Incremental Rehearsal of 'Math Facts'

Step 3: The tutor is now ready to follow a nine-step incremental-rehearsal sequence: First, the tutor presents the student with a single index card containing an 'unknown' math fact. The tutor reads the problem aloud, gives the answer, then prompts the student to read off the same unknown problem and provide the correct answer.



Math Review: Incremental Rehearsal of 'Math Facts'

Step 3: Next the tutor takes a math fact from the 'known' pile and pairs it with the unknown problem. When shown each of the two problems, the student is asked to read off the problem and answer it.

3 x 8 =__	4 x 5 =__

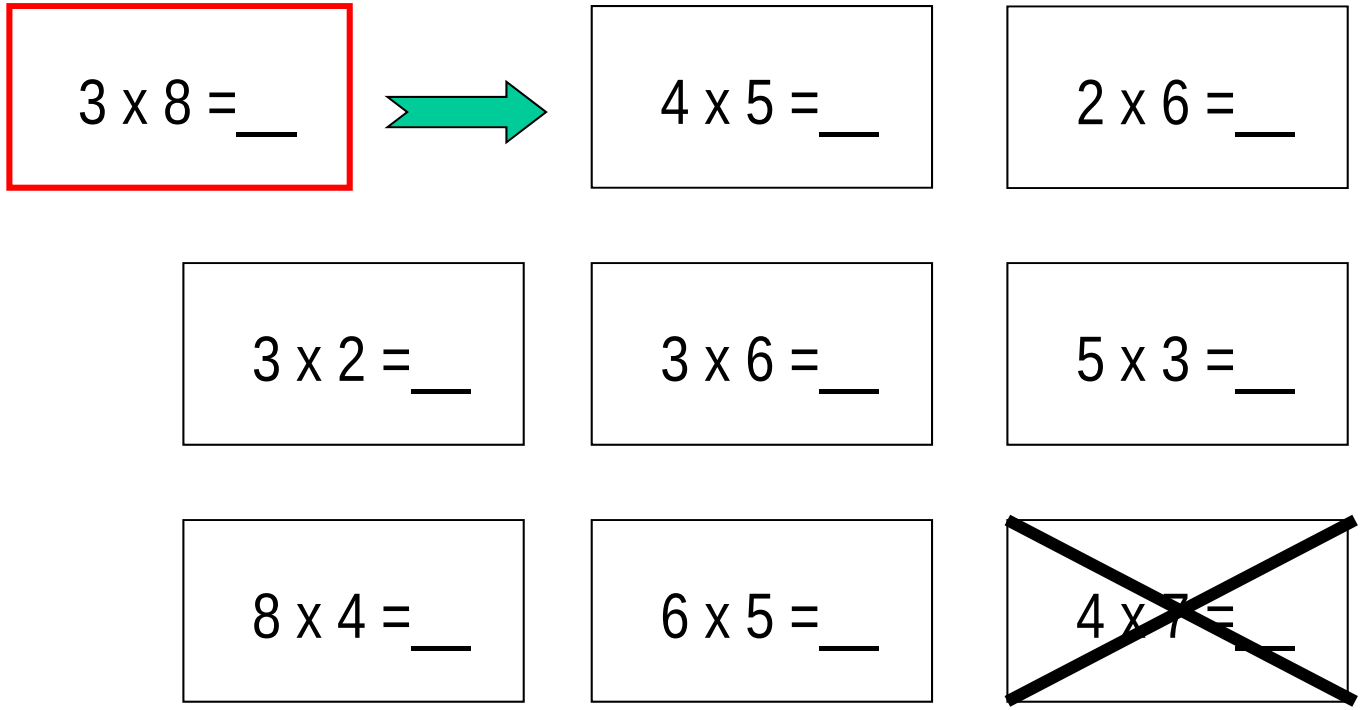
Math Review: Incremental Rehearsal of 'Math Facts'

Step 3: The tutor then repeats the sequence--adding yet another known problem to the growing deck of index cards being reviewed and each time prompting the student to answer the whole series of math facts—until the review deck contains a total of one 'unknown' math fact and nine 'known' math facts.

3 x 8 =__	4 x 5 =__	2 x 6 =__
3 x 2 =__	3 x 6 =__	5 x 3 =__
8 x 4 =__	6 x 5 =__	4 x 7 =__

Math Review: Incremental Rehearsal of 'Math Facts'

Step 4: At this point, the last 'known' math fact that had been added to the student's review deck is discarded (placed back into the original pile of 'known' problems) and the previously 'unknown' math fact is now treated as the first 'known' math fact in new student review deck for future drills.



Math Review: Incremental Rehearsal of 'Math Facts'

Step 4: The student is then presented with a new 'unknown' math fact to answer--and the review sequence is once again repeated each time until the 'unknown' math fact is grouped with nine 'known' math facts—and on and on. Daily review sessions are discontinued either when time runs out or when the student answers an 'unknown' math fact incorrectly three times.

9 x 2 =__	3 x 8 =__	4 x 5 =__
2 x 6 =__	3 x 2 =__	3 x 6 =__
5 x 3 =__	8 x 4 =__	6 x 5 =__

Cover-Copy-Compare: Math Facts

In this intervention to promote acquisition of math facts, the student is given a sheet with the math facts with answers. The student looks at each math model, covers the model briefly and copies it from memory, then compares the copied version to the original correct model (Skinner, McLaughlin & Logan, 1997).


Intervention Central

Cover-Copy-Compare Math Fact Student Worksheet

Worksheet: Cover-Copy-Compare Student: _____ Date: _____

Math Facts	Student Response
1. 9 x 7 = 63	1a. 9 x 7 = 63
	1b.
2. 9 x 2 = 18	2a.
	2b.
3. 9 x 4 = 36	3a.
	3b.
4. 9 x 1 = 9	4a.
	4b.
5. 9 x 9 = 81	5a.
	5b.
6. 9 x 6 = 54	6a.
	6b.
7. 9 x 3 = 27	7a.
	7b.
8. 9 x 5 = 45	8a.
	8b.
9. 9 x 10 = 90	9a.
	9b.
10. 9 x 8 = 72	10a.
	10b.

Peer Tutoring in Math Computation with Constant Time Delay

Peer Tutoring in Math Computation with Constant Time Delay

- DESCRIPTION: This intervention employs students as reciprocal peer tutors to target acquisition of basic math facts (math computation) using constant time delay (Menesses & Gresham, 2009; Telecsan, Slaton, & Stevens, 1999). Each tutoring 'session' is brief and includes its own progress-monitoring component--making this a convenient and time-efficient math intervention for busy classrooms.

Peer Tutoring in Math Computation with Constant Time Delay

MATERIALS:

Student Packet: A work folder is created for each tutor pair. The folder contains:

- ❑ 10 math fact cards with equations written on the front and correct answer appearing on the back. NOTE: The set of cards is replenished and updated regularly as tutoring pairs master their math facts.
- ❑ Progress-monitoring form for each student.
- ❑ Pencils.

Peer Tutoring in Math Computation with Constant Time Delay

Tutoring Activity. Each tutoring 'session' last for 3 minutes. The tutor:

- *Presents Cards*. The tutor presents each card to the tutee for 3 seconds.
- *Provides Tutor Feedback*. [When the tutee responds correctly] The tutor acknowledges the correct answer and presents the next card.

  [When the tutee does not respond within 3 seconds or responds incorrectly] The tutor states the correct answer and has the tutee repeat the correct answer. The tutor then presents the next card.
- *Provides Praise*. The tutor praises the tutee immediately following correct answers.
- *Shuffles Cards*. When the tutor and tutee have reviewed all of the math-fact carts, the tutor shuffles them before again presenting cards.

Peer Tutoring in Math Computation with Constant Time Delay

Progress-Monitoring Activity. The tutor concludes each 3-minute tutoring session by assessing the number of math facts mastered by the tutee. The tutor follows this sequence:

- *Presents Cards.* The tutor presents each card to the tutee for 3 seconds.
- *Remains Silent*. The tutor does not provide performance feedback or praise to the tutee, or otherwise talk during the assessment phase.
- *Sorts Cards*. Based on the tutee's responses, the tutor sorts the math-fact cards into 'correct' and 'incorrect' piles.
- *Counts Cards and Records Totals*. The tutor counts the number of cards in the 'correct' and 'incorrect' piles and records the totals on the tutee's progress-monitoring chart.

Peer Tutoring in Math Computation with Constant Time Delay

Tutoring Integrity Checks. As the student pairs complete the tutoring activities, the supervising adult monitors the integrity with which the intervention is carried out. At the conclusion of the tutoring session, the adult gives feedback to the student pairs, praising successful implementation and providing corrective feedback to students as needed.

NOTE: Teachers can use the attached form *Peer Tutoring in Math Computation with Constant Time Delay: Integrity Checklist* to conduct integrity checks of the intervention and student progress-monitoring components of the math peer tutoring.

Response

Peer Tutoring in Math Computation: Intervention Integrity Sheet: (Part 1: Tutoring Activity)

Peer Tutoring in Math Computation with Constant Time Delay: Integrity Checklist			
Tutoring Session: Intervention Phase			
Directions: Observe the tutor and tutee for a full intervention session. Use this checklist to record whether each of the key steps of the intervention were correctly followed.			
Correctly Carried Out?	Step	Tutor Action	NOTES
__Y__N	1.	**Promptly Initiates Session.** At the start of the timer, the tutor immediately presents the first math-fact card.	
__Y__N	2.	**Presents Cards.** The tutor presents each card to the tutee for 3 seconds.	
__Y__N	3.	**Provides Tutor Feedback.** [When the tutee responds correctly] The tutor acknowledges the correct answer and presents the next card. [When the tutee does not respond within 3 seconds or responds incorrectly] The tutor states the correct answer and has the tutee repeat the correct answer. The tutor then presents the next card.	
__Y__N	4.	**Provides Praise.** The tutor praises the tutee immediately following correct answers.	
__Y__N	5.	**Shuffles Cards.** When the tutor and tutee have reviewed all of the math-fact carts, the tutor shuffles them before again presenting cards.	
__Y__N	6.	**Continues to the Timer.** The tutor continues to presents math-fact cards for tutee response until the timer rings.	

Peer Tutoring in Math Computation: Intervention Integrity Sheet (Part 2: Progress-Monitoring)

Tutoring Session: Assessment Phase			
Directions: Observe the tutor and tutee during the progress-monitoring phase of the session. Use this checklist to record whether each of the key steps of the assessment were correctly followed.			
Correctly Carried Out?	Step	Tutor Action	NOTES
__Y__N	1.	**Presents Cards.** The tutor presents each card to the tutee for 3 seconds.	
__Y__N	2.	**Remains Silent.** The tutor does not provide performance feedback or praise to the tutee, or otherwise talk during the assessment phase.	
__Y__N	3.	**Sorts Cards.** The tutor sorts cards into 'correct' and 'incorrect' piles based on the tutee's responses.	
__Y__N	4.	**Counts Cards and Records Totals.** The tutor counts the number of cards in the 'correct' and 'incorrect' piles and records the totals on the tutee's progress-monitoring chart.	

Peer Tutoring in Math Computation: Score Sheet

Math Tutoring: Score Sheet

Tutor 'Coach': _____ Tutee 'Player': _____

Directions to the Tutor: Write down the number of math-fact cards that your partner answered *correctly* and the number answered *incorrectly*.

Date:	Cards Correct:	Cards Incorrect:
Date:	Cards Correct:	Cards Incorrect:
Date:	Cards Correct:	Cards Incorrect:
Date:	Cards Correct:	Cards Incorrect:
Date:	Cards Correct:	Cards Incorrect:
Date:	Cards Correct:	Cards Incorrect:
Date:	Cards Correct:	Cards Incorrect:
Date:	Cards Correct:	Cards Incorrect:

Sample Strategies to Promote… Solution of Math Word Problems

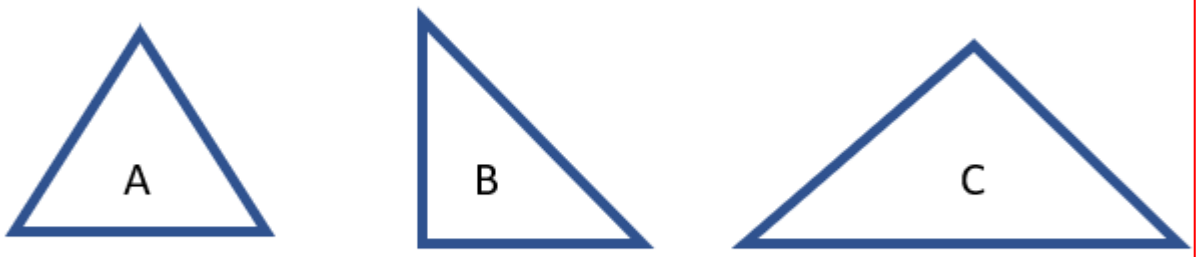
- Tracing Geometry Worked Problems
- STAR: Improving Performance on Math Word Problem-Solving

Tracing Geometry Worked Problems: A Simple Strategy to Enhance Learning

Students show enhanced learning when—in the course of study or independent work— they are encouraged to trace the relevant figures on worked geometry examples.

Figure 1: Sample Worked-Geometry Problem with Tracing Prompt

Review these 3 triangles. Trace each triangle with your finger.



Which is the *equilateral* triangle?

Answer: Triangle A is the equilateral triangle, as all sides are equal.

Source: *Hu, F., Ginns, P., & Bobis, J. (2015). Getting the point: Tracing worked examples enhances learning. Learning and Instruction, 35, 85-93.*

STAR: Improving Performance on Math Word Problems

Students can improve their performance on math word problems when they follow STAR, a simple 4-step self-guided strategy.

STAR is easy to recall and prompts the student to apply problem-solving steps in a logical order. It was found to be particularly effective with students with emotional/behavioral disorders.

Source: *Peltier, C., & Vannest, K. J. (2016). Utilizing the STAR strategy to improve the mathematical problem-solving abilities of students with emotional and behavioral disorders. Beyond Behavior, 25(1), 9-15.*

STAR: Solving Math Word Problems: 4-Step Strategy

Step	What I Do
Search	I search the problem for important information by: • reading it aloud • highlighting key words • crossing out information that is not important.
Translate	I translate the word problem into a number sentence. I can: • arrange counters/objects to understand the problem • draw the problem • explain the problem in my own words.
Answer	I answer the problem. When doing this, I: • consider the math operations I will use • think about the steps I will follow and their proper order • check my numbers to make sure they are written clearly and are placed correctly • show my work.
Review	I review my answer to make sure it is correct. To do this, I: • recheck my calculations • reread the problem and ask myself whether my answer makes sense.

STAR: Solving Math Word Problems

Student Name: _____

Directions: Use this step-by-step organizer as you solve each math word problem.

Step	*What I Do*	*My Workspace*
Search.	I **s**earch the problem for important information by: • reading it aloud • highlighting key words • crossing out information that is not important.	
Translate	I **t**ranslate the word problem into a number sentence. I can: • arrange counters/objects to understand the problem • draw the problem • explain the problem in my own words.	
Answer	I **a**nswer the problem. When doing this, I: • consider the math operations I will use • think about the steps I will follow and their proper order • check my numbers to make sure they are written clearly and are placed correctly • show my work.	
Review	I **r**eview my answer to make sure it is correct. To do this, I: • recheck my calculations • reread the problem and ask myself whether my answer makes sense.	

Sample Strategy to Promote… Accurate Interpretation of Math Graphics

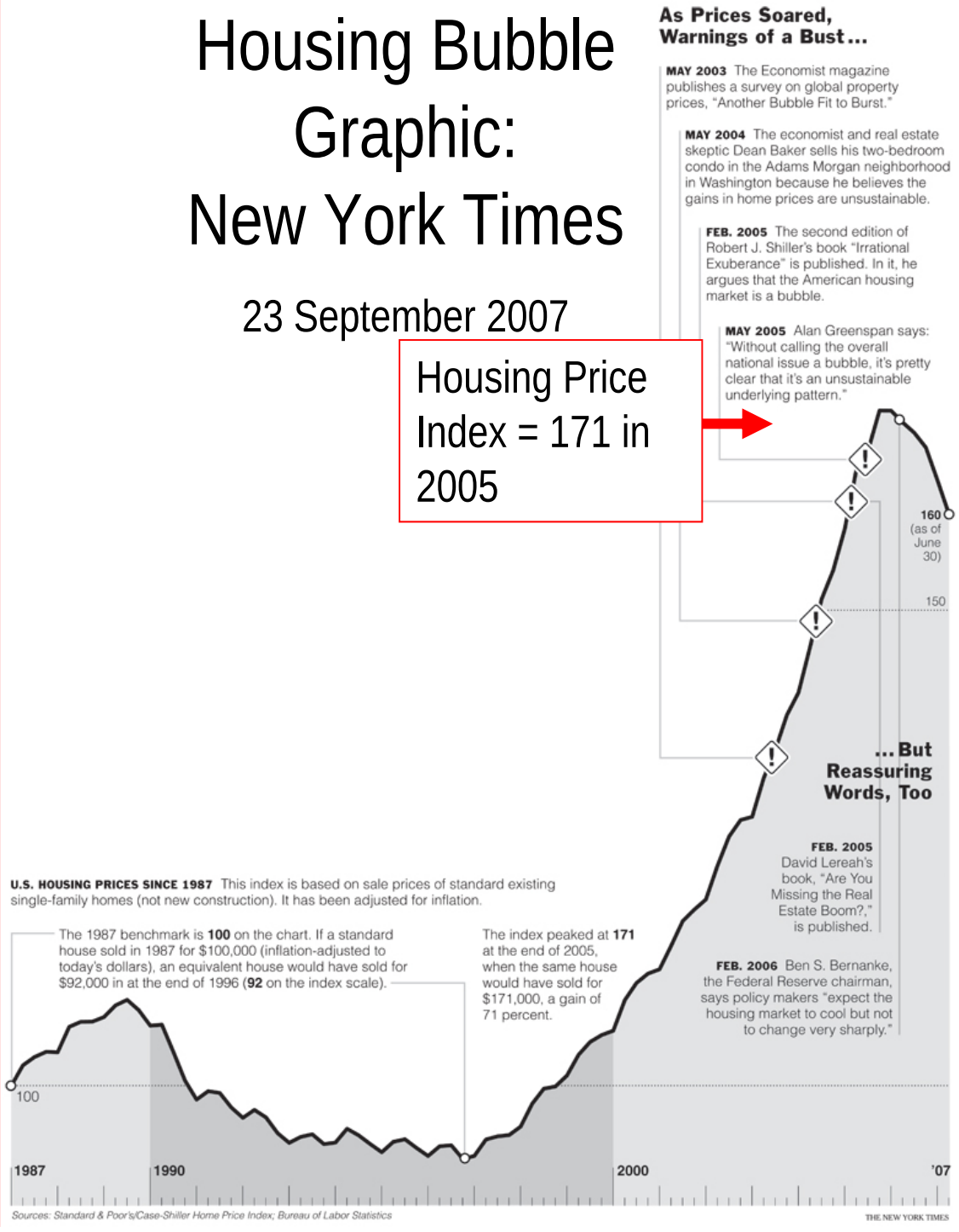
- Question-Answer Relationships (QARs) and Math Graphics

Housing Bubble Graphic: New York Times

23 September 2007

Housing Price Index = 171 in 2005

Housing Price Index = 100 in 1987



Classroom Challenges in Interpreting Math Graphics

When encountering math graphics, students may :

- expect the answer to be easily accessible when in fact the graphic may expect the reader to interpret and draw conclusions
- be inattentive to details of the graphic
- treat irrelevant data as 'relevant'
- not pay close attention to questions before turning to graphics to find the answer
- fail to use their prior knowledge both to extend the information on the graphic and to act as a possible 'check' on the information that it presents.

Source: *Mesmer, H.A.E., & Hutchins, E.J. (2002). Using QARs with charts and graphs. The Reading Teacher, 56, 21–27.*

Using Question-Answer Relationships (QARs) to Interpret Information from Math Graphics

Students can be more savvy interpreters of graphics in applied math problems by applying the Question-Answer Relationship (QAR) strategy. Four Kinds of QAR Questions:

- RIGHT THERE questions are fact-based and can be found in a single sentence, often accompanied by 'clue' words that also appear in the question.
- THINK AND SEARCH questions can be answered by information in the text but require the scanning of text and making connections between different pieces of factual information.
- AUTHOR AND YOU questions require that students take information or opinions that appear in the text and combine them with the reader's own experiences or opinions to formulate an answer.
- ON MY OWN questions are based on the students' own experiences and do not require knowledge of the text to answer.

Source: *Mesmer, H.A.E., & Hutchins, E.J. (2002). Using QARs with charts and graphs. The Reading Teacher, 56, 21–27.*

Using Question-Answer Relationships (QARs) to Interpret Information from Math Graphics: 4-Step Teaching Sequence

Students learn about math graphics in a 4-step teaching sequence:

1. DISTINGUISHING DIFFERENT KINDS OF GRAPHICS. Students are taught to differentiate between common types of graphics: e.g., table (grid with information contained in cells), chart (boxes with possible connecting lines or arrows), picture (figure with labels), line graph, bar graph.

2. INTERPRETING INFORMATION IN GRAPHICS. Students are paired off. They are presented with examples from each of the graphics categories—from the most concrete graphics to the more abstract: Pictures > tables > bar graphs > charts > line graphs. They discuss questions such as: "What information does this graphic present? What are strengths of this graphic for presenting data? What are possible weaknesses?"

Source: *Mesmer, H.A.E., & Hutchins, E.J. (2002). Using QARs with charts and graphs. The Reading Teacher, 56, 21–27.*

Using Question-Answer Relationships (QARs) to Interpret Information from Math Graphics: 4-Step Teaching Sequence

Students learn about math graphics in a 4-step teaching sequence:

3. LINKING THE USE OF QARS TO GRAPHICS. Students are given a series of worked math problems—data questions and correct answers. Each question is accompanied by a graphic that contains information needed to formulate the answer.

   Students are also each given index cards with titles and descriptions of each of the 4 QAR questions: RIGHT THERE, THINK AND SEARCH, AUTHOR AND YOU, ON MY OWN.

   Working in small groups and then individually, students read the questions, study the matching graphics, and 'verify' the answers as correct. They then identify the type question being asked using their QAR index cards.

Source: *Mesmer, H.A.E., & Hutchins, E.J. (2002). Using QARs with charts and graphs. The Reading Teacher, 56, 21–27.*

Using Question-Answer Relationships (QARs) to Interpret Information from Math Graphics: 4-Step Teaching Sequence

Students learn about math graphics in a 4-step teaching sequence:

4. USING QARS WITH GRAPHICS INDEPENDENTLY. When students are ready to use the QAR strategy independently to read graphics, they are given a laminated card as a reference with 6 steps to follow:
   - *A. Read the question,*
   - *B. Review the graphic,*
   - *C. Reread the question,*
   - *D. Choose a QAR,*
   - *E. Answer the question, and*
   - *F. Locate the answer derived from the graphic in the answer choices offered.*

   Students are strongly encouraged NOT to read the answer choices offered until they have first derived their own answer, so that those choices don't short-circuit their inquiry.

Source: *Mesmer, H.A.E., & Hutchins, E.J. (2002). Using QARs with charts and graphs. The Reading Teacher, 56, 21–27.*

Sample Strategy to Promote…Timely Math Work Completion

Math Computation: Problem Interspersal Technique

- The teacher first identifies the range of 'challenging' problem-types (number problems appropriately matched to the student's current instructional level) that are to appear on the worksheet.
- Then the teacher creates a series of 'easy' problems that the students can complete very quickly (e.g., adding or subtracting two 1-digit numbers). The teacher next prepares a series of student math computation worksheets with 'easy' computation problems interspersed at a fixed rate among the 'challenging' problems.
- The ratio of easy to challenge problems can vary from 1:1 for student-completed independent work to 3:1 for problems that are read aloud by another and the student responds.

Source: *Hawkins, J., Skinner, C. H., & Oliver, R. (2005). The effects of task demands and additive interspersal ratios on fifth-grade students' mathematics accuracy. School Psychology Review, 34, 543-555..*

PROBLEM-INTERSPERSAL TECHNIQUE: WITHIN AN ASSIGNMENT. The teacher selects a ratio of 'easy-to-challenge' problems or items (e.g., 3: 1). The instructor then formats the assignment or worksheet according to the 'easy-to-challenge' ratio.

Problem-Interspersal Technique: Example	
Easy	12 + 14 =?
Easy	21 + 8 = ?
Easy	3 + 14 = ?
Challenge	9 x 7 = ?

Sample Strategy to Promote…Student Self-Monitoring

Student Self-Monitoring: Customized Math Self-Correction Checklists

DESCRIPTION: The teacher analyzes a particular student's pattern of errors commonly made when solving a math algorithm (on either computation or word problems) and develops a brief error self-correction checklist unique to that student. The student then uses this checklist to self-monitor—and when necessary correct—his or her performance on math worksheets before turning them in.

Sources: *Dunlap, L. K., & Dunlap, G. (1989). A self-monitoring package for teaching subtraction with regrouping to students with learning disabilities. Journal of Applied Behavior Analysis, 229, 309-314.*

Uberti, H. Z., Mastropieri, M. A., & Scruggs, T. E. (2004). Check it off: Individualizing a math algorithm for students with disabilities via self-monitoring checklists. Intervention in School and Clinic, 39(5), 269-275.

Increase Student Math Success with Customized Math Self-Correction Checklists

MATERIALS:

- Customized student math error self-correction checklist
- Worksheets or assignments containing math problems matched to the error self-correction checklist

Sources: *Dunlap, L. K., & Dunlap, G. (1989). A self-monitoring package for teaching subtraction with regrouping to students with learning disabilities. Journal of Applied Behavior Analysis, 229, 309-314.*

Uberti, H. Z., Mastropieri, M. A., & Scruggs, T. E. (2004). Check it off: Individualizing a math algorithm for students with disabilities via self-monitoring checklists. Intervention in School and Clinic, 39(5), 269-275.

Sample Self-Correction Checklist

Math Self-Correction Checklist

Student Name: _____ Date: _____

Rater: Student Classroom: _____

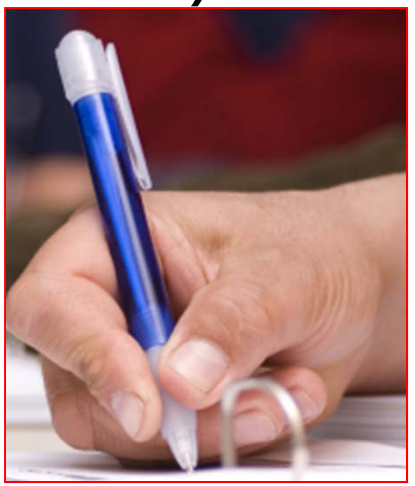
Directions: To the Student: BEFORE YOU START: Look at each of these goals for careful math work before beginning your assignment. AFTER EACH PROBLEM: Stop and rate YES or NO whether you performed each goal correctly.

	Problem#1	Problem#2	Problem#3	Problem#4	Problem#5
I underlined all numbers at the top of the subtraction problem that were smaller than their matching numbers at the bottom of the problem. Did the student succeed in this behavior goal? ❑ YES ❑ NO	__Y __N	__Y __N	__Y __N	__Y __N	__Y __N
I wrote all numbers carefully so that I could read them easily and not mistake them for other numbers. Did the student succeed in this behavior goal? ❑ YES ❑ NO	__Y __N	__Y __N	__Y __N	__Y __N	__Y __N
I lined up all numbers in the right place-value columns. Did the student succeed in this behavior goal? ❑ YES ❑ NO	__Y __N	__Y __N	__Y __N	__Y __N	__Y __N
I rechecked all of my answers. Did the student succeed in this behavior goal? ❑ YES ❑ NO	__Y __N	__Y __N	__Y __N	__Y __N	__Y __N

Sample Strategy to Reduce…Anxiety

Managing Academic Anxiety Through an Antecedent Writing Activity (Online)

Description. Students may become anxious when faced with academic tasks such as test-taking—to the point at which the anxiety seriously interferes with their work performance.



Being barraged with anxious thoughts while trying to complete academic tasks is a negative form of multi-tasking and taxes working memory (Beilock & Willingham, 2014). Anxious thoughts divert attention and thus degrade student performance.

Source: Beilock, S. L., & Willingham, D. T. (2014). Math anxiety: Can teachers help students reduce it? American Educator, 38(2), 28-32, 43.

Managing Academic Anxiety Through an Antecedent Writing Activity

Description (Cont.) One strategy that can help students to minimize the intrusion of anxious thoughts during a stressful test or assignment is to have them first complete a brief (7- to 10-minute) writing exercise in which they write about their anxiety (Park, Ramirez, & Beilock, 2014).

This activity can lower anxiety levels and thus allow the student to complete the academic task without interference.

Source: Beilock, S. L., & Willingham, D. T. (2014). Math anxiety: Can teachers help students reduce it? American Educator, 38(2), 28-32, 43.

Managing Academic Anxiety Through an Antecedent Writing Activity

Procedure. Before an individual student or larger group begins an academic task likely to trigger anxiety, the teacher hands out a worksheet with these (or similar) instructions:

Writing Exercise: This Assignment: How Are You Feeling?

I would like you to write honestly about what you are thinking and feeling as you prepare to take this exam/start this assignment.

Because everyone is unique, there is no 'correct response' to this writing task. You should just describe as fully as you can your thoughts and feelings about the exam/assignment. You can also write about how your current thoughts and feelings might be the same as—or different from—those you experienced in similar past situations.

You will have __ minutes to write. Please keep writing until you are told to stop. I will not collect this assignment.

Source: Beilock, S. L., & Willingham, D. T. (2014). Math anxiety: Can teachers help students reduce it? American Educator, 38(2), 28-32, 43.

Managing Academic Anxiety Through an Antecedent Writing Activity

Procedure (Cont.) The instructor gives students 7-10 minutes to complete the writing assignment.

Students are then instructed to put their compositions away (they are not collected).

The class then begins the high-stakes academic task.

Source: Beilock, S. L., & Willingham, D. T. (2014). Math anxiety: Can teachers help students reduce it? American Educator, 38(2), 28-32, 43.

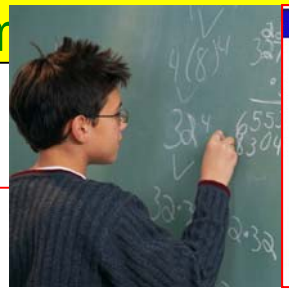
Managing Academic Anxiety Through an Antecedent Writing Activity

Tips for Use. Here are suggestions for using this antecedent writing exercise:

- *Administer to the entire class.* Certain academic tasks, such as important tests, will trigger anxiety in many, if not most, students in a classroom. Teachers can use this writing exercise with the entire group as an efficient way to 'take the edge off' this anxiety for all students and potentially improve their test performance.

Source: Beilock, S. L., & Willingham, D. T. (2014). Math anxiety: Can teachers help students reduce it? American Educator, 38(2), 28-32, 43.

Math Interventions: Activity



- Discuss the interventions reviewed today.
- Select at least one idea that you would like to try in your classroom or share with teachers in your school.

Math Interventions	
Math Fact Fluency	**Math Graphics**
• Explicit Time Drill	• QARs to Interpret Math Graphics
• Incremental Rehearsal	**Timely Work Completion**
• Cover-Copy-Compare	• Problem-Interspersal Technique
• Peer Tutoring: Math Facts	**Student Self-Monitoring**
Math Word Problems	• Math Self-Correction Checklist
• Tracing Geometry Worked Problems	**Math Graphics**
• STAR Self-Guided Strategy: Search-Translate-Answer-Review	• Antecedent ('Anxiety') Essay

Individualizing Math Supports. What are examples of differentiation and scaffolding to make math assignments accessible to students?

Individualizing Math Supports

Guiding Points for Teachers…

- Modest classroom accommodation ("instructional adjustments") can often make a positive difference for struggling math students.
- These adjustments can be used in a manner that still maintains grade-level academic expectations.

Tier 1 Academic Intervention: The Mathematics Teacher is Able to:

1. Provide Strong Core Instruction to the Whole Class

2. Understand & Accept Role as Intervention 'First Responder'

3. Define the Math-Related Problem(s) in Clear & Specific Terms

4. Develop an Appropriate Intervention Plan Matching the Identified Problem(s)

5. Write Down the Intervention Plan Before Implementing

6. Collect Data to Monitor & Judge Student Progress

Differentiation vs. Scaffolding: Two Kinds of Support

Differentiation & scaffolding share similarities. Both require individualization and are used to increase student engagement and academic success. However, they also differ…

Differentiation. The academic task itself is altered to match student abilities.

- Simpler Word -Problem Vocab
- Shorter independent work periods
- Different assignment format (e.g., multiple-choice vs. short-answer)

Scaffolding. The student is given supports that allow them to meet the demands of the original academic task.

- Pre-teaching vocabulary
- Chunking of tasks into smaller increments
- Use of organizers to guide math problem-solving

Source: Alber, R. (2014). 6 scaffolding strategies to use with your students. Edutopia. Retrieved from https://www.edutopia.org/blog/scaffolding-lessons-six-strategies-rebecca-alber

Defining Intervention-Related Terms. What are the definitions for different types of student instruction and support ? (Online)

Core Instruction, *Interventions*, Instructional Adjustments & Modifications: Sorting Them Out

- **Core Instruction.** Those instructional strategies that are used routinely with all students in a general-education setting are considered 'core instruction'. High-quality instruction is essential and forms the foundation of classroom academic support. NOTE: While it is important to verify that a struggling student receives good core instructional practices, those routine practices do not 'count' as individual student interventions.

*Core Instruction, **Interventions***, Instructional Adjustments & Modifications: Sorting Them Out

- **Academic Intervention.** An academic *intervention* is a strategy used to teach a new skill, build fluency in a skill, or encourage a child to apply an existing skill to new situations or settings. An intervention can be thought of as "a set of actions that, when taken, have demonstrated ability to change a fixed educational trajectory" (Methe & Riley-Tillman, 2008; p. 37).

Example: Academic Intervention: *Cover-Copy-Compare Math Fact Student Worksheet*

Worksheet: Cover-Copy-Compare Student: _____ Date: _____

Math Facts	Student Response
1. 9 x 7 = 63	1a. 9 x 7 = 63
	1b.
2. 9 x 2 = 18	2a.
	2b.
3. 9 x 4 = 36	3a.
	3b.
4. 9 x 1 = 9	4a.
	4b.
5. 9 x 9 = 81	5a.
	5b.
6. 9 x 6 = 54	6a.
	6b.
7. 9 x 3 = 27	7a.
	7b.
8. 9 x 5 = 45	8a.
	8b.
9. 9 x 10 = 90	9a.
	9b.
10. 9 x 8 = 72	10a.
	10b.

Core Instruction, Interventions, Instructional Adjustments & Modifications: Sorting Them Out

Instructional Adjustment/Accommodation. An *instructional adjustment* (also known as an 'accommodation') is intended to help the student to fully access and participate in the general-education curriculum without changing the instructional content and without reducing the student's rate of learning (Skinner, Pappas & Davis, 2005).

An instructional adjustment removes barriers to learning while still expecting that students will master the same instructional content as their typical peers.

Core Instruction, Interventions, Instructional Adjustments & Modifications: Sorting Them Out

Instructional Adjustment/Accommodation: Example.

- *Chunking*. The teacher breaks a larger assignment into smaller 'chunks' and provides a student with performance feedback and praise for each completed 'chunk' of assigned work (Skinner, Pappas & Davis, 2005).

- *Choice in Mode of Task Completion*. The teacher allows the student two or more choices for completing a given academic task. For example, a student may be given the option to use a computer keyboard to write an essay instead of writing it by hand -- or to respond orally to math-facts on flashcards rather than recording answers on a math worksheet (Kern & Clemens, 2007).

Core Instruction, Interventions, Instructional Adjustments & **Modifications**: Sorting Them Out

- **Modification**. A modification changes the expectations of what a student is expected to know or do—typically by lowering the academic standards against which the student is to be evaluated.

  Modifications are generally **not** included on a general-education student's classroom intervention plan—because lowering academic expectations is likely to result in these students falling further behind rather than closing the performance gap.

Core Instruction, Interventions, Instructional Adjustments & **Modifications**: Sorting Them Out

Modification: Examples.

- *Reduced Amount of Work on a Fluency-Building Assignment*. A student is given 5 math computation problems for practice on a **math-computation fluency task** instead of the 20 problems assigned to the rest of the class.
- *Open-Book Test for One.* Allowing a single student to consult course notes during a test when peers are not permitted to do so.

Deciding How to Accommodate. What is a process to find the 'right' accommodations for an individual or group? (pp. 20-22)

Handout
pp. 20-22

How To: Use Accommodations With General-Education Students: Teacher Guidelines

Classrooms in most schools look pretty much alike, with students sitting at rows of desks attending (more or less) to teacher instruction. But a teacher facing any class knows that behind that group of attentive student faces lies a kaleidoscope of differences in academic, social, self-management, and language skills. For example, recent national test results indicate that well over half of elementary and middle-school students have not yet attained proficiency in mathematics (NAEP, 20011a) or reading (NAEP 2011b). Furthermore, 1 in 10 students now attending American schools is an English Language Learner (Institute of Education Sciences, 2012) who must grapple with the complexities of language acquisition in addition to the demands of academic coursework.

Teachers can increase the chances for academic success by weaving into their instructional routine an appropriate array of classwide curricular accommodations made available to any general-education student who needs them (Kern, Bambara, & Fogt, 2002). However, teachers also know that they must strike an appropriate balance: while accommodations have the potential to help struggling learners to more fully engage in demanding academics, they should not compromise learning by holding a general-education student who accesses them to a lesser performance standard than the rest of the class. After all, students with academic deficits must actually accelerate learning to close the skill-gap with peers, so allowing them to do less is simply not a realistic option.

Read on for guidelines on how to select classroom accommodations to promote school success, verify whether a student actually needs a particular accommodation, and judge when accommodations should be used in instruction even if not allowed on state tests.

Identifying Appropriate Accommodations: Access vs. Target Skills. As an aid in determining whether a particular accommodation both supports individual student differences and sustains a demanding academic environment, teachers should distinguish between *target* and *access* skills (Tindal, Daesik, & Ketterlin, 2008). *Target skills* are those academic skills that the teacher is actively trying to assess or to teach. Target skills are therefore 'non-negotiable'; the teacher must ensure that these skills are not compromised in the instruction or assessment of any general-education student. For example, a 4th-grade teacher sets as a target skill for his class the development of computational fluency in basic multiplication facts. To work toward this goal, the teacher has his class complete a worksheet of 20 computation problems under timed conditions. This teacher would not allow a typical student who struggles with computation to do fewer than the assigned 20 problems, as this change would undermine the target skill of computational fluency that is the purpose of the assignment.

In contrast, *access skills* are those needed for the student to take part in a class assessment or instructional activity but are not themselves the target of current assessment or instruction. Access skills, therefore, can be the focus of accommodations, as altering them may remove a barrier to student participation but will not compromise the academic rigor of classroom activities. For example, a 7th-grade teacher assigns a 5-paragraph essay as an in-class writing assignment. She notes that one student finds the access skill of handwriting to be difficult and aversive, so she instead allows that student the accommodation of writing his essay on a classroom desktop computer. While the access skill (method of text production) is altered, the teacher preserves the integrity of those elements of the assignment that directly address the target skill (i.e., the student must still produce a full 5-paragraph essay).

Matching Accommodations to Students: Look for the 'Differential Boost'. The first principle in using accommodations in general-education classrooms, then, is that they should address access rather than target

Accommodations: Target vs. Access Skills. Teachers can divide student skills for any task into **access** and **target** skills.

- *Target skills* are those that the teacher is actively trying to assess or to teach. Target skills are **'non-negotiable'.** The teacher must ensure that these skills are not compromised in the instruction or assessment of any general-education student.
- *Access skills* are required to take part in a class assessment or instructional activity but are **not** the target of current assessment or instruction. Access skills, therefore, **can** be changed through accommodations. Altering them may remove a barrier to student participation but will not compromise academic rigor.

Teacher Task: Steering Clear of Classroom Modifications. In 2 steps, the teacher can ensure that classroom adjustments do not become 'modifications' (with below-grade-level expectations):

1. The teacher first identifies the **'target skills'** in the academic task that are non-negotiable (that is, skills that cannot be changed without compromising the task).

2. The teacher then has the freedom to alter any of the remaining **'access skills'** — the negotiable elements of the learning task.

Example 1: Independent Work: Response Format

Task. The student is directed to complete a math-fact worksheet. The purpose of the exercise is to increase student fluency in the task.

Target (non-negotiable) skills. The student must complete all assigned items on his or her own, to ensure that he/she gets the full benefit of drill and practice.

Access (negotiable) skills. Writing numbers legibly and fluently is an access skill to the task but is not the focus of the task. The teacher judges it acceptable for the student to answer problems verbally instead of writing them down (*response format*).

Example 2: Independent Work: Extra Time

Task. The class has 10 minutes to complete an in-class assignment. One student appears to know how to do the work but cannot finish the task in the allotted time.

Target (non-negotiable) skills. Students must complete all items, which provide performance feedback about skills mastered.

Access (negotiable) skills. The ability to complete items efficiently on this task is an access skill—as the teacher is *not* measuring fluency ('not a speed test'). So he decides to allow the student *additional time* to complete this instructor-made task.

Example 3: Work Pairs: Use of Calculators

Task. The class is divided into pairs. Each pair is given a math word problem to convert to equation and solve.

Target (non-negotiable) skills. This task requires that students demonstrate understanding of how to translate word problems into number sentences, successfully solve, and check answers.

Access (negotiable) skills. The teacher decides that access skills for this task include accuracy and speed in basic math calculations—they are important but not being directly assessed. So the instructor allows several student pairs to use calculators to speed their work.

Accommodations TIP: Look for the 'Differential Boost'. An accommodation is warranted if it:

- benefits the student, and
- shows a substantially greater benefit than for peers.

Two questions identify whether an accommodation provides a 'differential boost':

1. Does the student perform significantly better *with* the accommodation than *without* it?

2. Does the accommodation boost that particular student's performance substantially beyond what could be expected if it were given to all students in the class

A 'YES' answer to both questions suggests that the accommodation will benefit the student and that it is uniquely matched to the student's needs.

A Sampling of Instructional Adjustment/Accommodation Ideas

Accommodations: Sampling

- The following is a sampling of accommodations that could be used to support general-education students in the area of 'instruction', taken from the free Accommodations Finder application on Intervention Central (www.interventioncentral.org).
- A link to this resource also appears on the conference web page.

Instructional Adjustments/Accommodations

- INSTRUCTION: CUE IMPORTANT INFORMATION. Identify those concepts, ideas, or other academic content likely to be evaluated on upcoming tests and quizzes.

  During lecture or class discussion, teacher comment can draw attention to important content, while on handouts, asterisks or other visual highlighting techniques can be used to emphasize content likely to appear as test items.

Source: International Dyslexia Association. (2002). Accommodating students with dyslexia in all classroom settings. Retrieved from http://www.interdys.org/

Instructional Adjustments/Accommodations

- INSTRUCTION: REPEAT/REPHRASE COMMENTS. Repeat or rephrase student questions or comments to the class or group before responding.

Source: Disability Resource Center: University of Florida (2008). Instructor fact sheet: Teaching students with hearing loss. Retrieved from http://www.dso.ufl.edu/drc/documents/hearing_loss_instructor_fact_sheet.pdf

Instructional Adjustments/Accommodations

- INSTRUCTION: CHUNK CLASSWORK AND INCLUDE BREAKS. Break up lectures or student work sessions into smaller chunks and include brief breaks (e.g., THINK-PAIR-SHARE) to sustain student attention.

3

Source: Barkley, R. A. (2008). 80+ classroom accommodations for children or teens with ADHD. The ADHD Report, 16(4), 7-10.

Instructional Adjustments/Accommodations

- CLASS NOTES: PROVIDE A STUDENT COPY. Provide a copy of class notes to allow the student to focus more fully on the lecture and class discussion.

  This strategy can be strengthened by requiring that the student highlight key vocabulary terms appearing in the prepared notes as they are brought up in the lecture or discussion.

Source: International Dyslexia Association. (2002). Accommodating students with dyslexia in all classroom settings. Retrieved from http://www.interdys.org/

Instructional Adjustments/Accommodations

- CLASS NOTES: PROVIDE LECTURE OUTLINE. Make up an outline of the lecture to share with students.

  Encourage students to use the elements of the outline to structure class notes and to ensure that their notes do not omit important information.

Source: International Dyslexia Association. (2002). Accommodating students with dyslexia in all classroom settings. Retrieved from http://www.interdys.org/

Instructional Adjustments/Accommodations

- ASSIGNMENTS: OFFER CHOICE IN MODES OF TASK COMPLETION. Allow the student two or more choices for completing a given academic task.

  For example, a student may be given the option to review basic math facts with a peer using flashcards or review the same facts via self-directed Cover-Copy-Compare.

Source: Kern, L, & Clemens, N. (2007). Antecedent strategies to promote appropriate classroom behavior. Psychology in the Schools, 44(1), 65-75.

Instructional Adjustments/Accommodations

- ASSIGNMENTS: START CHALLENGING HOMEWORK ASSIGNMENTS IN CLASS. When assigning challenging homework, pair students off or divide into groups.

  Give them class time to begin the homework together, develop a plan for completing the homework, formulate questions about the homework, or engage in other activities to create the necessary momentum to motivate students then to complete the work independently.

Source: Skinner, C. H., Pappas, D. N., & Davis, K. A. (2005). Enhancing academic engagement: Providing opportunities for responding and influencing students to choose to respond. Psychology in the Schools, 42, 389-403.

Instructional Adjustments/Accommodations

- ASSIGNMENTS: GIVE TWO COPIES OF WORKSHEETS. Provide the student with two copies of worksheets. The student can use the first as a ‘draft’ and the second as the final, neat copy to be turned in to the teacher.

Source: Beech, M. (2010). Accommodations: Assisting students with disabilities. Florida Department of Education. Retrieved from http://www.fldoe.org/ese/pdf/accomm-educator.pdf

Instructional Adjustments/Accommodations

- ASSIGNMENTS: STRUCTURE ASSIGNMENTS FOR INITIAL SUCCESS. Promote student motivation on worksheets and independent assignments by presenting easier items first and more challenging items later on the sheet or assignment. Placing easier problems or questions first provide both skills practice and reinforcement to the student.

Source: International Dyslexia Association. (2002). Accommodating students with dyslexia in all classroom settings. Retrieved from http://www.interdys.org/

Instructional Adjustments/Accommodations

- ASSIGNMENTS/TESTS: SIMPLIFY DIRECTIONS. Simplify written directions on assignments and tests to the bare essentials to avoid student confusion or misunderstanding. Aim for simple vocabulary and conciseness of expression.

Source: International Dyslexia Association. (2002). Accommodating students with dyslexia in all classroom settings. Retrieved from http://www.interdys.org/

Instructional Adjustments/Accommodations

- INDEPENDENT WORK: CREATE LOW-DISTRACTION WORK AREAS. For students who are off-task during independent seatwork, set up a study carrel in the corner of the room or other low-distraction work area.

  The teacher can then either direct the distractible student to use that area whenever independent seatwork is assigned or can permit the student to choose when to use the area.

Source: U.S. Department of Education (2004). Teaching children with attention deficit hyperactivity disorder: Instructional strategies and practices. Retrieved fromhttp://www.ed.gov/teachers/needs/speced/adhd/adhd-resource-pt2.doc

11

Instructional Adjustments/Accommodations

- INDEPENDENT WORK: PROVIDE WORK SAMPLES AND EXEMPLARS. Provide samples of successfully completed academic items (e.g., math computation or word problems) or exemplars (e.g., samples of well-written paragraphs or essays) for the student to refer to when working independently.

Source: International Dyslexia Association. (2002). Accommodating students with dyslexia in all classroom settings. Retrieved from http://www.interdys.org/

Instructional Adjustments/Accommodations

- ORGANIZATION: ASSIGN A ‘FALL-BACK’ PEER. Choose a peer whom the student can call or email to get details about missing or lost homework assignments.

Source: Barkley, R. A. (2008). 80+ classroom accommodations for children or teens with ADHD. The ADHD Report, 16(4), 7-10.

Instructional Adjustments/Accommodations

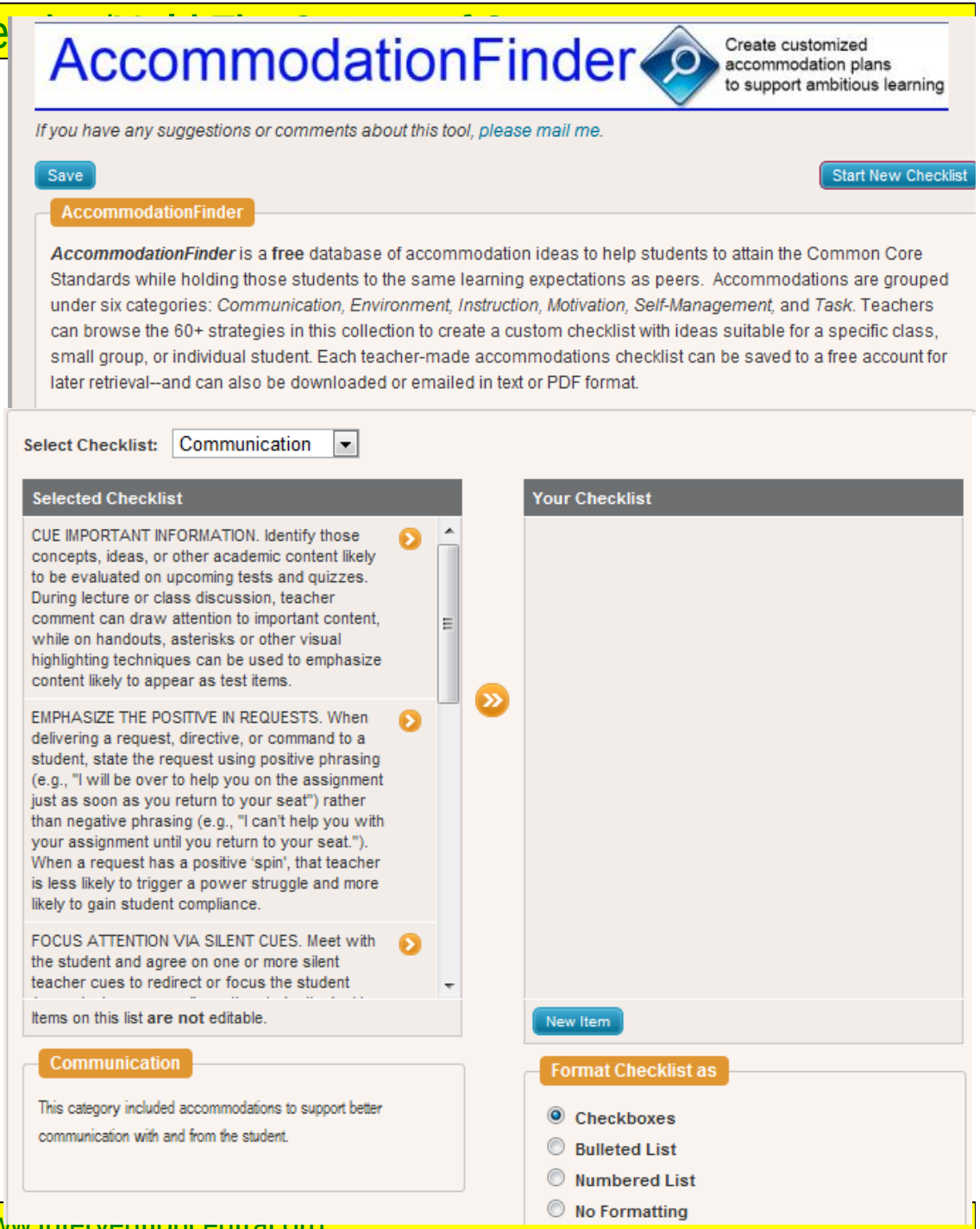
- ORGANIZATION: USE A PEER TO HELP IN STARTING ASSIGNMENTS. If a student finds it difficult to get organized and begin independent seatwork activities, select a supportive peer or adult in the classroom who can get the student organized and started on the assignment.

Source: Skinner, C. H., Pappas, D. N., & Davis, K. A. (2005). Enhancing academic engagement: Providing opportunities for responding and influencing students to choose to respond. Psychology in the Schools, 42, 389-403.

AccommodationFinder

http://www.interventioncentral.org/tools/accommodationfinder

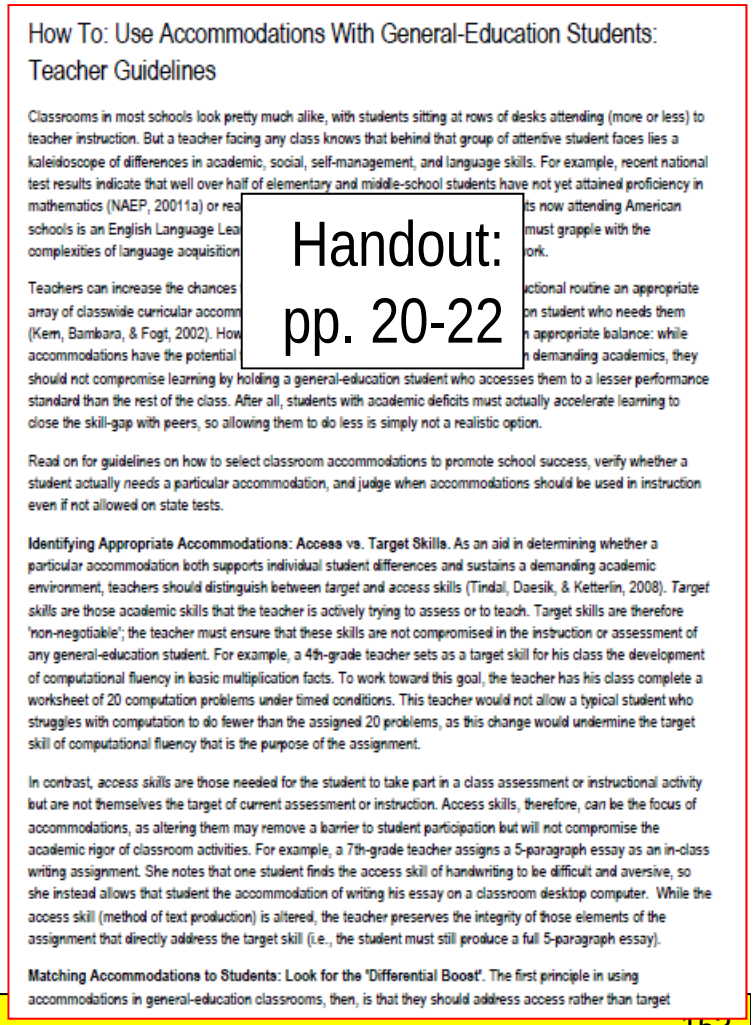
This application allows the user to browse a set of 60+ classroom accommodations to put together a unique plan for a struggling learner.



Lab Work: Separating Target and Access Skills

Use of classroom accommodations requires the teacher to analyze a task and distinguish **target** (non-negotiable) from **access** (negotiable) skills—with access skills the focus for accommodations.

Discuss how you might analyze classwork and homework assignments to identify when you can allow instructional adjustments/ accommodations without watering down the academic task. (Handout: pp. 20-22)



How To: Use Accommodations With General-Education Students: Teacher Guidelines

Classrooms in most schools look pretty much alike, with students sitting at rows of desks attending (more or less) to teacher instruction. But a teacher facing any class knows that behind that group of attentive student faces lies a kaleidoscope of differences in academic, social, self-management, and language skills. For example, recent national test results indicate that well over half of elementary and middle-school students have not yet attained proficiency in mathematics (NAEP, 20011a) or rea ts now attending American schools is an English Language Lea must grapple with the complexities of language acquisition ork.

Teachers can increase the chances actional routine an appropriate array of classwide curricular accomm on student who needs them (Kern, Bambara, & Fogt, 2002). How appropriate balance: while accommodations have the potential demanding academics, they should not compromise learning by holding a general-education student who accesses them to a lesser performance standard than the rest of the class. After all, students with academic deficits must actually accelerate learning to close the skill-gap with peers, so allowing them to do less is simply not a realistic option.

Handout: pp. 20-22

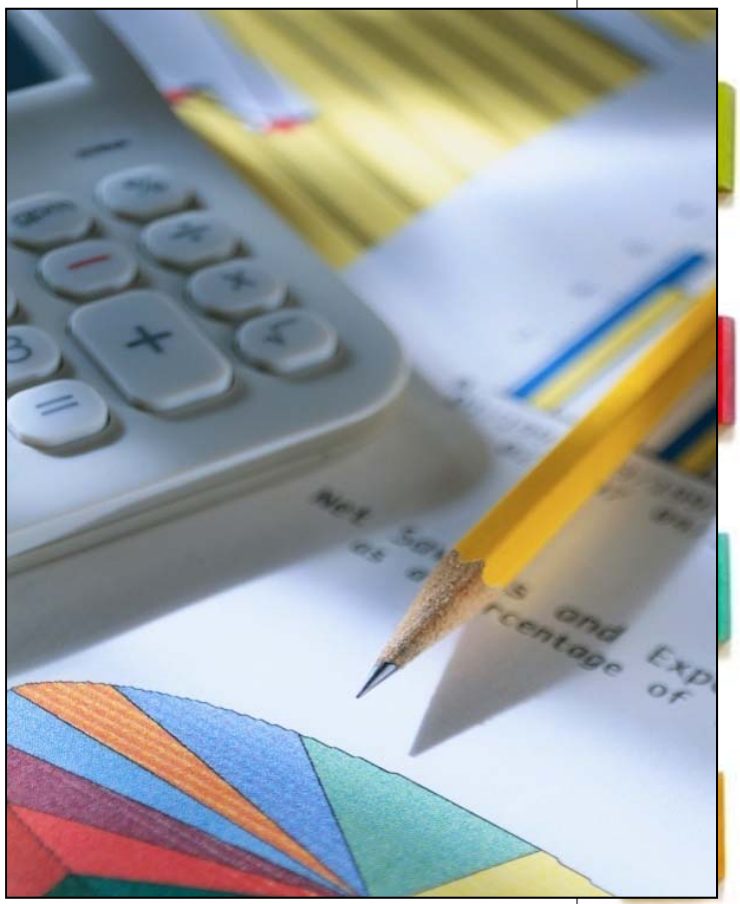
Read on for guidelines on how to select classroom accommodations to promote school success, verify whether a student actually needs a particular accommodation, and judge when accommodations should be used in instruction even if not allowed on state tests.

Identifying Appropriate Accommodations: Access vs. Target Skills. As an aid in determining whether a particular accommodation both supports individual student differences and sustains a demanding academic environment, teachers should distinguish between *target* and *access* skills (Tindal, Daesik, & Ketterlin, 2008). *Target skills* are those academic skills that the teacher is actively trying to assess or to teach. Target skills are therefore 'non-negotiable'; the teacher must ensure that these skills are not compromised in the instruction or assessment of any general-education student. For example, a 4th-grade teacher sets as a target skill for his class the development of computational fluency in basic multiplication facts. To work toward this goal, the teacher has his class complete a worksheet of 20 computation problems under timed conditions. This teacher would not allow a typical student who struggles with computation to do fewer than the assigned 20 problems, as this change would undermine the target skill of computational fluency that is the purpose of the assignment.

In contrast, *access skills* are those needed for the student to take part in a class assessment or instructional activity but are not themselves the target of current assessment or instruction. Access skills, therefore, can be the focus of accommodations, as altering them may remove a barrier to student participation but will not compromise the academic rigor of classroom activities. For example, a 7th-grade teacher assigns a 5-paragraph essay as an in-class writing assignment. She notes that one student finds the access skill of handwriting to be difficult and aversive, so she instead allows that student the accommodation of writing his essay on a classroom desktop computer. While the access skill (method of text production) is altered, the teacher preserves the integrity of those elements of the assignment that directly address the target skill (i.e., the student must still produce a full 5-paragraph essay).

Matching Accommodations to Students: Look for the 'Differential Boost'. The first principle in using accommodations in general-education classrooms, then, is that they should address access rather than target

Math and Data. What are ways to collect data to monitor math interventions?



Math and Data
Guiding Points for Teachers…

- Math interventions for individual students don't 'count' unless data are collected to track their effectiveness.
- Tier 1 math interventions can use data sources that are 'teacher-friendly' and feasible for use in classrooms.

Handout 1
pp. 28-29

Classroom Data Tools: What Are They and What Can They Measure?

Teachers have a variety of tools that they can access to collect behavioral or academic information and monitor classroom interventions. This 'look-up' chart provides a review of the most common data sources and what they can measure:

Data Tool	What It Is	What It Can Measure
Archival Data	Existing data routinely collected by schools that provides useful ongoing information about the student's academic or behavioral performance.	• Attendance • Office disciplinary referrals • Other aspects of behavior or academic performance captured in the school database
Behavior Report Cards	A teacher-created rating scale that measures student classroom behaviors. A behavior report card contains 3-4 rating items describing goal behaviors. Each item includes an appropriate rating scale (e.g., Poor-Fair-Good). At the end of an observation period, the rater fills out the report card as a summary snapshot of the student's behavior.	• General behaviors (e.g., complies with teacher requests; waits to be called on before responding) • Academic 'enabling' behaviors (e.g., has all necessary work materials; writes down homework assignment correctly and completely, etc.)
Checklists	The dividing of a larger behavioral task or sequence into constituent steps, sub-skills, or components. Each checklist element is defined in a manner that allows the observer to make a clear judgment (e.g., YES/NO, COMPLETED/NOT COMPLETED) about whether the student is displaying it.	• Step-by-step cognitive strategies • Behavioral routines • Generalization: Target behavior carried out across settings
Cumulative Mastery Records	A cumulative record of the student's acquisition/mastery of a defined collection of academic items such as multiplication math facts. This record is updated after every intervention session.	• Any discrete collection of academic items to be mastered: e.g., vocabulary, math facts, spelling words, letter or number names
Curriculum-Based Measures/ Assessment	A series of brief measures of basic academic skills given under timed conditions and scored using standardized procedures. CBM/CBA measures often include research-derived benchmark norms to assist in evaluating the student's performance.	• Speed and accuracy in basic academic skills: e.g., letter naming, number naming, number sense, vocabulary, oral reading fluency, reading comprehension (maze), production of writing, math fact computation
Grades	Represent in letter or number form the teacher's formal, summary evaluation of the student's academic performance on an assignment, quiz, test, or longer span of evaluation.	• Homework grades • Test grades • Quarterly report card grades
Interviews	Guided by prompts or questions, the student periodically provides verbal feedback about	• Student routines outside of class (e.g., use of study hall time, homework regimen)

Classroom Data Collection: The Basics…

Here are important guidelines: Tier 1/classroom data collection methods should:

- **measure skill(s) targeted by the intervention.** The teacher wants to know whether the student is improving specific academic skills or behaviors. The data-collection method is selected to track growth in that skill or behavior.
- **be sensitive to short-term gains.** Progress-monitoring should reveal in weeks—not months– whether the intervention is effective.
- **yield a specific number value.** The teacher selects progress-monitoring tool(s) that can be converted to numeric data—and charted.

Classroom Data Collection: Example

- Curriculum-Based Measurement: Math-Fact Fluency

Classroom Data Tool: Curriculum-Based Measurement/Assessment

- **What It Is:** A series of brief measures of basic academic skills given under timed conditions and scored using standardized procedures.

  CBM/CBA measures often include research-derived benchmark norms to assist in evaluating the student's performance.

Classroom Data Tool: Curriculum-Based Measurement/Assessment

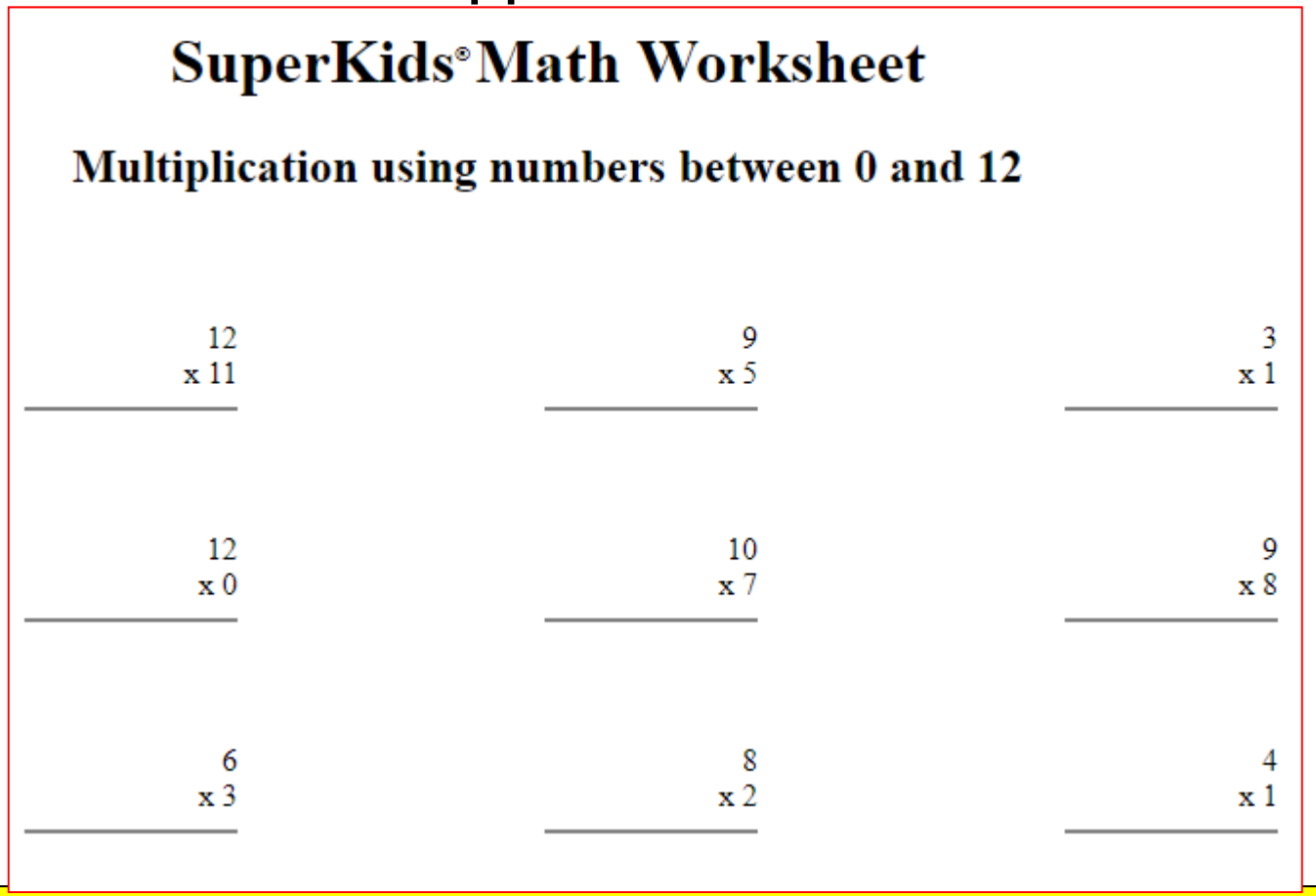
- What It Can Measure:
  - Speed and accuracy in basic academic skills, such as:
    - letter naming: 1 min
    - number naming: 1 min
    - number sense: 1 min
    - oral reading fluency: 1 min
    - reading comprehension (maze): 3 mins
    - production of writing: 3 mins
    - math fact computation: 2 mins

Curriculum-Based Measures (CBMs)

CBM	*Skill Area*	*Activity*
Letter Sound Fluency/Letter Name Fluency	Alphabetics/ Phonics	1 Minute: Student **reads letter names** or **sounds** from a **randomly generated list.**
Oral Reading Fluency	Reading Fluency	1 Minute: Student **reads aloud** from a **text passage.**
Reading Comprehension Fluency (Maze)	Reading Comprehension	3 Minutes: Student **reads silently** from a **Maze passage** and selects correct word in each choice item that restores meaning to the passage.
Early Math Fluency	Number Sense	1 Minute: Student completes an Early Math Fluency probe: (1) **Quantity Discrimination;** (2) **Missing Number;** or (3) **Number Identification**
Computation Fluency	Math Fact Fluency	2 Minutes: Student **completes math facts** and receives credit for each **correct digit.**
Written Expression	Mechanics/ Conventions of Writing	4 Minutes: Student reads a story-starter (sentence stem), then **produces a writing sample** that can be scored for **Total Words Written, Correctly Spelled Words, Correct Writing Sequences.**

- CBM: Math Computation Fluency [2 minutes]: The student is given a math-fact worksheet and completes as many problems as possible. The worksheet is scored for number of correct digits. See Handout 1/pp. 30-37 for instructions.

CBM: Math Computation: Example

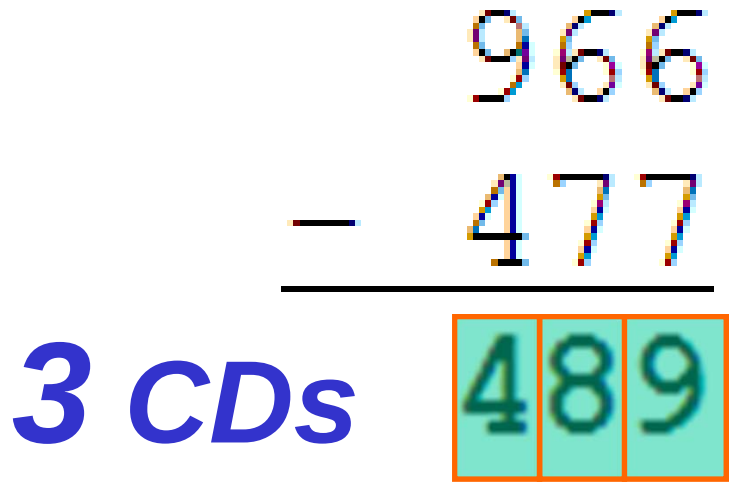


SuperKids® Math Worksheet

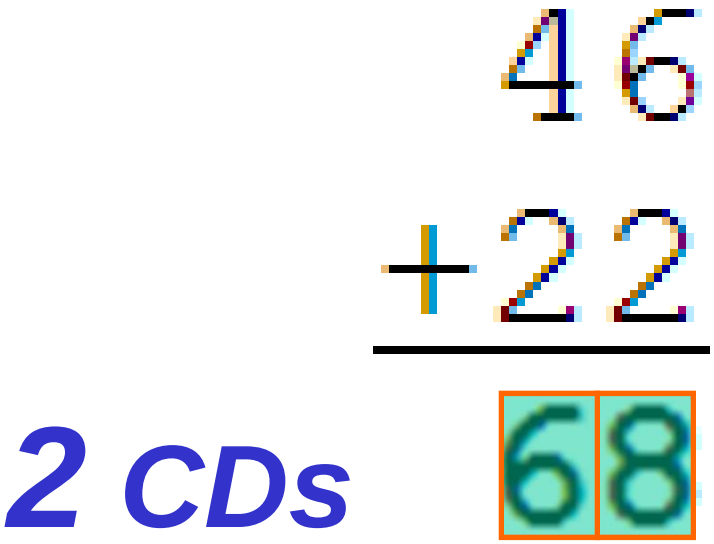
Multiplication using numbers between 0 and 12

12 x 11 =	9 x 5 =	3 x 1 =
12 x 0 =	10 x 7 =	9 x 8 =
6 x 3 =	8 x 2 =	4 x 1 =

- CBM: Math Computation Fluency [2 minutes]: The student is given a math-fact worksheet and completes as many problems as possible. The worksheet is scored for number of correct digits.



- CBM: Math Computation Fluency [2 minutes]: The student is given a math-fact worksheet and completes as many problems as possible. The worksheet is scored for number of correct digits.



- **Math Computation Fluency** [2 minutes]: The student is given a math-fact worksheet and completes as many problems as possible. The worksheet is scored for number of correct digits.

Curriculum-Based Measurement: Computation Fluency Norms

(Burns, VanDerHeyden, & Jiban, 2006; Deno & Mirkin, 1977; Fuchs & Fuchs, 1993; Fuchs & Fuchs, n.d.)*

Grade	Performance Level	Correct Digits per 2 Mins (Deno & Mirkin, 1977)	Weekly Growth: 'Realistic' (Fuchs & Fuchs, 1993)	Weekly Growth: 'Ambitious' (Fuchs & Fuchs, 1993)
6	Mastery	More than 79	0.45	1.0
	Instructional	40-79		
	Frustration	Less than 40		

Lab Work: Taking Data on Math Interventions

- Most data collection to monitor classroom math interventions will use one of the methods in this table (Handout 1; pp. 28-29).
- Review this list of 'teacher-friendly' assessment methods. For each, think of possible ways to use it to collect information on math-related skills, performance, or behavior.

Classroom Assessment Methods	
1. Archival Data	7. Interviews
2. Behavior Report Cards	8. Logs
3. Checklists	9. Observation
4. Cumulative Mastery Records	10. Rubrics
5. Curriculum-Based Measures/ Assessment	11. Self-Monitoring
6. Grades	12. Work Products

Motivation and Math. What teacher communication tools can promote student optimism and engagement in math?

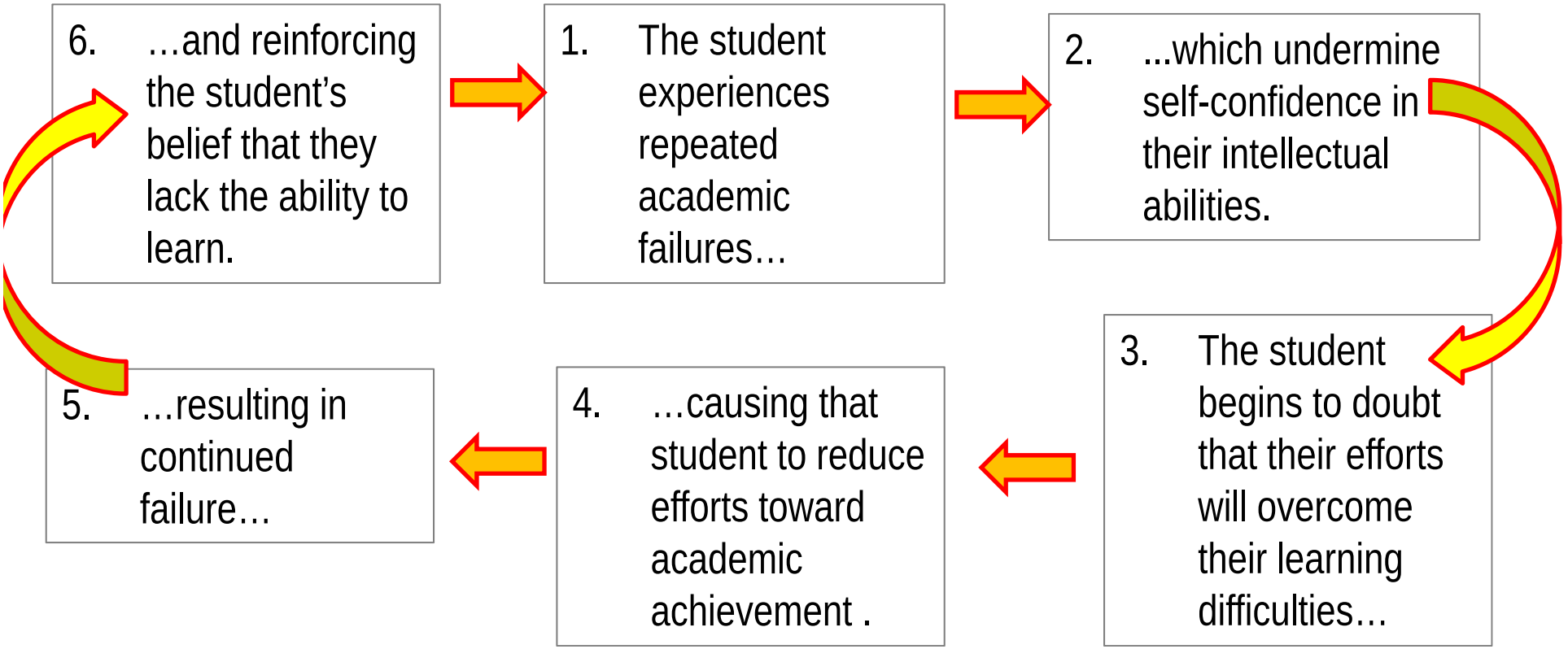
Motivation and Math
Guiding Points for Teachers…

- Students caught in the negative cycle of 'learned helplessness' can lack confidence in their math abilities.
- Teachers can use positive communication tools to promote student optimism and engagement in mathematics.

What is '**learned helplessness**' and how can this condition **undermine** motivation?

Learned Helplessness: The Failure Cycle

Students with a history of school failure are at particular risk of falling into the learned helplessness cycle:



Source: Sutherland, K. S., & Singh, N. N. (2004). Learned helplessness and students with emotional or behavioral disorders: Deprivation in the classroom. Behavioral Disorders, 29(2), 169–181.

How to Address 'Learned Helplessness': Teachers can help to support a student experiencing learned helplessness by:

- Using optimistic statements that encourage student effort and risk-taking (Dweck, 2006).
- teaching the student self-management skills, to include cognitive strategies, academic fix-up skills, and other techniques (e.g., 'process checklists') to use on challenging assignments.
- instructing the student in how to create a work plan for extended assignments.

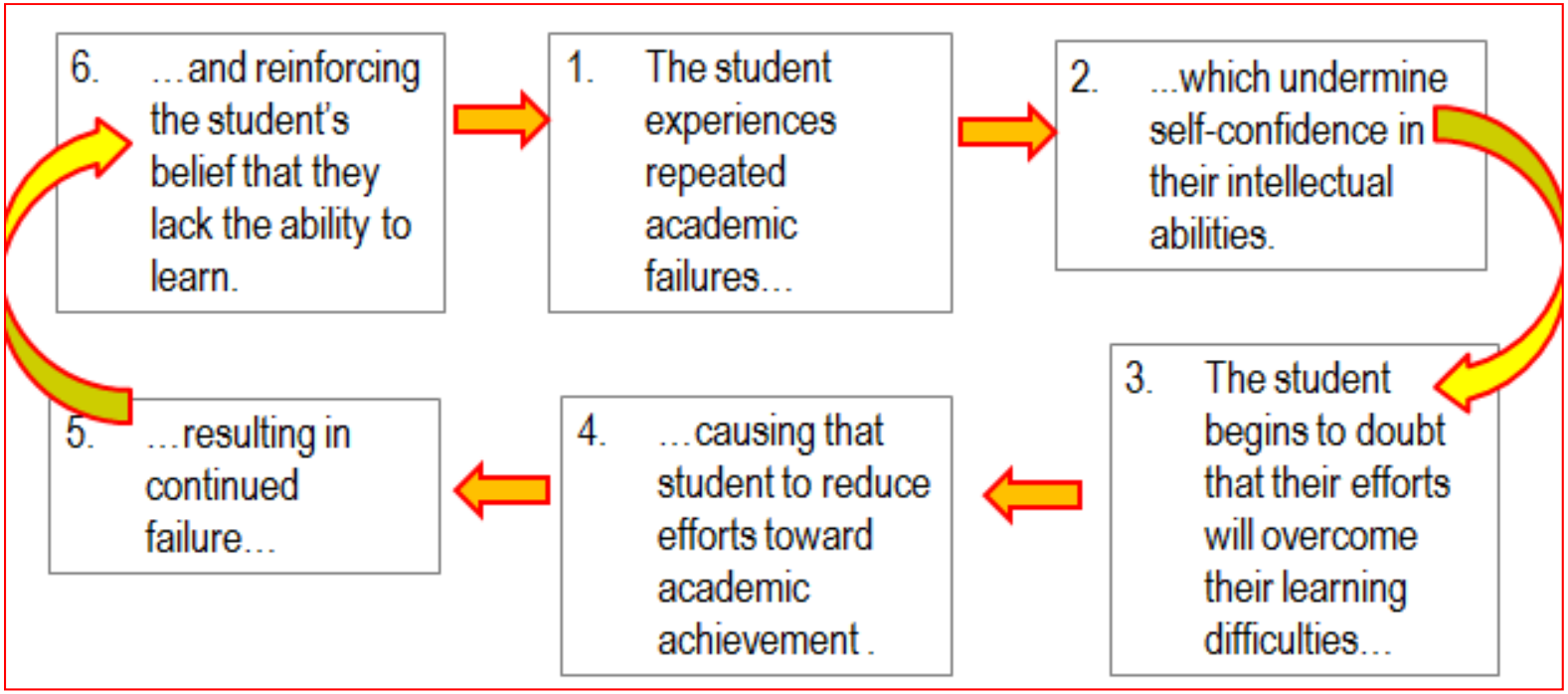
Sources: Dweck, C. S. (2006). Mindset: The new psychology of success. New York: Ballantine.

Sutherland, K. S., & Singh, N. N. (2004). Learned helplessness and students with emotional or behavioral disorders: Deprivation in the classroom. Behavioral Disorders, 29(2), 169–181.

Activity: *Learned Helplessness*

Discussion Question:

- Do you find that **'learned helplessness'** is a **problem** in your school or district? If so, share examples.



Growth Mindset: Teachers can combat 'learned helplessness‘ by structuring classroom statements to encourage optimism and motivation.

Handout 1; pp. 23-25

Mindsets: Determining Limits on Potential

Research in cognitive psychology (Dweck, 2006) demonstrates that individuals' performance as learners is profoundly influenced by

- their perceptions of their intelligence and/or abilities and
- their reinforcing these perceptions through an ongoing monologue as they encounter new challenges.

The habitual ways that people have of thinking about their abilities can be thought of as '**mindsets**'. Mindsets fall into two categories: **Fixed** vs. **growth**.

Source: Dweck, C. S. (2006). Mindset: The new psychology of success. New York: Ballantine.

Beliefs About Mindsets: Fixed vs. Growth

- Fixed Mindset	+ Growth Mindset
Intelligence (general ability) is fixed. **Effort** plays a **minor role** in determining one's level of accomplishment. Thus, **setbacks** are viewed as a **lack of ability** and result in the student "giving up or withdrawing effort" (Blackwell, et al., 2015).	Intelligence and other attributes are '**malleable**'--they can increase with effort. This perspective views **struggle** as a **positive**-- "an opportunity for growth, not a sign that a student is incapable of learning." (Paunesku, et al., 2015).

The 'Malleability' of Intelligence

"It is important to recognize that believing intelligence to be malleable does not imply that everyone has exactly the same potential in every domain, or will learn everything with equal ease.

Rather, it means that for any given individual, intellectual ability can always be further developed."

Source: Blackwell, L. S., Trzesniewski, K. H., & Dweck, C. S. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. Child Development, 78(1), 246-263.

Contrasting Mindsets: Responses to Setbacks

- Fixed Mindset: The student may:	+ Growth Mindset: The student will:
• give up • withdraw effort • 'disidentify' with challenge subject: e.g., "*I don't like math much anyway.*" • be at greater risk for cheating	• view setback as an opportunity for learning • increase effort • figure out deficiencies in work or study processes and correct them

Source: Blackwell, L. S., Trzesniewski, K. H., & Dweck, C. S. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. Child Development, 78(1), 246-263.

Mindsets: Fixed vs. Growth

"[Fixed vs. growth] mindsets affect students' achievement by creating **different psychological worlds**."

Dr. Carol Dweck

Source: Dweck, C. S. (2008). Mindsets: How praise is harming youth and what can be done about it. School Library Media Activities Monthly, 24(5), 55-58; p. 56.

Mindsets: Fixed vs. Growth

Does a student's type of mindset have a significant impact on school performance?

When students are not experiencing significant learning challenges, those with **fixed** and **growth** mindsets may do **equally well**.

However, during times of difficult academic work or dramatic changes in the learning environment (e.g., middle school), g**rowth-mindset** students tend to do **significantly better** than their fixed-mindset peers.

Source: Blackwell, L. S., Trzesniewski, K. H., & Dweck, C. S. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. Child Development, 78(1), 246-263.

Fixed-Mindset Statements: What NOT to Say

Fixed-mindset statements are those that reinforce the (untrue) idea that individuals have a fixed quantity of 'ability' that cannot expand much despite the learner's efforts. Here are statements to avoid, because they send a fixed-mindset message to students:

- *"Excellent essay. You are a **natural-born** writer!"*
- *"You need to work harder. I have seen your grades and know that you are **smart enough** to get an A in this course."*
- *"It's OK-not everyone **can be good** at math."*

To Promote a 'Growth Mindset'…Use Process-Oriented Statements

Teachers ' growth-mindset statements are varied. However, they tend to include these elements:

- **Challenge(s).** Recognizes difficulties or struggles to be faced and frames them as opportunities to learn.
- **Process.** Lays out a specific process for moving forward.
- **Confidence.** Conveys optimism that the student can and will move toward success if the learner puts in sufficient effort, follows the recommended process, and makes appropriate use of any 'help' resources.

Source: Dweck, C. S. (2007). The perils and promises of praise. Educational Leadership, 65(2), 34-39.

Integrate 'Pro-Growth-Mindset' Statements into Classroom Discourse

In day-to-day communication with students, instructors have many opportunities use growth-mindset principles to infuse their statements with optimism, including:

- praise
- work-prompts
- encouragement
- introduction of assignments

Source: *Dweck, C. S. (2007). The perils and promises of praise. Educational Leadership, 65(2), 34-39.*

Encouragement

"I can see that you didn't do as well on this math test as you had hoped, Luis.

Let's review ideas to help you prepare for the next exam.

If you are willing to put in the work, I know that you can raise your score."

Growth Mindset: Teacher Examples

Encouragement

When students have academic setbacks, the teacher can respond with empathy: framing the situation as a learning opportunity, describing proactive steps to improve the situation, and expressing confidence in the learner.

EXAMPLE:

"I can see that you didn't do as well on this math test as you had hoped, Luis.	Empathy
Let's review ideas to help you to prepare for the next exam. If you are willing to put in the work,	Process & Effort
I know that you can raise your score."	Confidence

Assignment

"You should plan spend at least 90 minutes on tonight's math homework.

When you start the assignment, some problems might look like they are too difficult to solve.

But if you give it your best and follow your problem-solving checklist, you should be able to answer them."

Growth Mindset: Teacher Examples
Assignment

The teacher can give assignments a growth-mindset spin--describing challenge(s), appraising the effort required, reminding what strategies or steps to use, and stating confidently that following the process will lead to success.

EXAMPLE:

"You should plan to spend at least 90 minutes on tonight's math homework.	Effort Needed
When you start the assignment, some problems might look like they are too difficult to solve.	Challenge
But if you give it your best and follow your problem-solving checklist,	Process & Effort
you should be able to answer them."	Confidence

To Promote a 'Growth Mindset'…Use Process-Oriented Statements

Teachers ' growth-mindset statements are as varied as the students and situations they address. However, they tend to include these elements:

- **Challenge(s).** Recognizes difficulties or struggles to be faced and frames them as opportunities to learn.
- **Process.** Lays out a specific process for moving forward.
- **Confidence.** Conveys optimism that the student can and will move toward success if the learner puts in sufficient effort, follows the recommended process, and makes appropriate use of any 'help' resources.

Source: Dweck, C. S. (2007). The perils and promises of praise. Educational Leadership, 65(2), 34-39.

Growth-Mindset Statement: A Motivational Push

Research studies have shown that even students with an ingrained 'fixed-mindset' view of academics can gain a brief motivation 'push' when the teacher reframes a past, present, or future learning activity in 'growth mindset' terms.

Each classroom, then, becomes its own motivational micro-climate.

And with the teacher's continued expression of an optimistic, growth-mindset view, students are more likely to apply more effort, attain greater success, and become self-directed learners.

Source: Dweck, C. S. (2006). Mindset: The new psychology of success. New York: Ballantine.

Mindsets Research: Effective Only If We Apply It…

Proponents of growth-mindset statements should be concerned that the average frequency in which teachers use classroom praise is generally low in general- and special-education classrooms (Hawkins & Heflin, 2011).

Frequency of praise is a useful indicator of the rate at which teachers might use ANY growth-mindset statement.

It is of little help if teachers agree that growth-mindset is important to student motivation but fail to actually implement the strategy.

Source: Hawkins, S. M., & Heflin, L. J. (2011). Increasing secondary teachers' behavior-specific praise using a video self-modeling and visual performance feedback intervention. Journal of Positive Behavior Interventions,13(2) 97–108.

'Wise' Feedback:
Teachers can increase student receptiveness to critical evaluation by using this feedback structure.
Handout 1; pp. 26-27

Critical Feedback: The Problem…

The intention of teachers' instructional feedback is often ambiguous, leaving learners free to impose their own interpretations. A student, for example, might view a teacher's written or verbal feedback about an assignment as a sign either of caring and commitment or a curt dismissal of the student's abilities (Yeager et al., 2013).

Students already sensitive to being stereotyped (e.g., because of race, gender, or economic class) may construe teacher feedback in a negative light—as a sign of stereotyping or bias (Cohen, Steele, & Ross, 1999; Yeager et al., 2013). So the student 'tunes out' that adult feedback—resulting in the 'mentor's dilemma'.

Sources: Cohen, G. L., Steele, C. M., and Ross, L. D. (1999). The mentor's dilemma: Providing critical feedback across the racial divide. Personality and Social Psychology Bulletin, 25(10), 1302-1318.

Yeager, D. S., Purdie-Vaughns, V., Garcia, J., Apfel, N., Brzustoski, P., Master, A., Hessert, W. T., & Williams, M. E. (2013). Breaking the cycle of mistrust: Wise interventions to provide critical feedback across the racial divide. Journal of Experimental Psychology: General, 143, 804-824.

'Wise' Feedback: Formatting Critical Feedback to Promote Student Acceptance

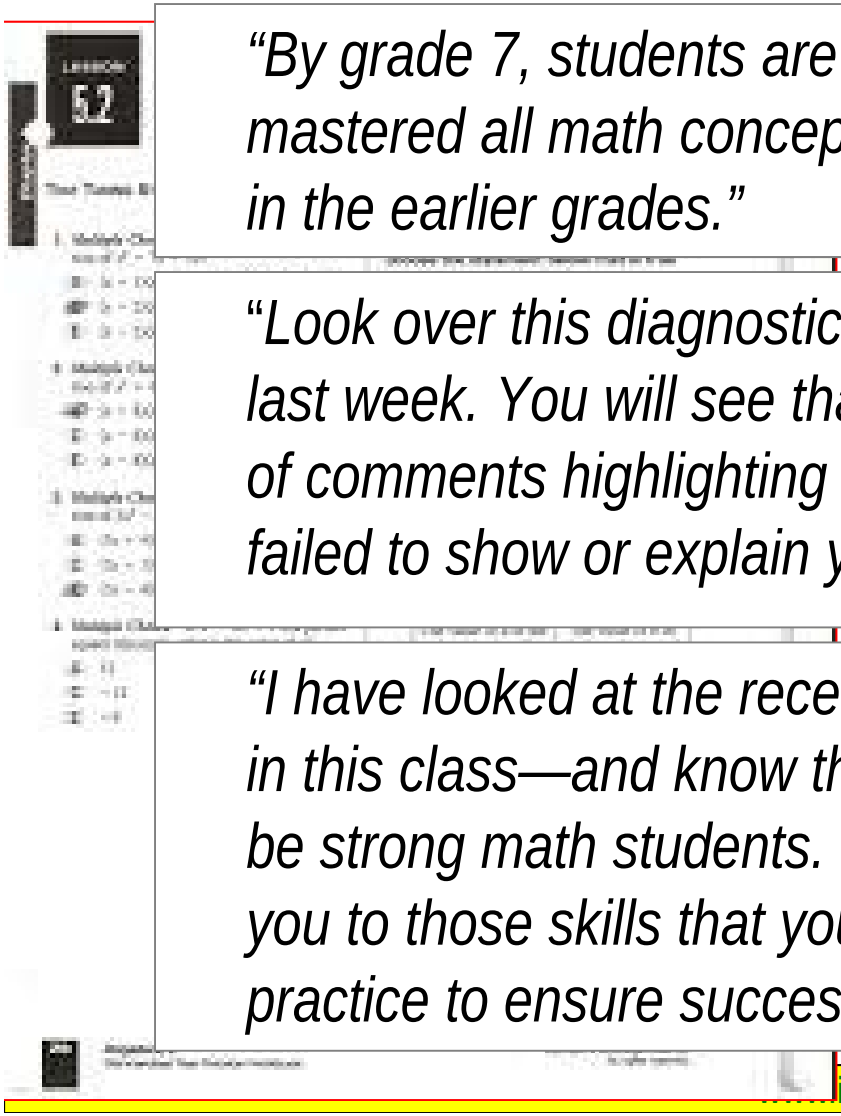
'Wise feedback' prevents the student from taking criticism about their work personally. Written or verbal feedback about a student's academic performance is prefaced with:

- an explicit statement of high standards,
- [optional] a brief description of the feedback, and
- assurance that the instructor fully believes the student capable of attaining those elevated standards.

The actual feedback offered should also be sufficiently rigorous to reflect high standards.

Source: *Cohen, G. L., Steele, C. M., & Ross, L. D. (1999). The mentor's dilemma: Providing critical feedback across the racial divide. Personality and Social Psychology Bulletin, 25, 1302-1318.*

Provide 'Wise' Feedback: Whole-Class Example



"By grade 7, students are expected to have fully mastered all math concepts and operations taught in the earlier grades."

Statement of high standards

"Look over this diagnostic math test that you took last week. You will see that I have written a number of comments highlighting where you made errors or failed to show or explain your work."

Description of feedback

"I have looked at the recent math work of everyone in this class—and know that you all have the skills to be strong math students. My comments will point you to those skills that you should review and practice to ensure success in this course."

Assurance of ability

Wise Feedback: Additional Suggestions…

- *Do not pair grades with wise feedback.* When possible, teachers should avoid attaching grades to any student work that contains wise feedback.

  Students tend to view a summative number or letter grade as the 'real' evaluation of an assignment and are therefore likely to ignore comments that accompany them (Yeager et al., 2013). So grades can 'short-circuit' the positive impact of wise feedback.

  One strategy to keep wise-feedback and grading separate on an assignment is to return the first draft of the assignment ungraded with wise feedback. The student is then directed to use the feedback to revise the assignment and submit for a grade.

Wise Feedback: Additional Suggestions…

- *Make student feedback 'ambitious'*. In an attempt to bond with unmotivated students, the teacher may over-praise them for mediocre work or provide only easy suggestions for improving the assignment.

  Either strategy sets a low bar for performance and can backfire. When students sense that instructors have limited expectations of them, they can feel patronized and stereotyped, lose motivation, and further withdraw effort from academic tasks (Yeager et al., 2013).

  Instead, the teacher should praise work that truly deserves it and offer ambitious feedback appropriate to students' skill level.

Growth Mindset & Wise Feedback: Implementation

- Consider the structures shared here for creating **growth-mindset** and **wise feedback** statements.
- Discuss ideas to use either or both of these communication tools *frequently*, and *consistently* in your classrooms.

Growth-mindset statements include:

- **Process.** Lays out a specific process for moving forward.
- **Challenge(s).** Recognizes difficulties or struggles to be faced and frames them as opportunities to learn.
- **Confidence.** Conveys optimism that the student can and will move toward success with effort.

Wise feedback statements include:

- **Feedback description.** Describes the nature of the feedback being offered.
- **High standards.** Explains the high standards used to evaluate the student work and generate the instructional feedback.
- **Assurance of student ability.** States explicitly that the student has the skills necessary to successfully meet those standards.

Documenting Math Interventions.

How can a teacher record a math intervention in a streamlined way to share with others?

Documenting Math Interventions

Guiding Points for Teachers…

- Any classroom interventions put into place by math teachers cannot be communicated to others unless they are documented.
- Documenting an intervention BEFORE it begins increases its likelihood of success and makes that plan potentially available to other stakeholders: future teachers of the student, parent(s), the building RTI/MTSS Team, the Section 504 Team, and the Special Education Eligibility Team.

Tier 1 Academic Intervention: The Mathematics Teacher is Able to:

1. Provide Strong Core Instruction to the Whole Class

2. Understand & Accept Role as Intervention 'First Responder'

3. Define the Math-Related Problem(s) in Clear & Specific Terms

4. Develop an Appropriate Intervention Plan Matching the Identified Problem(s)

5. Write Down the Intervention Plan Before Implementing

6. Collect Data to Monitor & Judge Student Progress

How to Create a Written Record of Classroom Interventions (Handout 1; pp. 11-13)

How To: Create a Written Record of Classroom Interventions

When general-education students begin to struggle with academic or behavioral issues, the classroom teacher will typically select and implement one or more evidence-based intervention strategies to assist those students. But a strong intervention plan needs more than just well-chosen interventions. It also requires 4 additional components (Witt, VanDerHeyden, & Gilbertson, 2004): (1) student concerns should be clearly and specifically defined; (2) one or more methods of formative assessment should be used to track the effectiveness of the intervention; (3) baseline student data should be collected prior to the intervention; and (4) a goal for student improvement should be calculated before the start of the intervention to judge whether that intervention is ultimately successful. If a single one of these essential 4 components is missing, the intervention is to be judged as fatally flawed (Witt, VanDerHeyden, & Gilbertson, 2004) and as not meeting minimum Response to Intervention standards.

Teachers need a standard format to use in documenting their classroom intervention plans. The *Classroom Intervention Planning Sheet* that appears later in this article is designed to include all of the essential documentation elements of an effective intervention plan. The form includes space to document:

- *Case information.* In this first section of the form, the teacher notes general information, such as the name of the target student, the adult(s) responsible for carrying out the intervention, the date the intervention plan is being created, the expected start and end dates for the intervention plan, and the total number of instructional weeks that the intervention will be in place. Most importantly, this section includes a description of the student problem; research shows that the most significant step in selecting an effective classroom intervention is to correctly identify the target student concern(s) in clear, specific, measureable terms (Bergan, 1995).
- *Intervention.* The teacher describes the evidence-based intervention(s) that will be used to address the identified student concern(s). As a shortcut, the instructor can simply write the intervention name in this section and attach a more detailed intervention script/description to the intervention plan.
- *Materials.* The teacher lists any materials (e.g., flashcards, wordlists, worksheets) or other resources (e.g., Internet-connected computer) necessary for the intervention.
- *Training.* If adults and/or the target student require any training prior to the intervention, the teacher records those training needs in this section of the form.
- *Progress-Monitoring.* The teacher selects a method to monitor student progress during the intervention. For the method selected, the instructor records what type of data is to be used, collects and enters student baseline (starting-point) information, calculates an intervention outcome goal, and notes how frequently he or she plans to monitor the intervention.

A completed example of the *Classroom Intervention Planning Sheet* that includes a math computation intervention can be found later in this article.

While a simple intervention documentation form is a helpful planning tool, schools should remember that teachers will need other resources and types of assistance as well to be successful in selecting and using classroom interventions. For example, teachers should have access to an 'intervention menu' that contains evidence-based strategies to address the most common academic and behavioral concerns and should be able to get coaching support as they learn how to implement new classroom intervention ideas.

References

Bergan, J. R. (1995). Evolution of a problem-solving model of consultation. *Journal of Educational and Psychological Consultation, 6(2),* 111-123.

Witt, J. C., VanDerHeyden, A. M., & Gilbertson, D. (2004). Troubleshooting behavioral interventions. A systematic process for finding and eliminating problems. *School Psychology Review, 33,* 363-383.

Question: What Does a Teacher Write into a Tier 1/Classroom Intervention Plan?

Teachers can document any elements of support that address the identified student academic deficit or delay, including:

- math **interventions**
- **differentiation** strategies
- **scaffolding** techniques

This documentation allows others to replicate successful instructional elements and avoid ineffective strategies.

Tier 1: Classroom Intervention: When to Put a Plan into Writing?

Teachers document classroom intervention plans to communicate with others, including:

1. next year's teacher(s). *What supports benefited the student?*
2. parent conference. What *additional teacher attention did the child receive? What was the outcome? What are next steps?*
3. the RTI/MTSS Problem-Solving Team. *What was the presenting problem, what classroom supports were offered, and what data were collected?*
4. Special Education Eligibility Team. *What evidence was collected to show that the student received appropriate, individualized instruction to address academic needs?*

Tier 1 Intervention Plans: Essentials…

- At Tier 1, problem-solving occurs when the teacher meets briefly with a team (e.g., grade-level team, instructional team, department) or a consultant.
- The teacher defines the student problem(s), selects intervention(s), decides how to monitor the intervention, and documents the intervention plan—with the guidance of the team or consultant
- The teacher meets again with team or consultant several weeks later to check on the status of the intervention.

Tier 1/Classroom Intervention Planning Sheet pp. 11-13

Case Information

Problem Description

Listing of Intervention Elements

Materials

Training

Plan to Monitor Progress

Case Information

What to Write: Record the important case information, including student, person delivering the intervention, date of plan, start and end dates for the intervention plan, and the total number of instructional weeks that the intervention will run.

ent:	*John Samuelson-Gr 4*	Interventionist(		Date Intervention Plan Was Written:	*10 October 2012*
tart:	*M 8 Oct 2012*	Date Interventi is to En		Total Number of Intervention Weeks:	*6 weeks*
Description of the Student Problem:	*Slow math computa ed (computes multiplication facts at 12 correct digits in 2 minutes, when ical gr 4 peers compute at least 24 correct digits).*				

Intervention

the intervention(s) to be used with this student. TIP: If you have a script for this ere and attach the script to this sheet.

et al., 2002)

tudents' rate of responding on arithmetic-fact worksheets: (1) The teacher hands out the will have 3 minutes to work on problems on the sheet. (2) The teacher starts the stop the end of the first minute in the 3-minute span, the teacher 'calls time', stops the e the last number written and to put their pencils in the air. Then students are told to stopwatch. (4) This process is repeated at the end of minutes 2 and 3. (5) At the conclusion of the 3 minutes, the teacher collects the student worksheets.

Materials

What to Write: Jot down materials (e.g., flashcards) or sources (e.g., Internet-connected computer) needed to ry out this intervention.

worksheet generato ww.interventioncentral.org to assessment materials.

Training

What to Write: Note adult(s) and/or the s

h the student at least once before t ervention to e with the time-drill technique and ied math computation ents.

Progress-Monitorin

What to Write: Select a meth rvention. For the method selected, record what type of data is to be used, enter student ba e an intervention outcome goal, and note how frequently you plan to monitor the intervention. Tip: Several ideas oom data collection appear on the right side of this table.

Type of Data Used to Monitor: *Curriculum-based rement: math computation assessments: 2 minute single-skill p s*

Baseline	Outcome Goa
12 correct digits per 2 minute probe	*24 correct digits per 2 minute probe*

How often will data be collected? (e.g., daily, every other day, weekly):
WEEKLY

Ideas for Intervention Progress-Monitoring

- Existing data: grades, homework logs, etc.
- Cumulative mastery log
- Rubric
- Curriculum-based measurement
- Behavior report card
- Behavior checklist

Creating a Written Record of Classroom Interventions: Form

- *Case information*. The opening section of the form includes general information about the case, including:
  - Target student
  - Teacher/interventionist
  - Date of the intervention plan
  - Start and end dates for the intervention
  - Description of the student problem to be addressed

Case Information

Problem Description

Case Info					
What to Write: Record the im nt case information, including student, person delivering the intervention, date of plan, start and end dates for the intervention n, and the total number of instructional weeks that the intervention will run.					
Student:	*John Samuelson-Gr 4*	Interventionist(s):	*Mrs. Kennedy, classroom teacher*	Date Intervention Plan Was Written:	*10 October 2012*
Date Intervention is to Start:	*M 8 Oct 2012*	Date Intervention is to End:	*F 16 Nov*	Total Number of Intervention Weeks:	*6 weeks*
Description of the Student Problem:	*Slow math computation speed (computes multiplication facts at 12 correct digits in 2 minutes, when typical gr 4 peers compute at least 24 correct digits).*				

Creating a Written Record of Classroom Interventions: Form

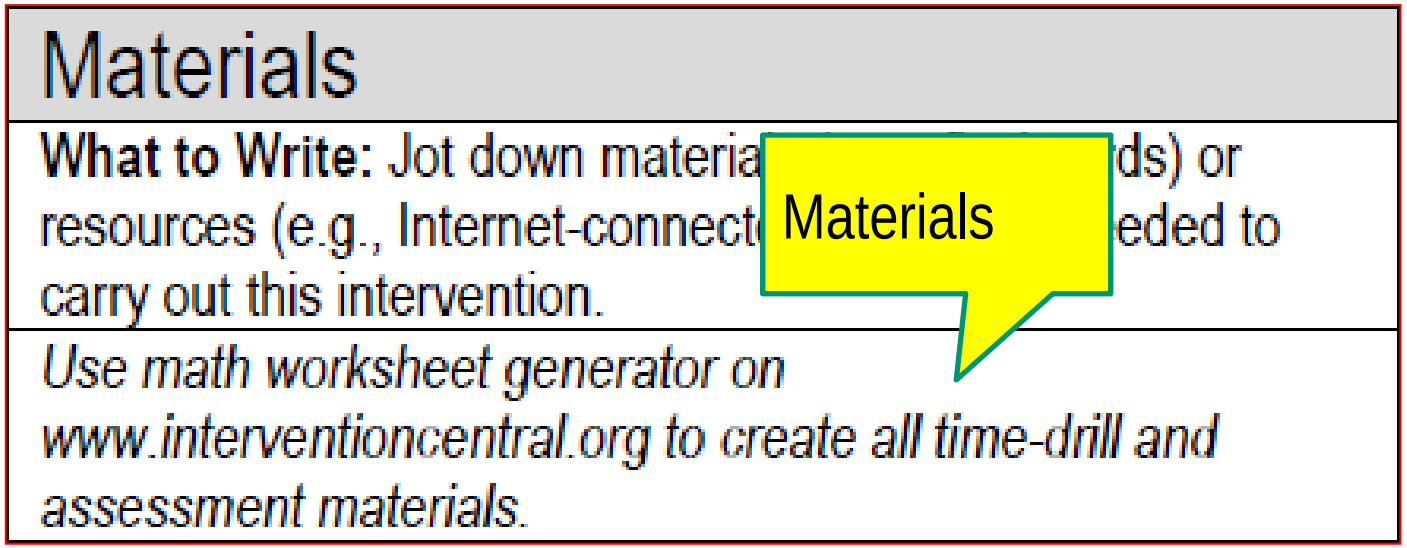
- *Intervention: Example 2.* The teacher describes the evidence-based intervention(s) that will be used to address the identified student concern(s).

Listing of Intervention Elements

Intervention
What to Write: Write a brief description of the intervention(s) to be used with this student. TIP: If you have a script for this intervention, you can just write its name here and attach the script to this sheet.
Math Computation Time Drill.(Rhymer et al., 2002) *Explicit time-drills are a method to boost students' rate of responding on arithmetic-fact worksheets: (1) The teacher hands out the worksheet. Students are instructed that they will have 3 minutes to work on problems on the sheet. (2) The teacher starts the stop watch and tells the students to start work. (3) At the end of the first minute in the 3-minute span, the teacher 'calls time', stops the stopwatch, and tells the students to underline the last number written and to put their pencils in the air. Then students are told to resume work and the teacher restarts the stopwatch. (4) This process is repeated at the end of minutes 2 and 3. (5) At the conclusion of the 3 minutes, the teacher collects the student worksheets.*

Creating a Written Record of Classroom Interventions: Form

- *Materials.* The teacher lists any materials (e.g., flashcards, wordlists, worksheets) or other resources (e.g., Internet-connected computer) necessary for the intervention.



Creating a Written Record of Classroom Interventions: Form

- *Training.* If adults and/or the target student require any training prior to the intervention, the teacher records those training needs in this section of the form.

Training
What to Write: Note what training, if any, is needed to prepare adult(s) and/or the student for the intervention.
Meet with the student at least once before the intervention to familiarize with the time-drill technique and timed math computation assessments.

Training

Creating a Written Record of Classroom Interventions: Form

- *Progress-Monitoring.* The teacher selects a method to monitor student progress during the intervention, to include:
  - what type of data is to be used
  - collects and enters student baseline (starting-point) information
  - calculates an intervention outcome goal
  - The frequency that data will be collect

Plan to Monitor Progress

Progress-Monitoring

What to Write: Select a method to monitor student progress is to be used, enter student baseline (starting-point) informat you plan to monitor the intervention. Tip: Several ideas for classroom data ctic

Type of Data Used to Monitor: *Curriculum-based measurement: ma computation assessments: 2 minute single-skill probes*

Baseline	Outcome Goal
12 correct digits per 2 minute probe	*24 correct digits per 2 minute probe*

How often will data be collected? (e.g., daily, every other day, weekly):
WEEKLY

How To: Create a Written Record of Classroom Interventions

Case Information

What to Write: Record the important case information, including student, person delivering the intervention, date of plan, start and end dates for the intervention plan, and the total number of instructional weeks that the intervention will run.

Student:	*John Samuelson-Gr 4*	Interventionist(s):	*Mrs. Kennedy, classroom teacher*	Date Intervention Plan Was Written:	*10 October 2012*
Date Intervention is to Start:	*M 8 Oct 2012*	Date Intervention is to End:	*F 16 Nov 2012*	Total Number of Intervention Weeks:	*6 weeks*
Description of the Student Problem:	*Slow math computation speed (computes multiplication facts at 12 correct digits in 2 minutes, when typical gr 4 peers compute at least 24 correct digits).*				

Intervention

What to Write: Write a brief description of the intervention(s) to be used with this student. TIP: If you have a script for this intervention, you can just write its name here and attach the script to this sheet.

Math Computation Time Drill.(Rhymer et al., 2002)

Explicit time-drills are a method to boost students' rate of responding on arithmetic-fact worksheets: (1) The teacher hands out the worksheet. Students are instructed that they will have 3 minutes to work on problems on the sheet. (2) The teacher starts the stop watch and tells the students to start work. (3) At the end of the first minute in the 3-minute span, the teacher 'calls time', stops the stopwatch, and tells the students to underline the last number written and to put their pencils in the air. Then students are told to resume work and the teacher restarts the stopwatch. (4) This process is repeated at the end of minutes 2 and 3. (5) At the conclusion of the 3 minutes, the teacher collects the student worksheets.

Materials	Training
What to Write: Jot down materials (e.g., flashcards) or resources (e.g., Internet-connected computer) needed to carry out this intervention.	**What to Write:** Note what training--if any--is needed to prepare adult(s) and/or the student to carry out the intervention.
Use math worksheet generator on www.interventioncentral.org to create all time-drill and assessment materials.	*Meet with the student at least once before the intervention to familiarize with the time-drill technique and timed math computation assessments.*

Progress-Monitoring

What to Write: Select a method to monitor student progress on this intervention. For the method selected, record what type of data is to be used, enter student baseline (starting-point) information, calculate an intervention outcome goal, and note how frequently you plan to monitor the intervention. Tip: Several ideas for classroom data collection appear on the right side of this table.

Type of Data Used to Monitor: *Curriculum-based measurement: math computation assessments: 2 minute single-skill probes*

Baseline	Outcome Goal
12 correct digits per 2 minute probe	*24 correct digits per 2 minute probe*

How often will data be collected? (e.g., daily, every other day, weekly):
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Ideas for Intervention Progress-Monitoring

- Existing data: grades, homework logs, etc.
- Cumulative mastery log
- Rubric
- Curriculum-based measurement
- Behavior report card
- Behavior checklist

Promoting Student Responsibility: The Learning Contract (Online)

Learning Contracts: Put Student Promises in Writing…

- **Description.** A learning contract is a voluntary, student-completed document that outlines actions the learner promises to take in a course to achieve academic success.

- This contract is signed by the student, the instructor, and (optionally) the parent.

Sources: Frank, T., & Scharff, L. F. V. (2013). Learning contracts in undergraduate courses: Impacts on student behaviors and academic performance. Journal of the Scholarship of Teaching and Learning, 13(4), 36-53.

Greenwood, S. C., & McCabe, P. P. (2008). How learning contracts motivate students. Middle School Journal, 39(5), 13-22.

Learning Contract: Example

Name: Troy Blue	Teacher: Mr. Smith	Class/Course: Algebra I	Date: 16 November 2018

Troy Blue's Learning Contract

I am making this learning contract because I want to improve my grades.

Student Responsibilities

I have chosen to complete the following actions:

1. I will be on-time for class.
2. I will turn in at least 80% of assigned homework, with all work attempted.
3. I will spend at least 30 minutes per day reviewing notes and working on assignments.
4. I will come to math free period at least once per week with questions from current work.

Teacher Responsibilities

My teacher will help me to achieve success in this course through these actions/supports:

1. Answer questions and offer help during weekly free-period check-ins.
2. Remind Troy weekly about any missing assignments.
3. Supply review copy of class notes each period.

Length of Contract

The terms of this contract will continue until:

My Algebra course grade rises to 75 or higher.

Sign-Offs

Mr. Frank Smith	*Troy Blue*	*Diane Blue*
Mr. Smith	Troy Blue	Diane Blue
Teacher	Student	Parent

Learning Contracts: Put Student Promises in Writing…

Benefits. Learning contracts:

- provide academic structure and support,
- motivate struggling learners by having them pledge publicly to engage in specific, positive study and learning behaviors, and
- serve as a vehicle to bring teachers and students to agreement on what course goals are important and how to achieve them.

Sources: Frank, T., & Scharff, L. F. V. (2013). Learning contracts in undergraduate courses: Impacts on student behaviors and academic performance. Journal of the Scholarship of Teaching and Learning, 13(4), 36-53.

Greenwood, S. C., & McCabe, P. P. (2008). How learning contracts motivate students. Middle School Journal, 39(5), 13-22.

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Length of Contract

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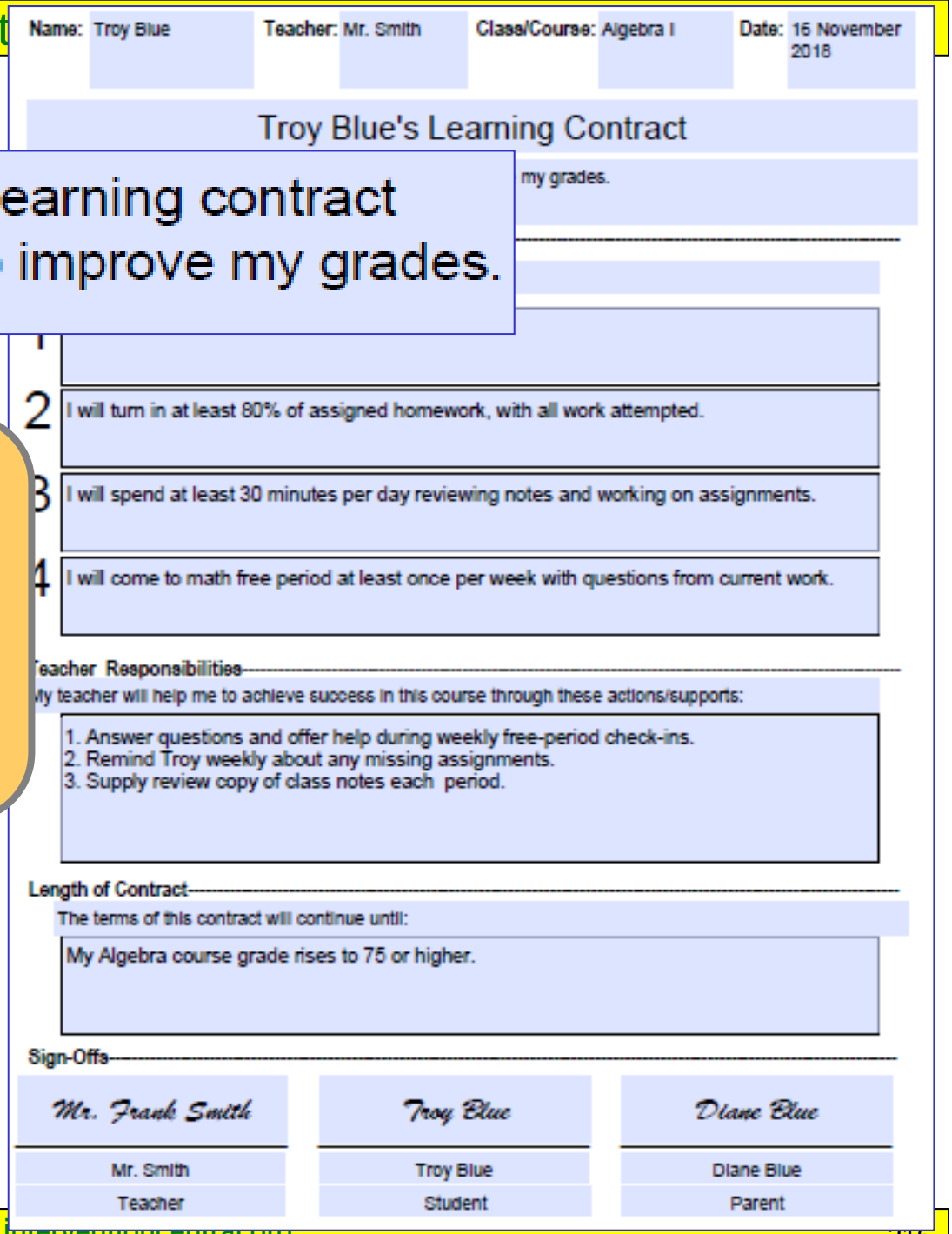
My Algebra course grade rises to 75 or higher.

Sign-Offs

Mr. Frank Smith	*Troy Blue*	*Diane Blue*
Mr. Smith	Troy Blue	Diane Blue
Teacher	Student	Parent

I am making this learning contract because I want to improve my grades.

Statement of Purpose. The contract opens with a statement presenting a rationale for why the contract is being implemented.



Name: Troy Blue | Teacher: Mr. Smith | Class/Course: Algebra I | Date: 16 November 2018

Troy Blue's Learning Contract

my grades.

1

2 I will turn in at least 80% of assigned homework, with all work attempted.

3 I will spend at least 30 minutes per day reviewing notes and working on assignments.

4 I will come to math free period at least once per week with questions from current work.

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Learning Contract: Example

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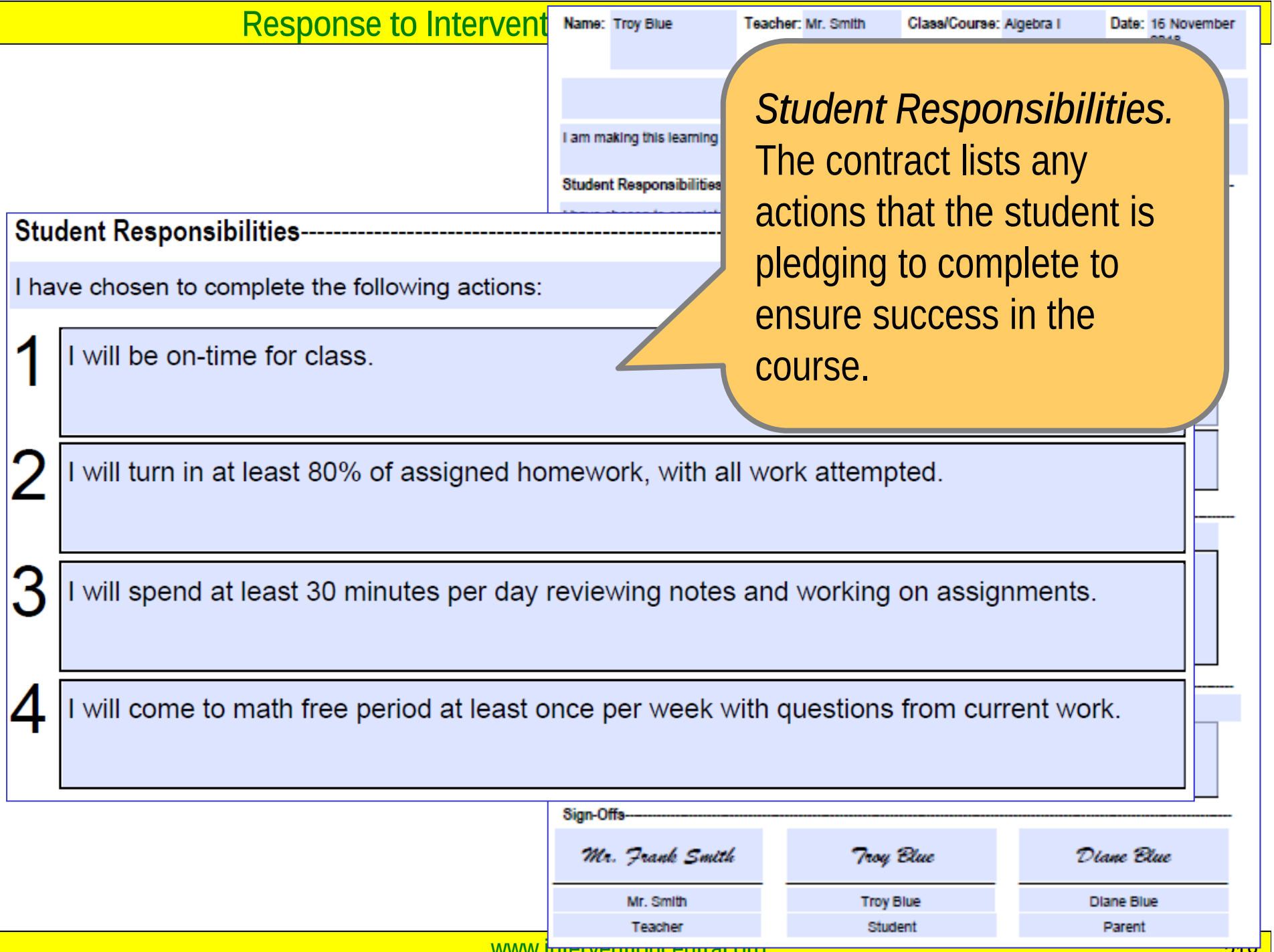

Name: Troy Blue | Teacher: Mr. Smith | Class/Course: Algebra I | Date: 16 November

I am making this learning

Student Responsibilities

Student Responsibilities----------

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4. I will come to math free period at least once per week with questions from current work.

Sign-Offs----------

Mr. Frank Smith	Troy Blue	Diane Blue
Mr. Smith	Troy Blue	Diane Blue
Teacher	Student	Parent

Student Responsibilities. The contract lists any actions that the student is pledging to complete to ensure success in the course.

Learning Contract: Example

Name: Troy Blue	Teacher: Mr. Smith	Class/Course: Algebra I	Date: 16 November 2018

Troy Blue's Learning Contract

I am making this learning contract because I want to improve my grades.

Student Responsibilities

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3. I will spend at least 30 minutes per day reviewing notes and working on assignments.
4. I will come to math free period at least once per week with questions from current work.

Teacher Responsibilities

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1. Answer questions and offer help during weekly free-period check-ins.
2. Remind Troy weekly about any missing assignments.
3. Supply review copy of class notes each period.

Length of Contract

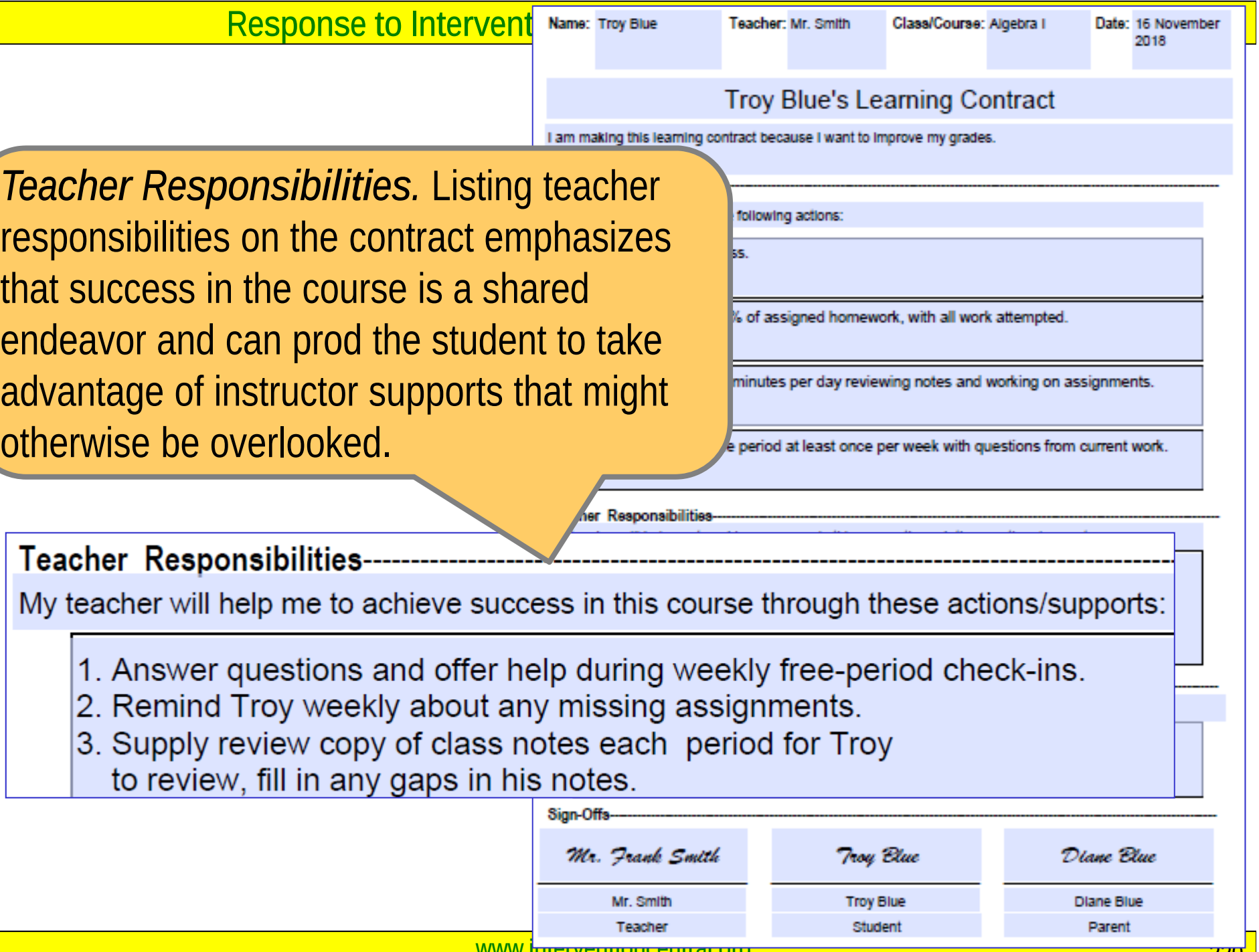
The terms of this contract will continue until:

My Algebra course grade rises to 75 or higher.

Sign-Offs

Mr. Frank Smith	*Troy Blue*	*Diane Blue*
Mr. Smith	Troy Blue	Diane Blue
Teacher	Student	Parent

Teacher Responsibilities. Listing teacher responsibilities on the contract emphasizes that success in the course is a shared endeavor and can prod the student to take advantage of instructor supports that might otherwise be overlooked.



Name: Troy Blue | Teacher: Mr. Smith | Class/Course: Algebra I | Date: 16 November 2018

Troy Blue's Learning Contract

I am making this learning contract because I want to improve my grades.

following actions:

ss.

% of assigned homework, with all work attempted.

minutes per day reviewing notes and working on assignments.

e period at least once per week with questions from current work.

her Responsibilities

Teacher Responsibilities

My teacher will help me to achieve success in this course through these actions/supports:

1. Answer questions and offer help during weekly free-period check-ins.
2. Remind Troy weekly about any missing assignments.
3. Supply review copy of class notes each period for Troy to review, fill in any gaps in his notes.

Sign-Offs

Mr. Frank Smith	Troy Blue	Diane Blue
Mr. Smith	Troy Blue	Diane Blue
Teacher	Student	Parent

Learning Contract: Example

Name: Troy Blue **Teacher:** Mr. Smith **Class/Course:** Algebra I **Date:** 16 November 2018

Troy Blue's Learning Contract

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Student Responsibilities

I have chosen to complete the following actions:

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3. I will spend at least 30 minutes per day reviewing notes and working on assignments.
4. I will come to math free period at least once per week with questions from current work.

Teacher Responsibilities

My teacher will help me to achieve success in this course through these actions/supports:

1. Answer questions and offer help during weekly free-period check-ins.
2. Remind Troy weekly about any missing assignments.
3. Supply review copy of class notes each period.

Length of Contract

The terms of this contract will continue until:

My Algebra course grade rises to 75 or higher.

Sign-Offs

Mr. Frank Smith	*Troy Blue*	*Diane Blue*
Mr. Smith	Troy Blue	Diane Blue
Teacher	Student	Parent

Length of Contract. This section describes the agreed-upon conditions that must be met to discontinue the contract.

Length of Contract

The terms of this contract will continue until:

My Algebra course grade is 75 or higher.

Name: Troy Blue | Teacher: Mr. Smith | Class/Course: Algebra I | Date: 16 November 2018

Troy Blue's Learning Contract

I am making this learning contract because I want to improve my grades.

Student Responsibilities

I have chosen to complete the following actions:

1. I will be on-time for class.
2. ...ll turn in at least 80% of assigned homework, with all work attempted.
3. ...ll spend at least 30 minutes per day reviewing notes and working on assignments.
4. ...ll come to math free period at least once per week with questions from current work.

Teacher Responsibilities

My teacher will help me to achieve success in this course through these actions/supports:

...help during weekly free-period check-ins.
...any missing assignments.
...s notes each period.

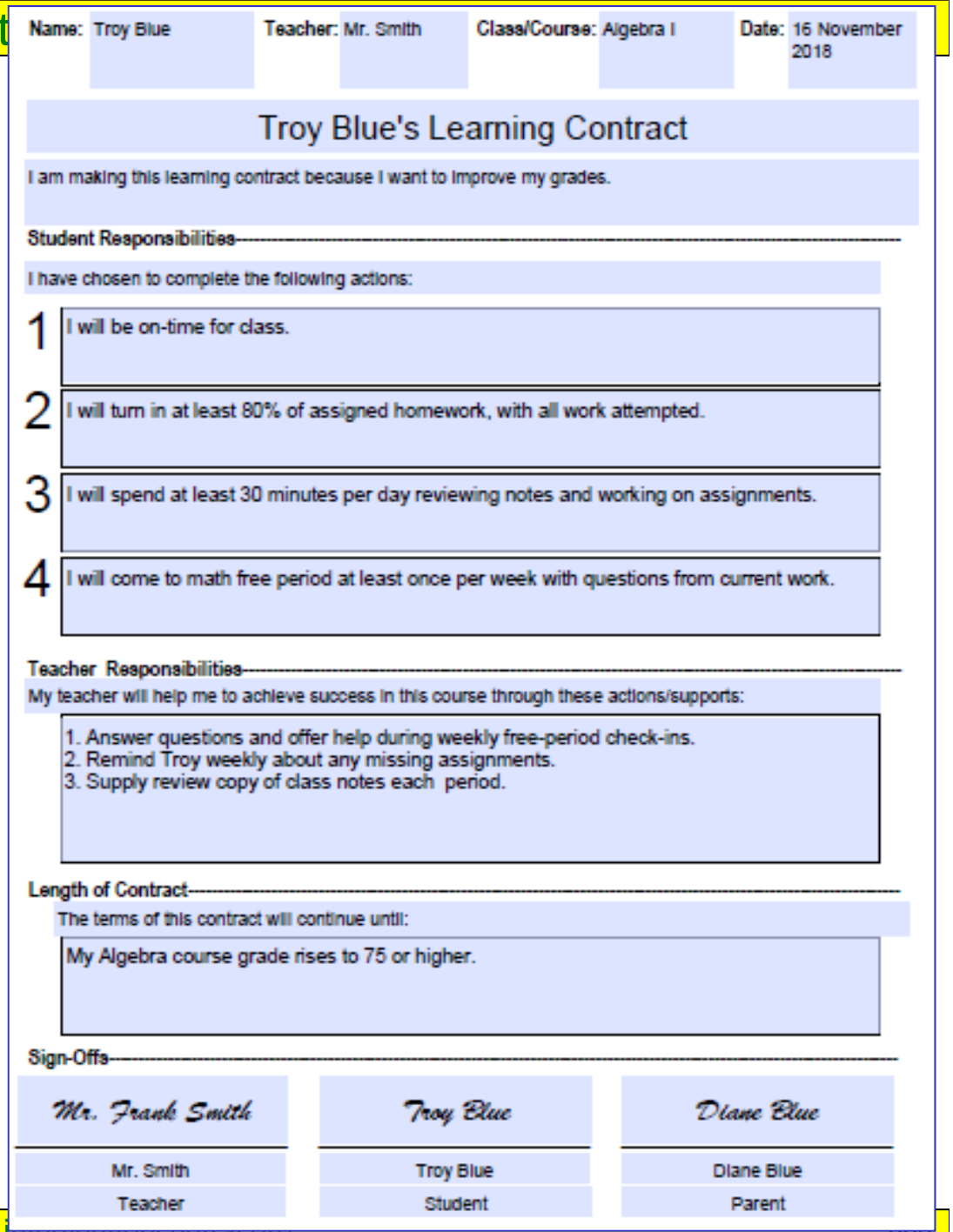
...tinue until:

My Algebra course grade rises to 75 or higher.

Sign-Offs

Mr. Frank Smith	Troy Blue	Diane Blue
Mr. Smith	Troy Blue	Diane Blue
Teacher	Student	Parent

Learning Contract: Example



Name: Troy Blue | Teacher: Mr. Smith | Class/Course: Algebra I | Date: 16 November 2018

Troy Blue's Learning Contract

I am making this learning contract because I want to improve my grades.

Student Responsibilities

I have chosen to complete the following actions:

1. I will be on-time for class.
2. I will turn in at least 80% of assigned homework, with all work attempted.
3. I will spend at least 30 minutes per day reviewing notes and working on assignments.
4. I will come to math free period at least once per week with questions from current work.

Teacher Responsibilities

My teacher will help me to achieve success in this course through these actions/supports:

1. Answer questions and offer help during weekly free-period check-ins.
2. Remind Troy weekly about any missing assignments.
3. Supply review copy of class notes each period.

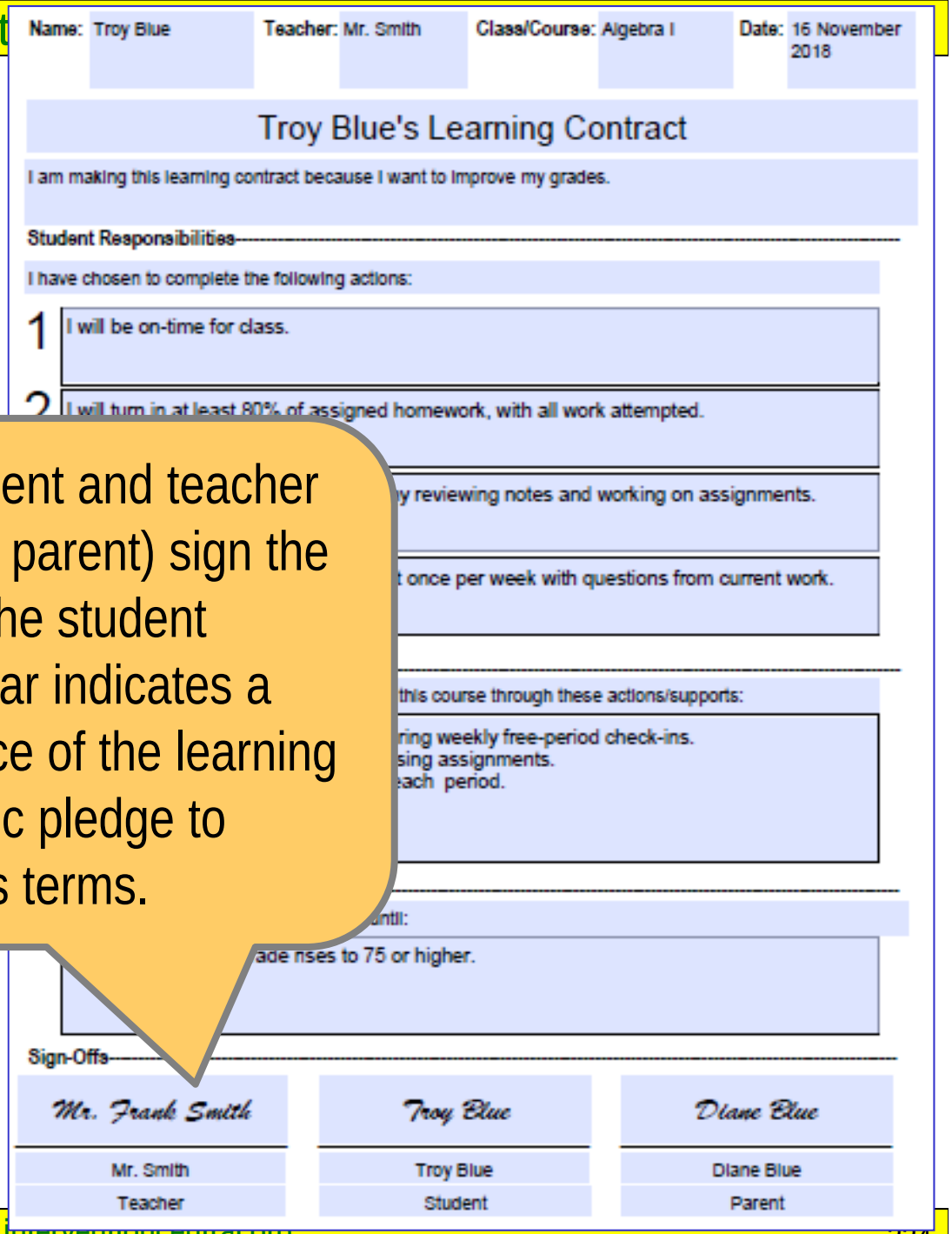
Length of Contract

The terms of this contract will continue until:

My Algebra course grade rises to 75 or higher.

Sign-Offs

Mr. Frank Smith	Troy Blue	Diane Blue
Mr. Smith	Troy Blue	Diane Blue
Teacher	Student	Parent



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Mr. Smith	Troy Blue	Diane Blue
Teacher	Student	Parent

Sign-Off. Both student and teacher (and, optionally, the parent) sign the learning contract. The student signature in particular indicates a voluntary acceptance of the learning contract and a public pledge to follow through on its terms.

Learning Contract: Example

Name: Troy Blue **Teacher:** Mr. Smith **Class/Course:** Algebra I **Date:** 16 November 2018

Troy Blue's Learning Contract

I am making this learning contract because I want to improve my grades.

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Mr. Smith	Troy Blue	Diane Blue
Teacher	Student	Parent

Learning Contract: Take-Away

- Learning Contracts are a great tool to record the outcome of student & parent conferences.

  The act of creating a Learning Contract provides focus and structure to the meeting while also resulting in a written record of the plan.

Lab Work: Classroom Math Intervention Plan

DISCUSSION Q 1:

- Review the **Classroom Intervention Planning Sheet** (pp. 11-14).
- Discuss the settings and/or situations when you might use a form like this to capture information about a student's classroom math intervention(s).
  or

DISCUSSION Q 2:

- Describe how you might use/adapt **learning contracts** for your student/parent conferences.

Helping Students to Retain Skills & Content: Classroom Ideas

Handout 1
pp. 6-8

Helping Students to Retain Skills and Content: Classroom Ideas

Students who struggle with academic work often have difficulty with retention—the capacity to maintain a previously mastered skill or content over the long term with little or no additional practice. Retention of skills and content does not happen automatically but requires sustained work on the part of both teacher and student.

Below are teaching strategies that can lay the foundation for student retention in your classroom. NOTE: While these strategies can work effectively with individuals, they are even more effective when woven into whole-group instruction:

1. **Use multiple direction formats.** When directing students to complete a task, provide those directions through more than one format (Thorne, 2006). For example, the teacher may state directions aloud, provide a visual demonstration, and also give students a written summary of the steps to follow. When directions to perform a task or skill are delivered through several formats, they can be made more memorable and thus easier for a student to retain and recall as needed.

2. **Encourage read-alouds.** Research shows that when we read text aloud to ourselves, we retain more information than when we read the same text silently (Cox, n.d.). The act of reading combined with the act of *listening* to one's own reading increases attention and retention. Teachers can suggest to students that, when completing assigned readings, they read particularly challenging passages aloud to promote comprehension and retention. Or the student can read multi-step directions aloud before undertaking a difficult academic task.

3. **Simplify learning with guides and organizers.** Teachers can use various types of organizers to streamline tasks and allow learners to concentrate on the most important content to be memorized (Thorne, 2006). Handouts distributed prior to a lecture can highlight key concepts to be covered. Guided notes (copies of teacher notes with strategically located blanks into which students copy important terms) can reduce the cognitive load on learners and allow them to attend more closely to the lecture. More specialized organizers such as comparison/contrast charts prompt students to narrow their inquiry to a manageable scope and maintain attention. Or, in mathematics, a student may be given a 'sequence chart' that walks the learner through the steps to follow when solving a linear equation with one variable (Florida Department of Education, 2010).

4. **Break tasks into checklists.** Students tasked with memorizing a multi-step cognitive task can benefit from having the steps of that task converted into a printed checklist. Initially, the student may need to reference the checklist sequentially while completing steps of the task. That student can then gradually reduce dependence on the checklist in stages. For example, a student familiar with a 7-step checklist for solving math word problems (Montague & Dietz, 2009) may switch to reviewing the checklist once as a prompt at the start of a homework assignment and then relying on memory to implement the steps—with the eventual goal of memorizing the checklist completely.

5. **Have students work collaboratively.** The likelihood that skills will be retained increases when the learner reviews or practices those skills with full attention. Collaborative learning activities are naturally motivating and can help to boost student engagement (Cox, n.d.). For example, students who are taught a math problem-solving strategy can be partnered with a peer and use a structured format like Think-Pair-Share (Rasinkski & Padak, 1996). to apply the strategy to a particular problem. (In Think-Pair-Share, students are first directed by the teacher to 'think' about a problem or task or question, then to 'pair' off with another student and 'share' their thinking. The instructor then directs a whole-group discussion to explore students' shared thinking.).

Student Memory: Steps to Retention

Step 1. Attention Filter. The student focuses full attention on the skill/ content.

Failure. Lack of attention deflects skill/content from short-term memory.

Step 2. Short-Term Memory Storage. The skill/content is stored in temporary memory.

Failure. The memory fails to transition from short- to long-term, resulting in its quick loss.

Step 3. Long-Term Memory Storage. The skill/ content is archived as a lasting memory.

Failures. The student cannot access an existing memory when needed…or the memory fades over time through disuse.

Step 4. Long-Term Memory Retrieval. The student retrieves the skill/content on command.

Source: Richards, R. G. (2008). Making it stick: Memorable strategies to enhance learning.. Retrieved from http://www.ldonline.org/article/5602/

Retention: Classroom Strategies…

The following are teaching strategies that can lay the foundation for student retention in your classroom.

NOTE: While these strategies can work effectively with individuals, they are most effective when woven into whole-group instruction:

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Helping Students Retain Skills & Content: Ideas

Use multiple direction formats. When directing students to complete a task, provide those directions through more than one format (Thorne, 2006).

For example, the teacher may:

- state directions aloud,
- provide a visual demonstration, and
- give students a written summary of the steps to follow.

Directions via multiple formats are more memorable and thus easier for a student to retain and recall as needed.

1

Helping Students Retain Skills & Content: Ideas

Encourage read-alouds. Research shows that when read a passage aloud to ourselves, we retain more information than when we read the same text silently (Cox, n.d.). The act of reading combined with the act of *listening* to one's own reading increases attention and retention.

Teachers can suggest to students that, when completing assigned readings, they read particularly challenging passages aloud to promote comprehension and retention.

Or the student can read multi-step directions aloud before undertaking a mathematics task.

2

Helping Students Retain Skills & Content: Ideas

Simplify learning with guides and organizers.

Teachers can use organizers to streamline tasks and allow learners to concentrate on the most important content to be memorized (Thorne, 2006). Examples are:

- handouts distributed prior to a lecture that highlight key concepts to be covered.
- guided notes (copies of teacher notes with strategically located blanks into which students copy important terms) that reduce the cognitive load on learners and allow them to attend more closely to the lecture.
- a math 'sequence chart' that walks the learner through the steps for solving a linear equation with one variable.

3

Helping Students Retain Skills & Content: Ideas

Break tasks into checklists. Students tasked with memorizing a multi-step cognitive task can benefit from having the steps of that task converted into a printed checklist.

Initially, the student might reference the checklist while completing steps of the task. That student can then gradually reduce dependence on the checklist in stages.

For example, a student using a 7-step checklist for solving math word problems (Montague & Dietz, 2009) may switch to reviewing the checklist once as a prompt at the start of a homework assignment—with the eventual goal of memorizing the checklist completely.

4

Checklist Example: Problem-Solving Strategy

Math Word Problem: Problem-Solving Checklist

WHEN COMPLETING A MATH WORD PROBLEM, THE STUDENT FOLLOWS THESE STEPS:

1. READING THE PROBLEM. The student reads the problem carefully, noting and attempting to clear up any areas of uncertainly or confusion (e.g., unknown vocabulary terms).
2. PARAPHRASING THE PROBLEM. The student restates the problem in his or her own words.
3. DRAWING THE PROBLEM. The student creates a drawing of the problem, creating a visual representation of the word problem.
4. CREATING A PLAN. The student decides on the best way to solve the problem and develops a plan to do so.
5. PREDICTING THE ANSWER. The student estimates or predicts what the answer to the problem will be. The student may compute a quick approximation of the answer, using rounding or other shortcuts.
6. COMPUTING THE ANSWER. The student follows the plan developed earlier to compute the answer to the problem.
7. CHECKING THE ANSWER. The student methodically checks the calculations for each step of the problem. The student also compares the actual answer to the estimated answer calculated in a previous step to ensure that there is general agreement between the two values.

SOURCE: Montague, M. (1992). The effects of cognitive and metacognitive strategy instruction on the mathematical problem solving of middle school students with learning disabilities. *Journal of Learning Disabilities, 25*, 230-248.

Student Memory: Steps to Retention

Step 1. **Attention Filter.** The student focuses full attention on the skill/ content.

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Helping Students Retain Skills & Content: Ideas

Have students work collaboratively. The likelihood that skills will be retained increases when the learner reviews or practices those skills with full attention. Collaborative learning activities are naturally motivating and can help to boost student engagement (Cox, n.d.).

Example: Think-Pair-Share (Rasinkski & Padak, 1996).

1. THINK. Students are first directed by the teacher to 'think' about a problem or task or question.
2. PAIR. Students 'pair' off with a classmate.
3. SHARE. Pairs 'share' their thinking. The instructor then directs a whole-group discussion to explore students' shared thinking.

5

Helping Students Retain Skills & Content: Ideas

Activate prior knowledge. Learners' capacity to retain newly taught skills or content increases when they are able to *link* that new material to what they already know (Cox, n.d.). So, as teachers prepare lessons, they can promote retention of the novel instruction by explicitly activating students' prior knowledge of the topic.

Example: KWL Chart.

The 3-column KWL chart is one classroom method that illustrates how to activate prior knowledge to support retention.

6

Helping Students Retain Skills & Content: Ideas

Name: _____ Date: _____

KWL Chart

Select a topic you want to research. In the first column, write what you already know about the topic. In the second column, write what you want to know about the topic. After you have completed your research, write what you learned in the third column.

What I **K**now	What I **W**ant to Know	What I **L**earned

6

Helping Students Retain Skills & Content: Ideas

Use memory tricks. An effective approach to improve retention relies is to teach students explicit strategies for memorization and recall (mnemonics) (Brigham & Brigham, 2001).

EXAMPLE 1: Acrostic: 'FOIL' (Wyzant, n.d.) for multiplying binomials: multiplication is completed in this sequence: multiply the (1) First terms—*ac*; (2) Outer terms—*ad*; (3) Inner terms—*bc*; (4) Last terms—*bd*.

EXAMPLE 2: Memory Sentence: *Please Excuse My Dear Aunt Sally* (FL Department of Education, 2010) prompts this order of operations for solving math equations: Parentheses, Exponents, Multiplication, Division, Addition, Subtraction.

7

Helping Students Retain Skills & Content: Ideas

Employ summarization activities. Any activity requiring the student to summarize and reflect on their reading can help the learner to winnow the content and increase the odds that they will retain the essentials of the passage. Examples of effective summarization activities include:

- having a student write or dictate a brief 'retell' just after reading (Schisler et al., 2010) and
- directing the reader to write a summary (main idea and two supporting details) for each paragraph in a passage (Hagaman, Casey, & Reid, 2010).

8

Helping Students Retain Skills & Content: Ideas

'Overlearn' the skill. With overlearning, the teacher sets a skill-proficiency goal for the student that is actually higher than required for classroom success. When the student reaches this ambitious goal, he or she is more likely to retain the skill over the long term.

9

Student Memory: Steps to Retention

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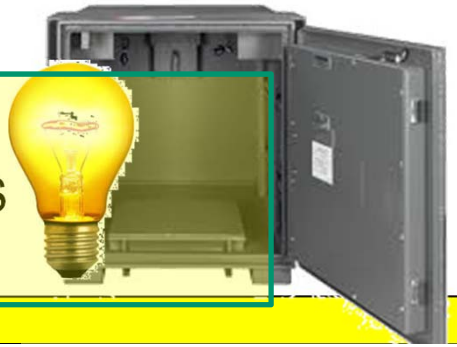


Helping Students Retain Skills & Content: Ideas

Practice memory retrieval. Retention includes the ability to retrieve memorized content or skills on demand. Like any other ability, retrieval of information from memory improves with practice (Thorne, 2006). Even better, each time that students successfully recall information, they can access it more easily in the future (Weinstein & Wu, 2009):

Examples:

- Give frequent quizzes to allow students more opportunities to try out their retrieval strategies (Weinstein & Wu, 2009).
- Begin the class each day with a bell-ringer activity in which they complete several short-answer questions that tap recently learned information (Weinstein & Wu, 2009).

10

Helping Students Retain Skills & Content: Ideas

Maintain skills through occasional practice. All of us experience 'memory decay', the gradual forgetting of memorized content that we do not review or use over extended periods of time (Pashler et al., 2007).

Teachers can guard against this predictable threat to retention of information through use of 'distributed practice'.

This term simply means that the teacher periodically (e.g., at intervals of 4-12 weeks) has students engage in practice activities that require the recall and application of the information or skills that the instructor wishes to maintain.

11

Activity: Retention

- Review ideas for promoting student skills/content retention in your handout.
- Select up to 2 ideas that you would like to promote in your classroom this year.
- Discuss these ideas with your group.

Retaining Skills & Content: Classroom Ideas

1. Use multiple direction formats.
2. Encourage read-alouds.
3. Simplify learning with guides and organizers.
4. Break tasks into checklists.
5. Have students work collaboratively.
6. Activate prior knowledge.
7. Use memory tricks.
8. Employ summarization activities.
9. 'Overlearn' the skill.
10. Practice memory retrieval.
11. Maintain skills through occasional practice.

Workshop Agenda

1. **RTI/MTSS and Mathematics.** What is the RTI/MTSS model and how can it address needs of math-challenged students?

2. **Strong Math Instruction.** What elements of strong math instruction optimize learning for diverse students?

3. **Defining the (Math) Problem.** What are short-cuts to help teachers to identify the primary obstacle(s) to a student's math performance?

4. **Interventions for Math.** What are examples of classroom interventions to address math deficits?

5. **Individualizing Math Supports.** What are examples of differentiation and scaffolding to make math assignments accessible to students?

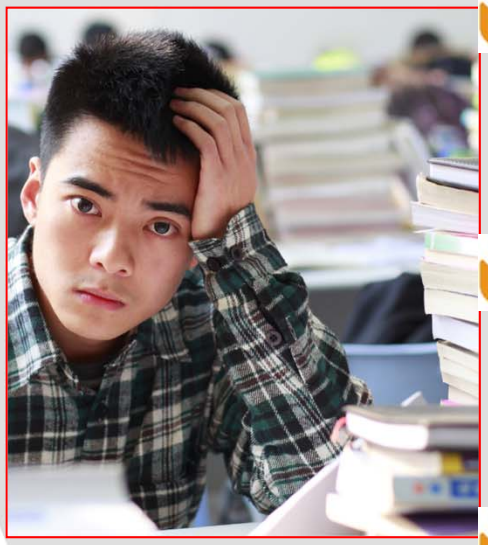
Workshop Agenda (Cont.)

6. **Math and Data.** What are ways to collect data to monitor math interventions?

7. **Motivation and Math.** What teacher communication tools can promote student optimism and engagement in math?

8. **Documenting Math Interventions.** How can a teacher write down a math intervention in a streamlined way to share with others?

Workshop Agenda: 8 Topics



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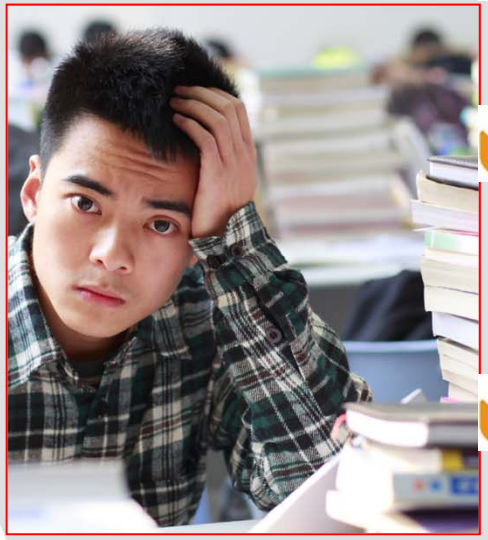

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8. **Documenting Math Interventions.** How can a teacher write down a math intervention in a streamlined way to share with others?

Activity: Next Steps Plan

Review the key points covered in this math-interventions training.

Come up with 2-3 **next steps** you intend to take to apply content or resources from the training back in your classroom or school