



RTI Toolkit: A Practical Guide for Schools

Best Practices in Secondary Math Interventions (7-12)

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Student Math Competencies: Sampling of Essential Skills

This listing allows the teacher to evaluate whether a student has essential math competencies via interview, direct observation, and/or analysis of work products.

Math Competency	Research Citation	Student Displays Skill? Y/N
<input type="checkbox"/> NUMBER SENSE: ACCESSING INTERNAL NUMBERLINE. The student can efficiently and accurately access an internal (mental) number-line--and does not rely on use of a physical counting strategy such as counting on fingers.	Bryant, D. P., Bryant, B. R., & Hammill, D. D. (2000). Characteristic behaviors of students with LD who have teacher-identified math weaknesses. <i>Journal of Learning Disabilities</i> , 33(2), 168-177.	
<input type="checkbox"/> SPATIAL ORIENTATION: CUES AND DIRECTIONS. The student is able to accurately follow spatial cues and directions on math problems, such as 'place the circle above the triangle'.	Bryant, D. P., Bryant, B. R., & Hammill, D. D. (2000). Characteristic behaviors of students with LD who have teacher-identified math weaknesses. <i>Journal of Learning Disabilities</i> , 33(2), 168-177.	
<input type="checkbox"/> GRAPHOMOTOR: LEGIBLE NUMBERS. When engaged in math problem-solving, the student writes numbers with sufficient care that he or she can later correctly 'read' those hand-written numbers when completing further calculations.	Rourke, B. P. (1993). Arithmetic disabilities, specific & otherwise: A neuropsychological perspective. <i>Journal of Learning Disabilities</i> , 26, 214-226.	
<input type="checkbox"/> GRAPHOMOTOR: CORRECT VERTICAL ALIGNMENT. During computation, the student correctly aligns numbers in vertical columns.	Bryant, D. P., Bryant, B. R., & Hammill, D. D. (2000). Characteristic behaviors of students with LD who have teacher-identified math weaknesses. <i>Journal of Learning Disabilities</i> , 33(2), 168-177.	
<input type="checkbox"/> UNDERSTANDING MATH VOCABULARY. When reading math explanations or word problems, the student understands the definitions of essential vocabulary terms.	Adams, T. L. (2003). Reading mathematics: More than words can say. <i>The Reading Teacher</i> , 56(8), 786-795.	

Math Competency	Research Citation	Student Displays Skill? Y/N
<input type="checkbox"/> MATH PROBLEM: CORRECT SEQUENCE OF STEPS. When using a multi-step math algorithm or heuristic, the student follows each step correctly and in the proper sequence--without leaving out essential steps or adding extraneous steps.	Rourke, B. P. (1993). Arithmetic disabilities, specific & otherwise: A neuropsychological perspective. <i>Journal of Learning Disabilities</i> , 26, 214-226.	
<input type="checkbox"/> MATH PROBLEM: SHOW WORK. On in-class, homework, and test math problems, the student shows all of his or her work, to allow both the student and the instructor to reconstruct the student's problem-solving approach.	Paul Dawkins (2006). How to study mathematics. [Lamar University]. Retrieved on August 28, 2012, from http://tutorial.math.lamar.edu/	
<input type="checkbox"/> MATH PROBLEM: UNDERSTAND BEFORE SOLVING. On in-class, homework, and test math problems, the student takes sufficient time to read and fully understand the problem before attempting to solve it.	Paul Dawkins (2006). How to study mathematics. [Lamar University]. Retrieved on August 28, 2012, from http://tutorial.math.lamar.edu/	
<input type="checkbox"/> MATH PROBLEM: DRAW IT. On in-class, homework, and test math problems, the student attempts to draw the problem when appropriate, as a visual representation can often clarify understanding.	Paul Dawkins (2006). How to study mathematics. [Lamar University]. Retrieved on August 28, 2012, from http://tutorial.math.lamar.edu/	
<input type="checkbox"/> MEMORY: NUMERIC VALUES. The student correctly remembers constants or other significant numeric values that require memorization.	Bryant, D. P., Bryant, B. R., & Hammill, D. D. (2000). Characteristic behaviors of students with LD who have teacher-identified math weaknesses. <i>Journal of Learning Disabilities</i> , 33(2), 168-177.	
<input type="checkbox"/> MEMORY: RETRIEVAL OF MATH FACTS. The student is able to rapidly retrieve math facts from memory for use in mental computation.	Bryant, D. P., Bryant, B. R., & Hammill, D. D. (2000). Characteristic behaviors of students with LD who have teacher-identified math weaknesses. <i>Journal of Learning Disabilities</i> , 33(2), 168-177.	

Math Competency	Research Citation	Student Displays Skill? Y/N
<input type="checkbox"/> ANSWER CHECK: FOR PROBLEMS WITH POSITIVE VALUES, ENSURE A POSITIVE ANSWER. When completing a math problem whose solution logically must be a positive value (e.g., units of volume or area), the student checks his or her answer to ensure that it is not a negative number.	Schechter, E. (2009). The most common errors in undergraduate mathematics.[Vanderbilt University]. Retrieved on August 28, 2012, from http://www.math.vanderbilt.edu/~schemtext/commerrs/	
<input type="checkbox"/> ANSWER CHECK: PLUG ANSWERS INTO PROBLEMS. Upon solving problems containing variables, the student checks his or her work by plugging the answer(s) back into the original problem to verify that the solution is correct.	Schechter, E. (2009). The most common errors in undergraduate mathematics.[Vanderbilt University]. Retrieved on August 28, 2012, from http://www.math.vanderbilt.edu/~schemtext/commerrs/	
<input type="checkbox"/> ANSWER CHECK: PLAUSIBILITY. After solving a math problem, the student reflects on his or her answer to ensure that it appears reasonable given the problem inputs. If the student notes an answer that seems extreme, the student checks his or her work.	Rourke, B. P. (1993). Arithmetic disabilities, specific & otherwise: A neuropsychological perspective. <i>Journal of Learning Disabilities</i> , 26, 214-226.	
<input type="checkbox"/> ANSWER CHECK: VERIFY THAT UNITS IN PROBLEM AND SOLUTION MATCH. The student monitors the units presented in a word problem and checks to see that the solution is expressed in the same units (e.g., for a problem requiring an answer in square inches, the student verifies that the answer is also expressed in square inches--instead of cubic centimeters).	Schechter, E. (2009). The most common errors in undergraduate mathematics.[Vanderbilt University]. Retrieved on August 28, 2012, from http://www.math.vanderbilt.edu/~schemtext/commerrs/	
<input type="checkbox"/> ASSIGNMENTS: TIME EFFICIENCY. The student is able to complete math assignments (in-class, homework, and tests) within the time allocated.	Bryant, D. P., Bryant, B. R., & Hammill, D. D. (2000). Characteristic behaviors of students with LD who have teacher-identified math weaknesses. <i>Journal of Learning Disabilities</i> , 33(2), 168-177.	

Math Competency	Research Citation	Student Displays Skill? Y/N
<input type="checkbox"/> FRACTIONS: ADDITION OR SUBTRACTION. When adding or subtracting fractions, the student (1) adjusts the fractions to find the least common denominator; (2) adds or subtracts the numerators; and (3) simplifies the resulting sum or difference if needed.	Schechter, E. (2009). The most common errors in undergraduate mathematics.[Vanderbilt University]. Retrieved on August 28, 2012, from http://www.math.vanderbilt.edu/~schectex/commerrs/	
<input type="checkbox"/> FRACTIONS: DIVISION. When dividing fractions, the student (1) converts the second fraction to its reciprocal (reverses numerator and denominator); (2) multiplies the first fraction by the reciprocal term; and (3) simplifies the resulting product if needed.	Schechter, E. (2009). The most common errors in undergraduate mathematics.[Vanderbilt University]. Retrieved on August 28, 2012, from http://www.math.vanderbilt.edu/~schectex/commerrs/	
<input type="checkbox"/> FRACTIONS: PLACEMENT OF FRACTION SEPARATOR. When writing fractions that include a combination of numbers and variables, the student separates the numerator and denominator with a horizontal line and positions each variable carefully so that it is clear whether that variable is associated with the numerator, denominator, or entire fraction.	Paul Dawkins (2006). Common math errors. [Lamar University]. Retrieved on August 28, 2012, from http://tutorial.math.lamar.edu/	
<input type="checkbox"/> OPERATORS: IDENTIFYING OPERATOR SIGNS. The student correctly identifies operator signs appearing in math equations (e.g., +, -, x, ÷).	Adams, T. L. (2003). Reading mathematics: More than words can say. <i>The Reading Teacher</i> , 56(8), 786-795.	
<input type="checkbox"/> OPERATORS: ORDER OF OPERATIONS. When solving mathematical expressions with mixed operations, the student correctly observes the order of operations (e.g., completing multiplication before addition).	Bryant, D. P., Bryant, B. R., & Hammill, D. D. (2000). Characteristic behaviors of students with LD who have teacher-identified math weaknesses. <i>Journal of Learning Disabilities</i> , 33(2), 168-177.	

Math Competency	Research Citation	Student Displays Skill? Y/N
<input type="checkbox"/> NEGATIVE SIGN AND VARIABLES. The student understands that putting the negative sign (-) in front of a variable (e.g., x) does not automatically assign the variable a negative value. (For example, if the variable $x = -4$, then $-x$ will actually equal 4.)	Schechter, E. (2009). The most common errors in undergraduate mathematics.[Vanderbilt University]. Retrieved on August 28, 2012, from http://www.math.vanderbilt.edu/~schemtext/commerrs/	
<input type="checkbox"/> PROBLEM FORMAT: USE OF BRACKETS. When setting up a math problem, the student correctly uses brackets as needed to identify which operations should be completed first.	Schechter, E. (2009). The most common errors in undergraduate mathematics.[Vanderbilt University]. Retrieved on August 28, 2012, from http://www.math.vanderbilt.edu/~schemtext/commerrs/	
<input type="checkbox"/> COMMUTATIVE RULE. DON'T OVERGENERALIZE. The student understands and correctly applies the commutative rule (i.e., that 2 operations can be carried out in either order with the same result). For example, $x+4 = 4+x$ and is therefore commutative, but $\sin 2x \neq 2 \sin x$ and is therefore not commutative.	Schechter, E. (2009). The most common errors in undergraduate mathematics.[Vanderbilt University]. Retrieved on August 28, 2012, from http://www.math.vanderbilt.edu/~schemtext/commerrs/	



Increase Student Math Success with 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.

MATERIALS:

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

INTERVENTION STEPS: The intervention with customized math error self-correction checklists includes these steps (adapted from Dunlap & Dunlap, 1989; Uberti et al., 2004):

1. *Develop the Checklist.* The teacher draws on multiple sources of data available in the classroom to create a list of errors that the student commonly makes on a specific type of math computation or word problem. Good sources of information for analyzing a student's unique pattern of math-related errors include review of completed worksheets and other work products, interviewing the student, asking the student to solve a math problem using a 'think aloud' approach to walk through the steps of an algorithm, and observing the student completing math problems in a cooperative learning activity with other children.

Based on this error analysis, the teacher creates a short (4-to-5 item) student self-correction checklist that includes the most common errors made by that student. Items on the checklist are written in the first person and when possible are stated as 'replacement' or goal behaviors. This checklist might include steps in an algorithm that challenge the student (e.g., "I underlined all numbers at the top of the subtraction problem that were smaller than their matching numbers at the bottom of the problem") as well as goals tied to any other errors that impede math performance (e.g., "I wrote all numbers carefully so that I could read them easily and not mistake them for other numbers").

NOTE: To reduce copying costs, the teacher can laminate the self-correction checklist and provide the student with an erasable marker to allow for multiple re-use of the form.

2. *Introduce the Checklist.* The teacher shows the student the self-correction checklist customized for that student. The teacher states that the student is to use the checklist to check his or her work before turning it in so that the student can identify and correct the most common errors.
3. *Prompt the Student to Use the Checklist to Evaluate Each Problem.* The student is directed to briefly review all items on the checklist before starting any worksheet or assignment containing the math problems that it targets.

When working on the math worksheet or assignment, the student uses the checklist after *every* problem to check his or her work—marking each checklist item with a plus sign ('+') if correctly followed or a minus sign ('-') if not correctly followed. If any checklist item receives a minus rating, the student is directed to leave the original



solution to the problem untouched, to solve the problem again, and again to use the checklist to check the work. Upon finishing the assignment, the student turns it in, along with the completed self-correction checklists.

4. *Provide Performance Feedback, Praise, and Encouragement.* Soon after the student submits any math worksheets associated with the intervention, the teacher should provide him or her with timely feedback about errors, praise for correct responses, and encouragement to continue to apply best effort.
5. *[OPTIONAL] Provide Reinforcement for Checklist Use.* If the student appears to need additional incentives to increase motivation for the intervention, the teacher can assign the student points for intervention compliance: (1) the student earns one point on any assignment for each correct answer, and (2) the student earns an additional point for each problem on which the student committed none of the errors listed on the self-correction checklist. The student is allowed to collect points and to redeem them for privileges or other rewards in a manner to be determined by the teacher.
6. *Fade the Intervention.* The error self-correction checklist can be discontinued when the student is found reliably to perform on the targeted math skill(s) at a level that the teacher defines as successful (e.g., 90 percent success or greater).

Reference

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, 22*(9), 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: 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
<p><i>I underlined all numbers at the top of the subtraction problem that were smaller than their matching numbers at the bottom of the problem.</i></p> <p>Did the student succeed in this behavior goal? <input type="checkbox"/> YES <input type="checkbox"/> NO</p>	__Y__N	__Y__N	__Y__N	__Y__N	__Y__N
<p><i>I wrote all numbers carefully so that I could read them easily and not mistake them for other numbers.</i></p> <p>Did the student succeed in this behavior goal? <input type="checkbox"/> YES <input type="checkbox"/> NO</p>	__Y__N	__Y__N	__Y__N	__Y__N	__Y__N
<p><i>I lined up all numbers in the right place-value columns.</i></p> <p>Did the student succeed in this behavior goal? <input type="checkbox"/> YES <input type="checkbox"/> NO</p>	__Y__N	__Y__N	__Y__N	__Y__N	__Y__N
<p><i>I rechecked all of my answers.</i></p> <p>Did the student succeed in this behavior goal? <input type="checkbox"/> YES <input type="checkbox"/> NO</p>	__Y__N	__Y__N	__Y__N	__Y__N	__Y__N

Applied Math Problems: Using Question-Answer Relationships (QARs) to Interpret Math Graphics



Students must be able to correctly interpret math graphics in order to correctly answer many applied math problems. Struggling learners in math often misread or misinterpret math graphics. For example, students may:

- overlook important details of the math graphic.
- treat irrelevant data on the math graphic as 'relevant'.
- fail to pay close attention to the question before turning to the math graphic to find the answer
- not engage their prior knowledge both to extend the information on the math graphic and to act as a possible 'reality check' on the data that it presents.
- expect the answer to be displayed in plain sight on the math graphic, when in fact the graphic may require that readers first to interpret the data, then to plug the data into an equation to solve the problem.

Teachers need an instructional strategy to encourage students to be more savvy interpreters of graphics in applied math problems. One idea is to have them apply a reading comprehension strategy, Question-Answer Relationships (QARs) as a tool for analyzing math graphics. The four QAR question types (Raphael, 1982, 1986) are as follows:

- **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 the making of connections between disparate pieces of factual information found in different sections of the reading.
- **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.

Steps to Implementing This Intervention

Teachers use a 4-step instructional sequence to teach students to use Question-Answer Relationships (QARs) to better interpret math graphics:

1. Step 1: Distinguishing Among Different Kinds of Graphics

Students are first taught to differentiate between five common types of math graphics: table (grid with information contained in cells), chart (boxes with possible connecting lines or arrows), picture (figure with labels), line graph, bar graph.

Students note significant differences between the various types of graphics, while the teacher

records those observations on a wall chart. Next students are shown examples of graphics and directed to identify the general graphic type (table, chart, picture, line graph, bar graph) that each sample represents.

As homework, students are assigned to go on a 'graphics hunt', locating graphics in magazines and newspapers, labeling them, and bringing them to class to review.

2. Interpreting Information in Graphics

Over several instructional sessions, students learn to interpret information contained in various types of math graphics. For these activities, students are paired off, with stronger students matched with less strong ones.

The teacher sets aside a separate session to introduce each of the graphics categories. The presentation sequence is ordered so that students begin with examples of the most concrete graphics and move toward the more abstract. The graphics sequence in order of increasing difficulty is: Pictures > tables > bar graphs > charts > line graphs.

At each session, student pairs examine examples of graphics from the category being explored that day and discuss questions such as: "What information does this graphic present? What are strengths of this type of graphic for presenting data? What are possible weaknesses?" Student pairs record their findings and share them with the large group at the end of the session.

3. Linking the Use of Question-Answer Relations (QARs) to Graphics

In advance of this lesson, the teacher prepares a series of data questions and correct answers. Each question and answer is paired with a math graphic that contains information essential for finding the answer.

At the start of the lesson, students are each given a set of 4 index cards with titles and descriptions of each of the 4 QAR questions: RIGHT THERE, THINK AND SEARCH, AUTHOR AND YOU, ON MY OWN. (TMESAVING TIP: Students can create their own copies of these QAR review cards as an in-class activity.)

Working first in small groups and then individually, students read each teacher-prepared question, study the matching graphic, and 'verify' the provided answer as correct. They then identify the type of question being posed in that applied problem, using their QAR index cards as a reference.

4. Using Question-Answer Relationships (QARs) Independently to Interpret Math Graphics

Students are now ready to use the QAR strategy independently to interpret graphics. They are given a laminated card as a reference with 6 steps to follow whenever they attempt to solve an

applied problem that includes a math graphic:

- ✓ Read the question,
- ✓ Review the graphic,
- ✓ Reread the question,
- ✓ Choose a Question-Answer Relationship that matches the question in the applied problem
- ✓ Answer the question, and
- ✓ Locate the answer derived from the graphic in the answer choices offered.

Students are strongly encouraged NOT to read the answer choices offered on a multiple-choice item until they have first derived their own answer—to prevent those choices from short-circuiting their inquiry.

References

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

Raphael, T. (1982). Question-answering strategies for children. *The Reading Teacher*, 36, 186-190.

Raphael, T. (1986). Teaching question answer relationships, revisited. *The Reading Teacher*, 39, 516-522.

Combining Cognitive & Metacognitive Strategies to Assist Students With Mathematical Problem Solving

Solving an advanced math problem independently requires the coordination of a number of complex skills. The student must have the capacity to reliably implement the specific steps of a particular problem-solving process, or cognitive strategy. At least as important, though, is that the student must also possess the necessary metacognitive skills to analyze the problem, select an appropriate strategy to solve that problem from an array of possible alternatives, and monitor the problem-solving process to ensure that it is carried out correctly.

The following strategies combine both cognitive and metacognitive elements (Montague, 1992; Montague & Dietz, 2009). First, the student is taught a 7-step process for attacking a math word problem (cognitive strategy). Second, the instructor trains the student to use a three-part self-coaching routine for each of the seven problem-solving steps (metacognitive strategy).

In the cognitive part of this multi-strategy intervention, the student learns an explicit series of steps to analyze and solve a math problem. Those steps include:

1. **Reading the problem.** The student reads the problem carefully, noting and attempting to clear up any areas of uncertainty 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 to solve the problem.** The student decides on the best way to solve the problem and develops a plan to do so.
5. **Predicting/Estimating 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.

The metacognitive component of the intervention is a three-part routine that follows a sequence of 'Say', 'Ask', 'Check'. For each of the 7 problem-solving steps reviewed above:

- The student first self-instructs by stating, or 'saying', the purpose of the step ('Say').
- The student next self-questions by 'asking' what he or she intends to do to complete the step ('Ask').
- The student concludes the step by self-monitoring, or 'checking', the successful completion of the step ('Check').

While the Say-Ask-Check sequence is repeated across all 7 problem-solving steps, the actual content of the student self-coaching comments changes across the steps.

Table 1 shows how each of the steps in the word problem cognitive strategy is matched to the three-part Say-Ask-Check sequence:

Table 1: 'Say-Ask-Check' Metacognitive Prompts Tied to a Word-Problem Cognitive Strategy (Montague, 1992)		
Cognitive Strategy Step	Metacognitive 'Say-Ask-Check' Prompt Targets	Sample Metacognitive 'Say-Ask-Check' Prompts
1. Read the problem.	<p>'Say' (Self-Instruction) Target: <i>The student reads and studies the problem carefully before proceeding.</i></p> <p>'Ask' (Self-Question) Target: <i>Does the student fully understand the problem?</i></p> <p>'Check' (Self-Monitor) Target: <i>Proceed only if the problem is understood.</i></p>	<p>Say: "I will read the problem. I will reread the problem if I don't understand it."</p> <p>Ask: "Now that I have read the problem, do I fully understand it?"</p> <p>Check: "I understand the problem and will move forward."</p>
2. Paraphrase the problem.	<p>'Say' (Self-Instruction) Target: <i>The student restates the problem in order to demonstrate understanding.</i></p> <p>'Ask' (Self-Question) Target: <i>Is the student able to paraphrase the problem?</i></p> <p>'Check' (Self-Monitor) Target: <i>Ensure that any highlighted key words are relevant to the question.</i></p>	<p>Say: "I will highlight key words and phrases that relate to the problem question."</p> <p>"I will restate the problem in my own words."</p> <p>Ask: "Did I highlight the most important words or phrases in the problem?"</p> <p>Check: "I found the key words or phrases that will help to solve the problem."</p>
3. 'Draw' the problem.	<p>'Say' (Self-Instruction) Target: <i>The student creates a drawing of the problem to consolidate understanding.</i></p> <p>'Ask' (Self-Question) Target: <i>Is there a match between the drawing and the problem?</i></p> <p>'Check' (Self-Monitor) Target: <i>The drawing includes in visual form the key elements of the math problem.</i></p>	<p>Say: "I will draw a diagram of the problem."</p> <p>Ask: "Does my drawing represent the problem?"</p> <p>Check: "The drawing contains the essential parts of the problem."</p>
4. Create a plan to solve the problem.	<p>'Say' (Self-Instruction) Target: <i>The student generates a plan to solve the problem.</i></p> <p>'Ask' (Self-Question) Target: <i>What plan will help the student to solve this problem?</i></p> <p>'Check' (Self-Monitor) Target: <i>The plan is appropriate to solve the problem.</i></p>	<p>Say: "I will make a plan to solve the problem."</p> <p>Ask: "What is the first step of this plan? What is the next step of the plan?"</p> <p>Check: "My plan has the right steps to solve the problem."</p>
5. Predict/estimate the	<p>'Say' (Self-Instruction) Target: <i>The student uses estimation or other strategies to predict or</i></p>	<p>Say: "I will estimate what the answer will be."</p>

Answer.	<i>estimate the answer.</i> 'Ask' (Self-Question) Target: <i>What estimating technique will the student use to predict the answer?</i> 'Check' (Self-Monitor) Target: <i>The predicted/estimated answer used all of the essential problem information.</i>	Ask: "What numbers in the problem should be used in my estimation?" Check: "I did not skip any important information in my estimation."
6. Compute the answer.	'Say' (Self-Instruction) Target: <i>The student follows the plan to compute the solution to the problem.</i> 'Ask' (Self-Question) Target: <i>Does the answer agree with the estimate?</i> 'Check' (Self-Monitor) Target: <i>The steps in the plan were followed and the operations completed in the correct order.</i>	Say: "I will compute the answer to the problem." Ask: "Does my answer sound right?" "Is my answer close to my estimate?" Check: "I carried out all of the operations in the correct order to solve this problem."
7. Check the answer.	'Say' (Self-Instruction) Target: <i>The student reviews the computation steps to verify the answer.</i> 'Ask' (Self-Question) Target: <i>Did the student check all the steps in solving the problem and are all computations correct?</i> 'Check' (Self-Monitor) Target: <i>The problem solution appears to have been done correctly.</i>	Say: "I will check the steps of my answer." Ask: "Did I go through each step in my answer and check my work?" Check: ""

Students will benefit from close teacher support when learning to combine the 7-step cognitive strategy to attack math word problems with the iterative 3-step metacognitive Say-Ask-Check sequence. Teachers can increase the likelihood that the student will successfully acquire these skills by using research-supported instructional practices (Burns, VanDerHeyden, & Boice, 2008), including:

- Verifying that the student has the necessary foundation skills to solve math word problems
- Using explicit instruction techniques to teach the cognitive and metacognitive strategies
- Ensuring that all instructional tasks allow the student to experience an adequate rate of success
- Providing regular opportunities for the student to be engaged in active accurate academic responding
- Offering frequent performance feedback to motivate the student and shape his or her learning.

References

Burns, M. K., VanDerHeyden, A. M., & Boice, C. H. (2008). Best practices in intensive academic interventions. In A. Thomas & J. Grimes (Eds.), *Best practices in school psychology V* (pp.1151-1162). Bethesda, MD: National Association of School Psychologists.

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.

Montague, M., & Dietz, S. (2009). Evaluating the evidence base for cognitive strategy instruction and mathematical problem solving. *Exceptional Children, 75*, 285-302.

Classroom Survival Skills: Homework

This form includes (1) your selected Academic Survival Skill Checklist items, (2) a column to verify whether the student possesses each survival skill (Y/N), and (3) a column to list the information used to verify each skill (Observation/Interview/Work Product).

Academic Survival-Skill Checklist	Student Displays Skill? (Y/N)	Data Source? (Observation/Interview/Work Product)
<input type="checkbox"/> WRITE DOWN HOMEWORK ASSIGNMENTS CORRECTLY. Make sure that you have copied down your homework assignment(s) correctly and completely. If necessary, approach the instructor before leaving the classroom to seek clarification about the homework assignment.		
<input type="checkbox"/> ASSEMBLE ALL NECESSARY HOMEWORK MATERIALS. Make a list of those school work materials that you will need for that night's homework assignments and ensure that you have them before going home. School materials may include the course text, copies of additional assigned readings, your class notes, and partially completed assignments that are to be finished as homework. Additionally, monitor your work supplies at home (e.g., graph paper, pens, printer cartridges) and replenish them as needed.		
<input type="checkbox"/> USE AVAILABLE SCHOOL TIME TO GET A START ON HOMEWORK. Take advantage of open time in school (e.g., time given in class, study halls, etc) to get a start on your homework. Getting a head start on homework in school can reduce the amount of time needed to complete that work later in the day. Also, if you start homework in school and run into problems, you have a greater chance of being able to seek out a teacher or fellow student to resolve those problems proactively and thus successfully complete that assignment.		
<input type="checkbox"/> CREATE AN OPTIMAL HOMEWORK SPACE. Create an organized space at home for getting homework done. The space can be temporary (e.g., kitchen table) or permanent (e.g., a desk in your bedroom). It should be quiet, well-lit, and include a table or desk large enough to lay out your work materials and a comfortable chair.		

Academic Survival-Skill Checklist	Student Displays Skill? (Y/N)	Data Source? (Observation/Interview/Work Product)
<input type="checkbox"/> SCHEDULE A REGULAR HOMEWORK TIME. Homework is easier to complete if you set aside sufficient time in your schedule to do it. If possible, your daily routine should include a standing time when any homework is to be done. In deciding when to schedule a homework period, consider such factors as when your energy level is highest, when surrounding distractions are less likely to occur, and when shared resources such as a computer or printer may be available for your use.		
<input type="checkbox"/> DEVELOP A DAILY HOMEWORK PLAN. Before beginning your homework each day, take a few minutes to review all of your homework assignments and to develop a work plan. Your plan should include a listing of each homework task and an estimate of how long it will take to complete that task. It is a good rule of thumb to select the most difficult homework task to complete first, when your energy and concentration levels are likely to be at their peak. At the conclusion of your homework session, review the plan, check off all completed tasks, and reflect on whether your time estimates were adequate for the various tasks.		
<input type="checkbox"/> DO NOT PROCRASTINATE ON LARGER HOMEWORK TASKS. Some homework assignments (e.g., term papers) require substantial work and successful completion of several related sub-tasks before attaining the final goal. It is a mistake to put off these larger assignments until the night before they are due. Instead, when first assigned a comprehensive task, break that task down into appropriate sub-tasks. Next to each sub-task, list a target date for completion. When compiling a daily homework plan, include any sub-tasks with upcoming due dates. Monitor your progress to ensure that you remain on schedule to complete the larger assignment on time.		

Academic Survival-Skill Checklist	Student Displays Skill? (Y/N)	Data Source? (Observation/Interview/Work Product)
<input type="checkbox"/> USE HOMEWORK SUPPORTS SUPPLIED BY YOUR TEACHER. Make use of homework guides or resources of any kind offered by your teacher. For example, be sure to review the course syllabus for information about upcoming homework, as well as any print or online listings of homework assignments for the day or week. Take advantage of teacher office hours to drop in and get help with homework as needed.		
<input type="checkbox"/> GET YOUR HOMEWORK ORGANIZED. When several homework tasks are assigned daily from several courses, the total volume of work can quickly pile up. Adopt simple but effective organizational strategies to keep track of all the paperwork. For example, consider maintaining two file folders labeled 'Work in Progress' and 'Completed Work'. Make a point of emptying the 'Completed Work' folder each day by turning in the finished homework.		
<input type="checkbox"/> NOTE AREAS OF HOMEWORK CONFUSION. If you are stuck on a homework item, be sure to note the specific reason(s) that you are unable to complete it. For example, you may have difficulty with a homework item because you failed to comprehend a passage in your assigned reading (note the problem by highlighting the confusing passage), do not know the meaning of a term (note the problem by writing down the unknown term), or do not understand the teacher's assignment (note the problem by writing a comment on the assignment worksheet). By recording the reason(s) that you are unable successfully to complete a homework item, you demonstrate to your teacher both that you made a good-faith effort to do the work and that you are able to clearly explain where you encountered the problem and why.		



Academic Survival-Skill Checklist	Student Displays Skill? (Y/N)	Data Source? (Observation/Interview/Work Product)
<input type="checkbox"/> CHECK HOMEWORK QUALITY. Students can improve homework performance by adopting quality self-checks. For example, before turning in any homework writing task, you might apply the SCOPE revision tool: check your composition for Spelling-Capitalization-Order of words-Punctuation-Expression of complete thoughts. If your teacher has given you rubrics or other rating forms to evaluate the quality of your work, these also may be useful for evaluating your homework.		



Motivation Challenge 1: *The student is unmotivated because he or she cannot do the assigned work.*

Profile of a Student with This Motivation Problem: The student lacks essential skills required to do the task. Areas of deficit might include basic academic skills, cognitive strategies, and academic-enabler skills. Here are definitions of these skill areas:

- *Basic academic skills.* Basic skills have straightforward criteria for correct performance (e.g., the student defines vocabulary words or decodes text or computes 'math facts') and comprise the building-blocks of more complex academic tasks (Rupley, Blair, & Nichols, 2009). The instructional goal in basic skills is for students to become 'automatic' in the skill(s) being taught.
- *Cognitive strategies.* Students employ specific cognitive strategies as "guiding procedures" to complete more complex academic tasks such as reading comprehension or writing (Rosenshine, 1995). Cognitive strategies are "intentional and deliberate procedures" that are under the conscious control of the student (Rupley, Blair, & Nichols, 2009; p. 127). The instructional goals are to train students to use specific cognitive instruction strategies, to reliably identify the conditions under which they should employ these strategies, and to actually use them correctly and consistently.

Question generation is an example of a cognitive strategy to promote reading comprehension (Rosenshine, Meister, & Chapman, 1996); the student is trained to locate or write main-idea sentences for each paragraph in a passage, then write those main ideas onto separate note cards with corresponding questions.

- *Academic-enabling skills.* Skills that are 'academic enablers' (DiPerna, 2006) are not tied to specific academic knowledge but rather aid student learning across a wide range of settings and tasks. Examples of academic-enabling skills include organizing work materials, time management, and making and sticking to a work plan. The instructional goal is to train students to acquire these academic-support skills and to generalize their use to become efficient, self-managing learners.

What the Research Says: When a student lacks the capability to complete an academic task because of limited or missing basic skills, cognitive strategies, or academic-enabling skills, that student is still in the acquisition stage of learning (Haring et al., 1978). That student cannot be expected to be motivated or to be successful as a learner unless he or she is first explicitly taught these weak or absent essential skills (Daly, Witt, Martens & Dool, 1997).

How to Verify the Presence of This Motivation Problem: The teacher collects information (e.g., through observations of the student engaging in academic tasks; interviews with the student; examination of work products, quizzes, or tests) demonstrating that the student lacks basic skills, cognitive strategies, or academic-enabling skills essential to the academic task.



How to Fix This Motivation Problem: Students who are not motivated because they lack essential skills need to be taught those skills.

Direct-Instruction Format. Students learning new material, concepts, or skills benefit from a 'direct instruction' approach. (Burns, VanDerHeyden & Boice, 2008; Rosenshine, 1995; Rupley, Blair, & Nichols, 2009). When following a direct-instruction format, the teacher:

- ensures that the lesson content is appropriately matched to students' abilities.
- opens the lesson with a brief review of concepts or material that were previously presented.
- states the goals of the current day's lesson.
- breaks new material into small, manageable increments, or steps.
- throughout the lesson, provides adequate explanations and detailed instructions for all concepts and materials being taught. NOTE: Verbal explanations can 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).
- regularly checks for student understanding by posing frequent questions and eliciting group responses.
- verifies that students are experiencing sufficient success in the lesson content to shape their learning in the desired direction and to maintain student motivation and engagement.
- provides timely and regular performance feedback and corrections throughout the lesson as needed to guide student learning.
- allows students the chance to engage in practice activities distributed throughout the lesson (e.g., through teacher demonstration; then group practice with teacher supervision and feedback; then independent, individual student practice).
- ensures that students have adequate support (e.g., clear and explicit instructions; teacher monitoring) to be successful during independent seatwork practice activities.

References:

Burns, M. K., VanDerHeyden, A. M., & Boice, C. H. (2008). Best practices in intensive academic interventions. In A. Thomas & J. Grimes (Eds.), *Best practices in school psychology V* (pp.1151-1162). Bethesda, MD: National Association of School Psychologists.

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- Rosenshine, B., Meister, C., & Chapman, S. (1996). *Teaching students to generate questions: A review of the intervention studies*. *Review of Educational Research, 66*, 181-221.
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<p>How Do We Reach Low-Performing Math Students?: Instructional Recommendations</p> <p><i>Important elements of math instruction for low-performing students</i> (Baker, Gersten, & Lee, 2002; p. 51):</p>	<p><i>IDEAS FOR IMPLEMENTATION</i></p>
<p>“Providing teachers and students with data on student performance”</p>	
<p>“Using peers as tutors or instructional guides”</p>	
<p>“Providing clear, specific feedback to parents on their children’s mathematics success”</p>	
<p>“Using principles of explicit instruction in teaching math concepts and procedures.”</p>	

Reference

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.

Intervention & Related RTI Terms: Definitions

Educators who serve as interventionists should be able to define and distinguish among the terms *core instruction*, *intervention*, *instructional adjustment*, and *modification*. (In particular, interventionists should avoid using modifications as part of an RTI plan for a general education student, as they can be predicted to undermine the student's academic performance.) Here are definitions for these key terms.

- ❑ **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 RTI 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.
- ❑ **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). As an example of an academic intervention, the teacher may select question generation (Davey & McBride, 1986.; Rosenshine, Meister & Chapman, 1996), a strategy in which the student is taught to locate or generate main idea sentences for each paragraph in a passage and record those 'gist' sentences for later review.
- ❑ **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 is intended to remove barriers to learning while still expecting that students will master the same instructional content as their typical peers. An instructional adjustment for students who are slow readers, for example, may include having them supplement their silent reading of a novel by listening to the book on tape. An instructional adjustment for unmotivated students may include breaking larger assignments into smaller 'chunks' and providing students with performance feedback and praise for each completed 'chunk' of assigned work (Skinner, Pappas & Davis, 2005).
- ❑ **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. Examples of modifications are giving a student five math computation problems for practice instead of the 20 problems assigned to the rest of the class or letting the student consult course notes during a test when peers are not permitted to do so. Instructional modifications are essential elements on the Individualized Education Plans (IEPs) or Section 504 Plans of many students with special needs. Modifications are generally not included on a general-education student's RTI intervention plan, however, because the assumption is that the student can be successful in the curriculum with appropriate interventions and instructional adjustments alone. In fact, modifying the work of struggling general education students is likely to have a negative effect that works *against* the goals of RTI. Reducing academic expectations will result in these students falling further behind rather than closing the performance gap with peers

References

Davey, B., & McBride, S. (1986). Effects of question-generation training on reading comprehension. *Journal of Educational Psychology, 78*, 256-262.

Methe, S. A., & Riley-Tillman, T. C. (2008). An informed approach to selecting and designing early mathematics interventions. *School Psychology Forum: Research into Practice, 2*, 29-41.

Rosenshine, B., Meister, C., & Chapman, S. (1996). Teaching students to generate questions: A review of the intervention studies. *Review of Educational Research, 66*, 181-221.

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.

Accommodation Strategies for General-Education Students

This report lists selected accommodations in one column and research citations for each in the next column. A third column includes a space to write notes.

Accommodation	Research Citation	NOTES
<p>1. 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.</p>	<p>International Dyslexia Association. (2002). Accommodating students with dyslexia in all classroom settings. Retrieved from http://www.interdys.org/</p>	
<p>2. EMPHASIZE THE POSITIVE IN REQUESTS. When delivering a request, directive, or command to a student, state the request using positive phrasing (e.g., "I will be over to help you on the assignment just as soon as you return to your seat") rather than negative phrasing (e.g., "I can't help you with your assignment until you return to your seat."). When a request has a positive 'spin', that teacher is less likely to trigger a power struggle and more likely to gain student compliance.</p>	<p>Braithwaite, R. (2001). <i>Managing aggression</i>. New York: Routledge.</p>	
<p>3. FOCUS ATTENTION VIA SILENT CUES. Meet with the student and agree on one or more silent teacher cues to redirect or focus the student (e.g., placing a paperclip on the student's desk) during class instruction. Use the cue as needed. Optionally, direct the student to keep track of the number of times the cue is used and provide incentives to the student for reducing the number of teacher prompts needed.</p>	<p>Barkley, R. A. (2008). 80+ classroom accommodations for children or teens with ADHD. <i>The ADHD Report</i>, 16(4), 7-10.</p>	

Accommodation	Research Citation	NOTES
<p>4. PREPARE A COURSE GLOSSARY. Create a glossary with definitions of vocabulary terms essential for the course or content area. Make copies of the glossary available to all students. Provide opportunities for struggling students to practice and demonstrate mastery of these crucial vocabulary items.</p>	<p>International Dyslexia Association. (2002). Accommodating students with dyslexia in all classroom settings. Retrieved from http://www.interdys.org/</p>	
<p>5. PUBLICLY POST DIRECTIONS. Post routine directions on classroom walls or provide copies for students to refer to as needed. Format complex directions into bulleted sub-steps for posting.</p>	<p>Beech, M. (2010). Accommodations: Assisting students with disabilities. Florida Department of Education. Retrieved from http://www.fldoe.org/ese/pdf/acommm-educator.pdf</p>	
<p>6. REPEAT/REPHRASE COMMENTS. Repeat or rephrase student questions or comments to the class or group before responding.</p>	<p>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</p>	
<p>7. 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.</p>	<p>International Dyslexia Association. (2002). Accommodating students with dyslexia in all classroom settings. Retrieved from http://www.interdys.org/</p>	
<p>8. USE STRONG TEACHER COMMANDS. Maximize the likelihood of student compliance with teacher commands by (1) gaining the attention of the student, (2) stating the command calmly in clear and simple language as a 'do' statement, (3) presenting multi-step commands one step at a time, and (4) waiting for compliance with each step before moving to the next.</p>	<p>Kern, L, & Clemens, N. (2007). Antecedent strategies to promote appropriate classroom behavior. <i>Psychology in the Schools</i>, 44(1), 65-75.</p>	
<p>9. ALLOW MUSIC DURING INDEPENDENT WORK. Permit the student to listen to music with earphones during independent work if this allows her or him to improve concentration and increase productivity.</p>	<p>Barkley, R. A. (2008). 80+ classroom accommodations for children or teens with ADHD. <i>The ADHD Report</i>, 16(4), 7-10.</p>	

Accommodation	Research Citation	NOTES
<p>10. ARRANGE CLASSROOM SEATING. Arrange classroom seating to elicit the desired student behavior: (1) to promote higher rates of student engagement and on-task behavior, arrange seats in traditional rows facing the instructor; (2) to promote discussion and student questions, arrange seats in a semi-circle.</p>	<p>Kern, L, & Clemens, N. (2007). Antecedent strategies to promote appropriate classroom behavior. <i>Psychology in the Schools</i>, 44(1), 65-75.</p>	
<p>11. 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.</p>	<p>U.S. Department of Education (2004). Teaching children with attention deficit hyperactivity disorder: Instructional strategies and practices. Retrieved from http://www.ed.gov/teachers/needs/speced/adhd/adhd-resource-pt2.doc</p>	
<p>12. DIRECTIONS: ASSIGN A BUDDY. Assign a study buddy who is willing and able to repeat and explain directions to the student.</p>	<p>Beech, M. (2010). Accommodations: Assisting students with disabilities. Florida Department of Education. Retrieved from http://www.fldoe.org/ese/pdf/acommm-educator.pdf</p>	
<p>13. PROVIDE APPROPRIATE OUTLETS FOR PHYSICAL MOVEMENT. To accommodate the student who is fidgety or has a greater need than peers for physical movement, negotiate with the student appropriate outlets for movement. For example, the teacher and student may agree that it is acceptable for the student to stand when completing independent work at his or her desk.</p>	<p>Barkley, R. A. (2008). 80+ classroom accommodations for children or teens with ADHD. <i>The ADHD Report</i>, 16(4), 7-10.</p>	
<p>14. PROVIDE CLASSROOM STORAGE SPACE. Provide the student with a section of shelf or container in the classroom to store work materials required for class.</p>	<p>Beech, M. (2010). Accommodations: Assisting students with disabilities. Florida Department of Education. Retrieved from http://www.fldoe.org/ese/pdf/acommm-educator.pdf</p>	

Accommodation	Research Citation	NOTES
<p>15. PROVIDE MISSING WORK MATERIALS. Provide reasonable work materials (e.g., paper, writing utensil) for students who forget to bring them to class. Rather than withhold work materials from the habitually unprepared student, devise other appropriate consequences for missing materials (e.g., incentives for students who come to class prepared; deductions in global 'effort' grade for unprepared students).</p>	<p>Skinner, C. H., Pappas, D. N., & Davis, K. A. (2005). Enhancing academic engagement: Providing opportunities for responding and influencing students to choose to respond. <i>Psychology in the Schools</i>, 42, 389-403.</p>	
<p>16. USE PREFERENTIAL SEATING. Seat the student in a classroom location that minimizes distractions and maximizes the ability to focus on the teacher's instruction. When possible, the student should be consulted and offered two or more seating choices. Also, preferential seating should be presented as a support, not as a punitive response to student misbehavior or inattention.</p>	<p>International Dyslexia Association. (2002). Accommodating students with dyslexia in all classroom settings. Retrieved from http://www.interdys.org/</p>	
<p>17. ADJUST INSTRUCTIONAL MATCH. Verify that the student possesses the required skills to understand course instruction and complete academic tasks assigned as in-class work or homework. If necessary, provide additional instruction (e.g., via tutoring sessions with a peer or instructor) or other supports to enable the student to meet academic expectations.</p>	<p>Kern, L., & Clemens, N. (2007). Antecedent strategies to promote appropriate classroom behavior. <i>Psychology in the Schools</i>, 44(1), 65-75.</p>	
<p>18. CHUNK CLASSWORK AND INCLUDE BREAKS. Break up lectures or student work sessions into smaller chunks and include brief breaks to sustain student attention.</p>	<p>Barkley, R. A. (2008). 80+ classroom accommodations for children or teens with ADHD. <i>The ADHD Report</i>, 16(4), 7-10.</p>	
<p>19. CLASS NOTES: CREATE GUIDED NOTES. Prepare a copy of notes summarizing content from a class lecture or assigned reading—with blanks inserted in the notes where key facts or concepts should appear. As information is covered during lecture or in a reading assignment, the student writes missing content into blanks to complete the guided notes.</p>	<p>Konrad, M., Joseph, L. M., & Eveleigh, E. (2009). A meta-analytic review of guided notes. <i>Education and Treatment of Children</i>, 32, 421-444.</p>	

Accommodation	Research Citation	NOTES
20. 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.	International Dyslexia Association. (2002). Accommodating students with dyslexia in all classroom settings. Retrieved from http://www.interdys.org/	
21. 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 help to structure their class notes and to ensure that their notes do not omit important information.	International Dyslexia Association. (2002). Accommodating students with dyslexia in all classroom settings. Retrieved from http://www.interdys.org/	
22. INCREASE OPPORTUNITIES TO RESPOND. Provide the student with increased classroom opportunities for active academic responding. Examples of active student responding are reading aloud, responding in writing or orally to a teacher question, and collaborating with a peer to solve a math problem.	Kern, L, & Clemens, N. (2007). Antecedent strategies to promote appropriate classroom behavior. <i>Psychology in the Schools</i> , 44(1), 65-75.	
23. INTERSPERSE LOW- AND HIGH-INTEREST ACTIVITIES. When structuring a lesson, switch between less-appealing and more-appealing activities in short spans to hold student interest.	Barkley, R. A. (2008). 80+ classroom accommodations for children or teens with ADHD. <i>The ADHD Report</i> , 16(4), 7-10.	
24. LECTURE: SUMMARIZE OFTEN. When lecturing, review and reinforce student understanding through repetition, paraphrase, and frequent summarization of important points.	Beech, M. (2010). Accommodations: Assisting students with disabilities. Florida Department of Education. Retrieved from http://www.fldoe.org/ese/pdf/acommm-educator.pdf	

Accommodation	Research Citation	NOTES
25. LECTURE: TIE INFORMATION TO COURSE READINGS. When presenting important course concepts during lecture, explicitly link that content to page references in the course text or other assigned readings that also cover that information. In class notes, also link important information to the course text by page number.	Beech, M. (2010). Accommodations: Assisting students with disabilities. Florida Department of Education. Retrieved from http://www.fldoe.org/ese/pdf/acommm-educator.pdf	
26. MATCH WORK TO PEAK ENERGY PERIODS. Schedule the most challenging academic subjects, tasks, or activities when students' energy levels are highest (e.g., at the start of the day or class period).	Barkley, R. A. (2008). 80+ classroom accommodations for children or teens with ADHD. <i>The ADHD Report</i> , 16(4), 7-10.	
27. PREPARE READING GUIDES. Develop reading guides to help students to better access demanding texts in the course or content area. Reading guides provide a general map of the text, summarize main ideas and key details presented, and offer tips and pose questions to alert the reader to important content. Depending on student needs, reading guides can deal broadly with whole sections of a text or focus more specifically on chapters or sub-chapters.	International Dyslexia Association. (2002). Accommodating students with dyslexia in all classroom settings. Retrieved from http://www.interdys.org/	
28. PREPARE WEEKLY HOMEWORK ASSIGNMENTS. Share weekly listings of upcoming homework assignments with the student. Also, ensure that these homework assignments are shared with the student's parent(s), to help them to support their child's homework completion.	Barkley, R. A. (2008). 80+ classroom accommodations for children or teens with ADHD. <i>The ADHD Report</i> , 16(4), 7-10.	
29. SET A REASONABLE HOMEWORK QUOTA. Limit homework to a manageable amount of work. Use this formula to estimate an appropriate homework load: 10 minutes times the student's grade level equals an appropriate TOTAL time devoted to nightly homework.	Barkley, R. A. (2008). 80+ classroom accommodations for children or teens with ADHD. <i>The ADHD Report</i> , 16(4), 7-10.	

Accommodation	Research Citation	NOTES
30. TEST: ALLOW EXTRA TIME. For tests that evaluate student knowledge or skills but do not formally assess speed/fluency with fixed time limits, allow all students a reasonable amount of additional time if needed.	Nelson, J. (2000). Student preferences for adaptations in classroom testing. Remedial & Special Education, 21, 21, 41-52.	
31. TEST: ALLOW OPEN-BOOK/OPEN-NOTES. In situations in which students are being tested on their ability to apply – rather than memorize—course information or concepts, allow students full access to their textbooks and/or notes during the test.	Nelson, J. (2000). Student preferences for adaptations in classroom testing. Remedial & Special Education, 21, 21, 41-52.	
32. TEST: EVALUATE MORE FREQUENTLY. Assess student mastery of course content frequently (e.g., weekly) through shorter quizzes in place of less-frequent, more-comprehensive tests. More frequent, smaller assessments can make study more manageable for students, build strong habits of continual study and review, and provide more formative assessment information for the teacher.	Nelson, J. (2000). Student preferences for adaptations in classroom testing. Remedial & Special Education, 21, 21, 41-52.	
33. TEST: HIGHLIGHT KEY WORDS IN DIRECTIONS. When preparing test directions, highlight key words or phrases in bold or underline to draw student attention.	Nelson, J. (2000). Student preferences for adaptations in classroom testing. Remedial & Special Education, 21, 21, 41-52.	
34. TEST: PRACTICE UNDER TEST CONDITIONS. Create practice tests that mimic the actual test in format and environmental conditions (e.g., with time limits). Have the student complete practice tests to build endurance, reduce test anxiety.	Beech, M. (2010). Accommodations: Assisting students with disabilities. Florida Department of Education. Retrieved from http://www.fldoe.org/ese/pdf/acommm-educator.pdf	
35. TEST: PROVIDE EXTRA SPACE. Format tests with extra space to write answers. This formatting change has two advantages: (1) it can accommodate students who have difficulty writing in small spaces due to fine-motor issues, and (2) it can result in a neater test that looks less crowded and therefore less intimidating.	Nelson, J. (2000). Student preferences for adaptations in classroom testing. Remedial & Special Education, 21, 21, 41-52.	

Accommodation	Research Citation	NOTES
<p>36. USE GRAPHIC ORGANIZERS. Select the graphic organizer(s) (e.g., outline, chart, or other visual representation) most appropriate to help the student to better understand course content by noting key ideas, recording important details, making specific connections between concepts, etc. To adequately use graphic organizers, students should first be explicitly trained in their use. Teachers should also require that students turn in completed organizers periodically to monitor their use and effectiveness.</p>	<p>International Dyslexia Association. (2002). Accommodating students with dyslexia in all classroom settings. Retrieved from http://www.interdys.org/</p>	
<p>37. USE WHITEBOARDS FOR STUDENT RESPONDING. Reduce impulsive responding and increase student participation by providing all students with small white boards and markers. The teacher (1) poses a question, (2) directs students to write their answers on whiteboards, and then (3) prompts all students in unison to hold up their whiteboards for teacher review.</p>	<p>Barkley, R. A. (2008). 80+ classroom accommodations for children or teens with ADHD. <i>The ADHD Report</i>, 16(4), 7-10.</p>	
<p>38. INCORPORATE STUDENT INTERESTS. Structure or rework instruction or academic tasks to incorporate topics of student interests. If students are interested in NASCAR or fashion, for example, the teacher can work these topics into writing or math lessons.</p>	<p>Kern, L, & Clemens, N. (2007). Antecedent strategies to promote appropriate classroom behavior. <i>Psychology in the Schools</i>, 44(1), 65-75.</p>	
<p>39. 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 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.</p>	<p>Kern, L, & Clemens, N. (2007). Antecedent strategies to promote appropriate classroom behavior. <i>Psychology in the Schools</i>, 44(1), 65-75.</p>	

Accommodation	Research Citation	NOTES
40. OFFER CHOICE VIA ASSIGNMENT SUBSTITUTION. Present the student with two or more alternative activities to choose from that contain equivalent academic requirements. For example, an instructor who wants students to review a chapter of the course textbook might allow them the choices of reading the passage independently or discussing that passage in a structured cooperative learning activity.	Kern, L, & Clemens, N. (2007). Antecedent strategies to promote appropriate classroom behavior. <i>Psychology in the Schools</i> , 44(1), 65-75.	
41. OFFER CHOICE: TASK SEQUENCE. When the student has several tasks to complete during independent work time, allow the student to select the order in which she or he will complete those tasks. When the student begins the independent work, provide encouragement and prompting as needed to keep the student engaged.	Kern, L., Bambara, L., & Focht, J. (2002). Class-wide curricular modification to improve the behavior of students with emotional or behavioral disorders. <i>Behavioral Disorders</i> , 27, 317-326.	
42. PROVIDE ADULT ATTENTION. Provide the student with brief, regular, repeated doses of positive adult attention ("scheduled attention") at times when the student is behaving appropriately. Examples of positive teacher attention are greetings, brief conversations, encouraging notes written on assignments, and non-verbal signals (e.g., thumbs-up).	Kern, L, & Clemens, N. (2007). Antecedent strategies to promote appropriate classroom behavior. <i>Psychology in the Schools</i> , 44(1), 65-75.	
43. REWARD ACCURACY AND EFFORT FOR BEGINNING LEARNERS. For the student just acquiring an academic skill who is not yet proficient, provide encouragement and/or incentives for overall effort and accuracy of any work completed-- rather than focusing on speed or total number of problems finished.	Barkley, R. A. (2008). 80+ classroom accommodations for children or teens with ADHD. <i>The ADHD Report</i> , 16(4), 7-10.	
44. ASSIGN A 'FALL-BACK' PEER. Choose a peer whom the student can call or email to get details about missing or lost homework assignments.	Barkley, R. A. (2008). 80+ classroom accommodations for children or teens with ADHD. <i>The ADHD Report</i> , 16(4), 7-10.	

Accommodation	Research Citation	NOTES
45. CREATE STUDENT ORGANIZATION FOLDER. Help the student to create a work folder to organize materials for a course or content area. The folder should include dividers and color-coding to organize materials by subject or topic.	Beech, M. (2010). Accommodations: Assisting students with disabilities. Florida Department of Education. Retrieved from http://www.fldoe.org/ese/pdf/acommm-educator.pdf	
46. DEVELOP A STUDENT SELF-CHECK ERROR CHECKLIST. Meet with the student and generate a short list of the most common errors that the student habitually makes on course assignments (e.g., 'In writing assignments, some words are illegible', 'Not all words at sentence beginning are capitalized'.) Format that list as a customized error-correction checklist. Instruct the student to review completed assignments using the error-correction checklist before turning in the work.	Beech, M. (2010). Accommodations: Assisting students with disabilities. Florida Department of Education. Retrieved from http://www.fldoe.org/ese/pdf/acommm-educator.pdf	
47. HIGHLIGHT ESSENTIAL MATERIAL. Have the student use a highlighter to identify key ideas and vocabulary in text. If necessary, train the student in the skill of highlighting only essential material (e.g., with the teacher initially highlighting a text selection and comparing her/his highlights to those of the student).	International Dyslexia Association. (2002). Accommodating students with dyslexia in all classroom settings. Retrieved from http://www.interdys.org/	
48. PROMOTE STUDENT-DEVELOPED STUDY SCHEDULES. Sit with the student to develop daily (and perhaps weekly and monthly) schedules to study material from a course or content-area. Meet periodically with the student to update these study schedules, gradually placing full responsibility on the student to create the schedule independently and bring to the instructor for review.	Gettinger, M., & Seibert, J. K. (2002). Contributions of study skills to academic competence. <i>School Psychology Review</i> , 31, 350-365.	

Accommodation	Research Citation	NOTES
<p>49. PROVIDE SCHEDULES/AGENDAS. Provide the student with an academic agenda or schedule for the class period or school day. This agenda outlines the instructional activities, independent assignments, and other tasks to be covered during the period, as well as their approximate duration. Preview the schedule with students to prepare them for upcoming activities. To forestall problem behaviors that might arise during a long or challenging activity, refer to the schedule at several points during the activity in order both to remind students of the time remaining and (perhaps) to describe the next activity to follow. Prepare students with a brief prompt/warning to prepare them for upcoming transitions between activities.</p>	<p>Kern, L, & Clemens, N. (2007). Antecedent strategies to promote appropriate classroom behavior. <i>Psychology in the Schools</i>, 44(1), 65-75.</p>	
<p>50. SELF-MONITOR STUDENT GOALS. Meet with the student to develop one or more classroom performance goals (e.g., arriving to class on time; completing independent assignments; participating in class discussion). Have the student monitor and chart her or his performance during each class period. Meet periodically with the student to review performance.</p>	<p>Barkley, R. A. (2008). 80+ classroom accommodations for children or teens with ADHD. <i>The ADHD Report</i>, 16(4), 7-10.</p>	
<p>51. TRAIN THE STUDENT IN BASIC STUDY HABITS. Share study tips with the student, including these recommendations: (1) Schedule the most difficult academic tasks and content for times when the student has peak energy; (2) break larger assignments into smaller, more manageable chunks; (3) mix and vary study tasks (e.g., reading writing) to avoid monotony; (4) show flexibility in updating the study schedule to accommodate unforeseen interruptions or unexpected windfalls of study time.</p>	<p>Gettinger, M., & Seibert, J. K. (2002). Contributions of study skills to academic competence. <i>School Psychology Review</i>, 31, 350-365.</p>	

Accommodation	Research Citation	NOTES
<p>52. TRAIN THE STUDENT TO REQUEST ASSISTANCE. Meet with the student and share your expectations for when and how he or she should request help during independent work. This training is likely to include these elements: (1) providing the student with simple fix-up skills to use when stuck; (2) self-identifying when the student needs outside assistance (e.g., 'If you have worked for more than five minutes on a math problem and are still not sure what to do, it's time to get help.');</p> <p>and (3) guidelines for seeking additional assistance (e.g., 'First, ask a peer for help. If you are still stuck, come to my desk for help.'). Create a checklist with the assistance steps and tape it to the student's desk, place into his or her work folder, or post on the wall.</p>	<p>Beech, M. (2010). Accommodations: Assisting students with disabilities. Florida Department of Education. Retrieved from http://www.fldoe.org/ese/pdf/acommm-educator.pdf</p>	
<p>53. USE 'VISUAL BLOCKERS'. Encourage the student to reduce distractions on assignments by using a blank sheet of paper or similar aid to cover sections of the page that the student is not currently working on.</p>	<p>International Dyslexia Association. (2002). Accommodating students with dyslexia in all classroom settings. Retrieved from http://www.interdys.org/</p>	
<p>54. USE DAILY HOMEWORK ASSIGNMENT SHEET. Create an assignment sheet for the student to record daily homework assignments. The sheet should include columns to record individual homework tasks, materials needed for each task, an estimated amount of time needed to complete each task, and whether the student actually completes and turns in each assignment task. Optionally, have the student collect completed homework assignment sheets and turn them in each week to verify that they are being used.</p>	<p>Barkley, R. A. (2008). 80+ classroom accommodations for children or teens with ADHD. <i>The ADHD Report</i>, 16(4), 7-10.</p>	

Accommodation	Research Citation	NOTES
55. ALLOW EXTRA WORK TIME. Allow the student additional time to complete an in-class activity or assignment. Particularly for longer assignments, the instructor may want to announce to students at the start the amount of extra time available for those that need it.	International Dyslexia Association. (2002). Accommodating students with dyslexia in all classroom settings. Retrieved from http://www.interdys.org/	
56. ELIMINATE BUSY WORK: Decrease the student's class or homework to include just the essential tasks needed to master course or topic content. Maintain high academic standards but eliminate any 'busy' work not required for student success.	Barkley, R. A. (2008). 80+ classroom accommodations for children or teens with ADHD. The ADHD Report, 16(4), 7-10.	
57. FORMULATE STUDENT-SEATWORK GOALS. Before beginning an in-class or homework assignment, have the student set a work goal (e.g., to complete 20 math computation problems; to write an introductory paragraph for an essay). Later, check in with the student to see whether the goal(s) were successfully attained.	Barkley, R. A. (2008). 80+ classroom accommodations for children or teens with ADHD. The ADHD Report, 16(4), 7-10.	
58. GIVE AN ASSIGNMENT HEAD-START. Allow students who require extra time to complete a lengthy or involved assignment to start it early to secure additional time to complete the task.	Beech, M. (2010). Accommodations: Assisting students with disabilities. Florida Department of Education. Retrieved from http://www.fldoe.org/ese/pdf/acommm-educator.pdf	
59. HIGHLIGHT TEXTBOOK INFORMATION. Encourage the student to use post-it notes and/or erasable highlighter to highlight important information in the course textbook.	Beech, M. (2010). Accommodations: Assisting students with disabilities. Florida Department of Education. Retrieved from http://www.fldoe.org/ese/pdf/acommm-educator.pdf	

Accommodation	Research Citation	NOTES
<p>60. PROVIDE A WORK PLAN. Provide a Formal Work Plan. In advance of more complex assignments such as research papers, give the student an outline of a work plan for completing those assignments. The plan breaks a larger assignment into appropriate sub-steps (e.g., 'find five research articles for the paper', 'summarize key information from research articles into notes', etc.). For each sub-step, the plan provides (1) an estimate of the minimum amount of 'seat time' required to complete it and (2) sets a calendar-date deadline for completion. The teacher then touches base with the student at least weekly to ensure that the student is staying current with the work plan. TIPE: Over time, the teacher can transfer increasing responsibility for generating work plans to the student.</p>	<p>Beech, M. (2010). Accommodations: Assisting students with disabilities. Florida Department of Education. Retrieved from http://www.fldoe.org/ese/pdf/accomm-educator.pdf</p>	
<p>61. PROVIDE TEXTS WITH EASIER READABILITY. Locate alternative texts for course readings that have the same vocabulary and concepts as the standard text(s) but are written at a lower reading level. Allow students to select the easier texts as substitutes or as supplemental course readings.</p>	<p>Beech, M. (2010). Accommodations: Assisting students with disabilities. Florida Department of Education. Retrieved from http://www.fldoe.org/ese/pdf/accomm-educator.pdf</p>	
<p>62. 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.</p>	<p>International Dyslexia Association. (2002). Accommodating students with dyslexia in all classroom settings. Retrieved from http://www.interdys.org/</p>	
<p>63. RESPONSE EFFORT: CHUNK INDIVIDUAL ASSIGNMENTS. To reduce the response effort for a particular student, break a larger in-class or homework assignment into smaller 'chunks'. Optionally, the teacher can then provide the student with performance feedback and praise for each completed 'chunk' of assigned work.</p>	<p>Skinner, C. H., Pappas, D. N., & Davis, K. A. (2005). Enhancing academic engagement: Providing opportunities for responding and influencing students to choose to respond. <i>Psychology in the Schools</i>, 42, 389-403.</p>	

Accommodation	Research Citation	NOTES
<p>64. RESPONSE EFFORT: START ASSIGNED READINGS IN CLASS. Whenever students are assigned a challenging text to read independently (e.g., as homework), have either the teacher or other skilled reader (e.g., student) read the first few paragraphs of the assigned reading aloud while the class follows along silently in their own texts. Students are then expected to read the remainder of the text on their own.</p>	<p>Skinner, C. H., Pappas, D. N., & Davis, K. A. (2005). Enhancing academic engagement: Providing opportunities for responding and influencing students to choose to respond. <i>Psychology in the Schools</i>, 42, 389-403.</p>	
<p>65. RESPONSE EFFORT: START CHALLENGING HOMEWORK ASSIGNMENTS IN CLASS. When assigning challenging homework, pair students off or divide into groups and give them a small amount of 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.</p>	<p>Skinner, C. H., Pappas, D. N., & Davis, K. A. (2005). Enhancing academic engagement: Providing opportunities for responding and influencing students to choose to respond. <i>Psychology in the Schools</i>, 42, 389-403.</p>	
<p>66. 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.</p>	<p>International Dyslexia Association. (2002). Accommodating students with dyslexia in all classroom settings. Retrieved from http://www.interdys.org/</p>	
<p>67. 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.</p>	<p>Skinner, C. H., Pappas, D. N., & Davis, K. A. (2005). Enhancing academic engagement: Providing opportunities for responding and influencing students to choose to respond. <i>Psychology in the Schools</i>, 42, 389-403.</p>	

Accommodation	Research Citation	NOTES
68. WORKSHEETS: GIVE TWO COPIES. 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.	Beech, M. (2010). Accommodations: Assisting students with disabilities. Florida Department of Education. Retrieved from http://www.fldoe.org/ese/pdf/accomm-educator.pdf	

Best Practices in Secondary Math Interventions (7-12): Planning Sheet: Use this planning sheet to plan the essential 'next steps' to help struggling math students in your class, school, or district.

Participant: _____ School/District: _____ Date: _____

<p>GOAL 1: Creating a Supportive Math Instructional Environment. The math classroom that offers explicit instruction, accommodations, and strong core math instruction can reach the widest range of struggling learners.</p>	
<p>List the 'next steps' that you plan to follow to accomplish this goal:</p> <p>1. _____</p> <p>2. _____</p> <p>3. _____</p> <p>4. _____</p> <p>5. _____</p>	<p>Who in your school or district will you need to enlist to help you with this goal?:</p> <p>1. _____</p> <p>2. _____</p> <hr/> <p>What resources will you need beyond those supplied in this training to accomplish the goal?</p> <p>1. _____</p> <p>2. _____</p>
<p>Additional Notes: _____</p> <p>_____</p>	

<p>GOAL 2: Obtaining or Developing Classroom Formative Math Assessments. Teachers who can measure student math skills formatively can efficiently adjust instruction to meet the needs of a wider range of math learners.</p>	
<p>List the 'next steps' that you plan to follow to accomplish this goal:</p> <p>1. _____</p> <p>2. _____</p> <p>3. _____</p> <p>4. _____</p> <p>5. _____</p>	<p>Who in your school or district will you need to enlist to help you with this goal?:</p> <p>1. _____</p> <p>2. _____</p> <hr/> <p>What resources will you need beyond those supplied in this training to accomplish the goal?</p> <p>1. _____</p> <p>2. _____</p>
<p>Additional Notes: _____</p> <p>_____</p>	

GOAL 3: Developing a Math 'Intervention Menu'. Math teachers who have at their fingertips a range of research-based intervention ideas can better meet the needs of struggling students.	
List the 'next steps' that you plan to follow to accomplish this goal:	Who in your school or district will you need to enlist to help you with this goal?:
1. _____	1. _____
2. _____	2. _____
3. _____	What resources will you need beyond those supplied in this training to accomplish the goal?
4. _____	1. _____
5. _____	2. _____
Additional Notes: _____	

GOAL 4: Enlisting the Student as a Motivated, Self-Managing Learner. The teacher who can motivate a struggling student to take increased responsibility for his or her own math learning has a greater likelihood of success.	
List the 'next steps' that you plan to follow to accomplish this goal:	Who in your school or district will you need to enlist to help you with this goal?:
1. _____	1. _____
2. _____	2. _____
3. _____	What resources will you need beyond those supplied in this training to accomplish the goal?
4. _____	1. _____
5. _____	2. _____
Additional Notes: _____	
