

Part I

INTERVENTION PLANNING: DIAGNOSTIC ASSESSMENT, RESPONSE TO INTERVENTION, AND CONSULTATION

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One

A SYSTEMATIC METHOD OF ANALYZING ASSESSMENT RESULTS FOR TAILORING INTERVENTIONS (SMAARTI)

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The term *intervention* is one that is familiar to anyone working in a school system. Adjectives such as *research-based* and *evidence-based* when placed in front of this term elevate it to an indubitable status. This is primarily because these descriptors suggest that the intervention was subjected to a rigorous evaluation and was found to be effective, meaning that when implemented with fidelity, it leads to positive outcomes (e.g., Cooney, Huser, Small, & O'Connor, 2007; Flanagan & Alfonso, 2011).

Not surprisingly, then, evidence-based interventions are often the ones that are used first in either general or specialized instructional settings as compared to those interventions and techniques without such support. In general, it is incumbent upon practitioners to use evidence-based interventions with students who struggle academically. It is also prudent to use comprehensive interventions that can meet students' multiple manifest academic difficulties (e.g., remedial reading programs that contain the five essential components of reading; Feifer, 2011). However, it is clear from the literature that despite their overt relevancy, not all comprehensive, evidence-based interventions address the academic needs of every student effectively (e.g., Della Tofallo, 2010; Hale, Wycoff, & Fiorello, 2011).

In a tiered service delivery model, interventions are planned for and selected based on universal screening data. For example, students who are at risk for reading difficulties may receive *Wilson* if their reading difficulties are related

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primarily to decoding difficulties or *Read 180* if their reading difficulties are related primarily to comprehension difficulties (e.g., Feifer, 2011, and Chapter 5, this volume). When a student does not respond as expected to evidence-based interventions, a comprehensive evaluation is often recommended to gain a better understanding of the nature of and basis for the student's learning difficulties. It is through a comprehensive and focused evaluation that the intervention process moves from *planning and selecting interventions* to *tailoring interventions*. Planning and selecting interventions is typical of a *standard treatment protocol* Response to Intervention (RTI) service delivery model, whereas tailoring interventions is more consistent with a *problem-solving* RTI model.

PLANNING AND SELECTING INTERVENTIONS VERSUS TAILORING INTERVENTIONS

Planning and selecting interventions is conceptualized here as the process of identifying evidence-based interventions that are most often used in standard service delivery models to address manifest academic difficulties that are revealed via progress monitoring (e.g., a particular reading program is selected by a district as a Tier II intervention for students with reading fluency difficulties). On the other hand, a primary focus of *tailoring* interventions involves understanding the student's pattern of cognitive and academic strengths and weaknesses and how this pattern interacts with the instructional materials used by the student as well as classroom instructional factors, environmental factors, and other individual/situational factors that may facilitate or inhibit learning. The goals, therefore, are (a) to use information about a variety of intrinsic and extrinsic factors to tailor specific interventions; and (b) to ensure that a student has appropriate access to the curriculum by minimizing or bypassing the adverse affects that cognitive and other weaknesses have on the student's learning. Tailoring interventions may include *Modification* (e.g., instructional, curricular), *Accommodation*, *Remediation*, and *Compensation*. The acronym, *MARC*, can be used to assist in remembering these methods of tailoring interventions, which are defined in Rapid Reference 1.1.

A METHOD FOR TAILORING INTERVENTIONS

This chapter provides a *Systematic Method of Analyzing Assessment Results for Tailoring Interventions* (SMAARTI). This method, as initially conceptualized by Mascolo (2008), involves the organization, analysis, and synthesis of assessment data to aid in understanding the cognitive basis of students' learning difficulties. Based on multiple data sources, the steps of SMAARTI assist in identifying various

Rapid Reference 1.1 Methods of Tailoring Interventions

Tailoring Method	Brief Description	Examples
Modification	Changes content of material to be taught or measured; typically involves changing or reducing learning or measurement expectations; may change the depth, breadth, and complexity of learning and measurement goals.	Reducing the amount of material that a student is required to learn Simplifying material to be learned Requiring only literal (as opposed to critical/inferential) questions from an end-of-chapter comprehension check Simplifying test instructions and content
Accommodation	Changes conditions under which learning occurs or is measured, but does not change or reduce learning or assessment expectations. Accommodations may include timing, flexible scheduling, presentation, setting, and response accommodations.	Extending time on exams Assigning a project in advance or allowing more time to complete a project Aligning math problems vertically, as opposed to horizontally Providing a separate room to work Having a student dictate responses to a scribe
Remediation	Techniques or programs used to ameliorate cognitive and academic deficits. Academic interventions typically focus on developing a skill, increasing automaticity of skills, or improving the application of skills. Cognitive interventions typically focus on improving cognitive processes such as working memory capacity and phonological processing. There are many techniques, published programs, and software designed for the purpose of remediation.	Evidence-based programs listed at What Works Clearing House: http://ies.ed.gov/ncee/wwc Reading programs appearing on the Florida Center for Reading Research website: www.fcr.ord Techniques and materials from the Reading Rockets website: www.readingrockets.org CogMed (Pearson) Spotlight on Listening Comprehension (LinguiSystems, 2006)
Compensation	Procedures, techniques, and strategies that are intended to bypass or minimize the impact of a cognitive or academic deficit.	Teaching the use of mnemonic devices Organizational aids or techniques Teaching a student to outline or use graphic organizers

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methods of tailoring intervention (i.e., MARC) that make instruction more accessible to the student, thereby improving learning. SMAARTI is used when a student fails to respond as expected to evidence-based interventions (typically those used at Tier II) and, therefore, undergoes a comprehensive evaluation that includes an assessment of cognitive functioning.

STEPS OF SMAARTI

SMAARTI consists of five steps (see Rapid Reference 1.2). While this method assumes that several forms of data have already been collected for a particular student and, therefore, will be viewed *post-hoc*, the steps of SMAARTI can also serve as a roadmap to the types of data that ought to be gathered in an initial evaluation to aid in tailoring interventions for students with unique learning needs.

DON'T FORGET

A comprehensive evaluation should include data from the following areas of functioning: (a) educational history and current academic performance; (b) familial factors and medical history; (c) cognitive performance (including Cattell-Horn-Carroll [CHC] ability domains and neuropsychological processes); (d) behavioral and social-emotional functioning; and (e) classroom/instructional/environmental observations. Other information that must be garnered during the course of an evaluation to ensure that interventions are practical include parent/home resources (e.g., time available to spend with student, parent interest/motivation, parents' level of language proficiency, computer in the home), student's schedule and routine, current and past interventions used, and current strategies used by the student. When necessary, a comprehensive evaluation may include assessment of cultural and linguistic factors as well as any other factors that will assist in differential diagnosis.

Rapid Reference 1.2 The Five Steps of SMAARTI

1. Organize primary data using the CHC-based *Data Organization and Targets for Intervention* form (or DOTI form; see Table 1.1 and CD). *Primary data* include information from norm-referenced, standardized tests of cognitive and academic ability and neuropsychological processes and provide information about characteristics that reside mainly within the child (i.e., that are intrinsic). Examine all primary data to gain an understanding of the student's unique pattern of ability and processing strengths and weaknesses.
2. Determine whether academic weaknesses are empirically related to the cognitive weaknesses by reviewing the research on the relations among specific cognitive

abilities, neuropsychological processes, and academic skills (see Rapid Reference 1.4). An empirically established relationship between cognitive abilities or processes and academic skills allows practitioners to gain a better understanding of the potential reasons for the academic deficit. Knowledge of the underlying reasons for academic skill deficiency is necessary for both diagnosis and intervention.

3. Review manifestations of cognitive weaknesses, organize secondary data, identify initial targets for intervention, and identify types of academic skill deficits for remediation using the DOTI form. Determine whether identified cognitive weaknesses manifest in real-world performances in predictable ways. Refer to the CHC-based manifestations tables (see Rapid References 1.5 to 1.13) to gain an understanding of the various ways in which a weakness in a specific cognitive domain likely manifests generally, as well as more specifically in reading, math, and writing. Based on this information, integrate secondary data into the DOTI form. *Secondary data* include information from rating scales, classroom observations, and interviews with parents, teachers, and the student him- or herself. Like primary data, secondary data typically provide information about characteristics that are intrinsic to the child. When practitioners are able to observe the manifestations of specific cognitive deficits in classroom performance, for example, cognitive test results are ecologically valid. Be sure to note whether manifestations of cognitive deficits are pervasive (i.e., occur across settings) or setting-specific (e.g., occur only in school during mathematics instruction). When recording data in the DOTI form, hypothesize whether the cognitive areas of weakness should be targeted for modification, accommodation, remediation, compensation, or some combination thereof, and whether the areas of academic weakness are related to basic skill acquisition, fluency, or higher level skill (i.e., application).
4. Consider *tertiary data*, which are comprised of information about classroom instruction, instructional materials, environment, and strategies—that is, information about factors that affect learning and that are largely external to the student (i.e., extrinsic). Use the information in Rapid References 1.14 to 1.20 to tailor interventions for the purpose of minimizing the effects of cognitive weaknesses on learning and achievement.
5. Integrate data from all previous steps, design and implement an intervention, and monitor its effectiveness.

Step 1: Organize Primary Data Using the CHC-Based Data Organization and Targets for Intervention (DOTI) Form

In this step, practitioners may use the CHC-based DOTI form in Table 1.1 (also downloadable from CD) to organize primary data. Primary data include standardized test scores from cognitive and academic measures, special-purpose batteries (e.g., memory, language), district-wide testing programs (e.g., English Language Arts scores), and progress monitoring. As may be seen in Table 1.1, the DOTI form is organized into 10 CHC domains. It also contains an “other” category, which is reserved for use with measures not

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Table 1.1 CHC-Based Data Organization and Targets for Intervention (DOTI) Form

CHC Cognitive/Academic Ability or Processing Domain	Normative Weakness and Information About Intervention	Within Normal Limits	Normative Strength and Information About Intervention
Fluid Reasoning (Gf)			
Target for Intervention?			
Crystallized Intelligence (Gc)			
Target for Intervention?			
Long-Term Storage and Retrieval (Glr)			
Target for Intervention?			
Short-Term Memory (Gsm)			
Target for Intervention?			
Visual Processing (Gv)			
Target for Intervention?			
Auditory Processing (Ga)			
Target for Intervention?			
Processing Speed (Gs)			
Target for Intervention?			
Reading (Grw-R)			
Type of Skill Targeted			
Writing (Grw-W)			
Type of Skill Targeted			
Mathematics (Gq)			
Type of Skill Targeted			
Other			
Target for Intervention?			

Note: Use the following guidelines for identifying strengths and weaknesses: Normative Weakness is defined by standard scores that are about one standard deviation or more below the mean; Normative Strength is defined by standard scores that are about one standard deviation or more above the mean; within normal limits is defined by standard scores that fall between ± 1 SD of the normative mean (i.e., standard scores between 85 and 115). If a cognitive domain is targeted for intervention, note whether it is targeted for Modification to Instruction/Curriculum (**M**), Accommodation (**A**), Remediation (**R**), or Compensation (**C**). When there is a need to target an academic area for intervention, note the type of skill targeted as either a Basic (or foundational) skill (**B**), Fluency (**F**), or a Higher-level (or applied) skill (**H**).

readily classified into one of the 10 CHC domains (e.g., measures of visual motor ability, attention, executive functions, social-emotional). The DOTI form has three columns for organizing data, allowing for normative strengths and weaknesses to be recorded in separate columns. As the note to Table 1.1

indicates, in general, standard scores that are about 1 standard deviation (SD) below the mean or lower are considered normative weaknesses and standard scores that are about 1 SD above the mean or higher are considered normative strengths.

To illustrate various aspects of SMAARTI, this chapter includes excerpts from a case study, a boy, Ayden Murphy, who has difficulties with learning (see Rapid Reference 1.3). A DOTI form for Ayden is included in Table 1.2. This table contains primary data only. For example, a quick review of the data included in this table shows that Ayden has cognitive weaknesses in G_{lr}, G_a, and G_s as well as deficits in reading, math, and writing skills. He also has relative strengths, particularly in the area of G_v.

CAUTION

Readers not familiar with CHC theory are referred to *Essentials of Cross-Battery Assessment, Third Edition* (Flanagan, Ortiz, & Alfonso, 2013) for definitions and task examples of all CHC abilities as well as CHC classifications of cognitive, academic, and neuropsychological tests.

Rapid Reference 1.3 Selected Information From a Psychoeducational Evaluation of Ayden Murphy

Name:	Ayden Murphy
Age:	10
Gender:	Male
Grade Level:	Fifth Grade

Reason for Referral:

Ayden was referred to the Spotswood Center for Psychological Services for an evaluation by his mother, Ms. Murphy. Ms. Murphy reported that she was concerned about Ayden's difficulties in reading, reading comprehension, and writing. More specifically, Ms. Murphy indicated that Ayden continues to have difficulty decoding words and is not able to write in complete sentences most of the time or form paragraphs. In general, Ayden's academic performance has declined markedly in the fifth grade and he has recently demonstrated much less interest in school, homework, and reading.

Selected Measures Administered/Evaluation Procedures:

Beery-Buktenica Developmental Test of Visual-Motor Integration, Sixth Edition (BEERY VMI)

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(continued)

Child Intake Interview

Parent Intake Interview (Source: Mother)

Test of Orthographic Competence (TOC)

Woodcock-Johnson III Normative Update Tests of Achievement (WJ III NU ACH);
Form A, Age Norms

Woodcock-Johnson III Normative Update Tests of Cognitive Abilities (WJ III NU
COG); Form A, Age Norms

Background Information:

Ayden is a 10-year-old Caucasian male who is currently in fifth grade at Jefferson Elementary. He resides with his mother, stepfather, maternal grandmother, and younger sister. Ms. Murphy reported that Ayden typically gets along with all members of the household. Ayden has no reported medical conditions and is seemingly in good health. Ayden's last vision exam was approximately a year ago. He wears glasses for nearsightedness. Although he has never had a hearing exam outside of school, his hearing has never been a concern and he has passed all screening exams conducted at school.

Ayden attended Washington Heights Day Care between the ages of 3 and 5 years. He has attended Jefferson Elementary School since kindergarten and is currently in the fifth grade. During kindergarten (age 5), Ayden's teacher reported that he behaved well, but had difficulty reading and making sound-symbol connections. During first grade (age 6), Ayden had a strict teacher whom Ms. Murphy believed was beneficial for him. Specifically, Ayden's first-grade teacher kept him on-task and worked with him often on an individual basis. Nevertheless, during second grade (age 7), Ayden continued having difficulty reading and also began misbehaving in the classroom. For example, he would often play with things in his desk during reading instruction and frequently left his seat during reading groups. In third grade (age 8), Ayden was described as having problems with reading and writing and, in fourth grade (age 9), he received additional help from a reading teacher. Although he continued to struggle in reading and writing in the fourth grade, his teacher reported that he made some improvement over the course of the academic year.

Ayden is currently in fifth grade (age 10). According to his mother, Ayden is currently receiving pull-out services, which include meeting with the remedial reading teacher for one period three times per week for 30 minutes.

In terms of social-emotional development, Ms. Murphy described Ayden as generally cooperative, even-tempered, friendly, happy, and affectionate. He reportedly gets along well with others. Ayden enjoys playing football, soccer, and X-Box. According to Ayden, his least favorite activities are reading independently and completing social studies homework, although Ms. Murphy reported that Ayden enjoys reading with his family. Ayden also likes going to the park, movies, and out to eat. Ayden attends Operation Exodus, which is an after-school program designed to help him complete his homework and explore various educational activities.

Table 1.2 DOTI Form for Ayden Murphy With Primary Data Only

CHC Cognitive/Academic Ability or Processing Domain	Normative Weakness and Information About Intervention	Within Normal Limits	Normative Strength and Information About Intervention
Fluid Reasoning (Gf)		Fluid Reasoning Factor = 88 ± 4	
Target for Intervention?			
Crystallized Intelligence (Gc)		Comprehension-Knowledge Factor = 95 ± 4	
Target for Intervention?			
Long-Term Storage and Retrieval (Glr)	Long-Term Storage and Retrieval Factor = 77 ± 5		
Target for Intervention?			
Short-Term Memory (Gsm)		Short-Term Memory Factor = 96 ± 6	
Target for Intervention?			
Visual Processing (Gv)		Visual Processing Factor = 107 ± 4	
Target for Intervention?			
Auditory Processing (Ga)	Auditory Processing Factor = 72 ± 5		
Target for Intervention?			
Processing Speed (Gs)	Processing Speed Factor = 84 ± 4		
Target for Intervention?			
Reading (Grw-R)	Passage Comprehension = 70 ± 5 Reading Fluency = $83 \pm$	Letter-Word Identification = 90 ± 4	
Type of Skill Targeted			
Writing (Grw-W)	Writing Samples = 74 ± 6	Spelling = 87 ± 5 Writing Fluency = 95 ± 5	
Type of Skill Targeted			
Mathematics (Gq)	Applied Problems = 81 ± 4 Fluency = 80 ± 4	Calculation = 107 ± 4	
Type of Skill Targeted			

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Table 1.2 (Continued)

CHC Cognitive/Academic Ability or Processing Domain	Normative Weakness and Information About Intervention	Within Normal Limits	Normative Strength and Information About Intervention
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Other**Target for Intervention?**

Note: Cognitive and Academic standard scores are from the WJ III NU COG and ACH batteries (Woodcock, McGrew, & Mather, 2001, 2007), unless otherwise noted. Use the following guidelines for identifying strengths and weaknesses: Normative Weakness is defined by standard scores that are about one standard deviation or more below the mean; Normative Strength is defined by standard scores that are about one standard deviation or more above the mean; within normal limits is defined by standard scores that fall between ± 1 SD of the normative mean (i.e., standard scores between 85 and 115). If a cognitive domain is targeted for intervention, note whether it is targeted for Modification to Instruction/Curriculum (**M**), Accommodation (**A**), Remediation (**R**), or Compensation (**C**). When there is a need to target an academic area for intervention, note the type of skill targeted as either a Basic (or foundational) skill (**B**), Fluency (**F**), or a Higher-level (or applied) skill (**H**).

Step 2: Determine Whether Academic Weaknesses Are Empirically Related to the Cognitive Weaknesses by Reviewing the Research on the Relations among Specific Cognitive Abilities, Neuropsychological Processes, and Academic Skills

In the initial step of SMAARTI, data were organized by CHC domain and normative strengths and weaknesses were identified. Prior to making classifications or diagnostic decisions and tailoring interventions, however, it is important to examine the relations among cognitive abilities, neuropsychological processes, and specific academic skills for the following reasons. First, information on cognitive-achievement relationships assists in interpreting the data entered on the DOTI form. Second, because specific learning disabilities are caused by underlying cognitive processing weaknesses, knowing the cognitive correlates of manifest academic difficulties assists in diagnosis (e.g., Flanagan, Alfonso, & Ortiz, 2012; Flanagan et al., 2013). Third, when empirical data are available to support a relationship between identified areas of cognitive and academic weaknesses, interventions designed to remediate academic skill deficits can be tailored in an attempt to minimize the effects of cognitive weaknesses on learning. Thus, in this step, practitioners should examine the information in Rapid Reference 1.4 to determine if identified cognitive and academic weaknesses are related empirically.

Rapid Reference 1.4 Summary of Relations Between CHC Broad and Narrow Cognitive Abilities and Reading, Math, and Writing Achievement

	Reading Achievement	Math Achievement	Writing Achievement
Gf	Inductive (I) and general sequential reasoning (RG) abilities play a moderate role in reading comprehension .	Inductive (I) and general sequential (RG) reasoning abilities are consistently very important for math problem solving at all ages.	Inductive (I) and general sequential reasoning abilities (RG) are consistently related to written expression at all ages.
Gc	Language development (LD), lexical knowledge (VL), and listening ability (LS) are important at all ages. These abilities become increasingly important with age.	Language development (LD), lexical knowledge (VL), and listening abilities (LS) are important at all ages. These abilities become increasingly important with age.	Language development (LD), lexical knowledge (VL), and general information (KO) are important primarily after about the second grade. These abilities become increasingly important with age.
Gsm	Memory span (MS) and working memory (WM) capacity.	Memory span (MS) and working memory (WM) capacity.	Memory span (MS) is important to writing, especially spelling skills, whereas working memory (WM) has shown relations with advanced writing skills (e.g., written expression).
Gv	Orthographic Processing— reading fluency	May be important primarily for higher level or advanced mathematics (e.g., geometry, calculus).	Orthographic Processing—spelling (continued)

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Ga	Phonetic coding (PC) or “phonological awareness/processing” is very important during the elementary school years.		Phonetic coding (PC) or “phonological awareness/processing” is very important during the elementary school years for both basic writing skills and written expression (primarily before about grade 5).
Glr	Naming facility (NA) or “rapid automatic naming” is very important during the elementary school years. Associative memory (MA) is also important.	Naming facility (NA); associative memory (MA)	Phonetic coding (PC) or “phonological awareness/processing” is very important during the elementary school years for both basic writing skills and written expression (primarily before about grade 5).
Gs	Perceptual speed (P) abilities are important during all school years, particularly the elementary school years.	Perceptual speed (P) abilities are important during all school years, particularly the elementary school years.	Perceptual speed (P) abilities are important during all school years for basic writing and related to all ages for written expression.

Research on the relations among cognitive abilities, neuropsychological processes, and specific academic skills has mounted over the years (see Flanagan, Ortiz, Alfonso, & Mascolo, 2006; Flanagan, Alfonso, & Mascolo, 2011; Fletcher, Lyon, Fuchs, & Barnes, 2007; and McGrew & Wendling, 2010, for summaries). Much of the recent research on cognitive-academic relationships has been interpreted within the context of CHC theory (e.g., Flanagan et al., 2011) and with specific instruments developed from CHC theory (e.g., McGrew & Wendling, 2010). In addition, statistical analyses, such as structural equation modeling, have been used to understand the extent to which specific cognitive abilities explain variance in academic skills above and beyond the variance accounted for by *g* (e.g., Floyd et al., 2008; McGrew, Flanagan, Keith, & Vanderwood, 1997; Juarez, 2012; Vanderwood, McGrew, Keith, & Flanagan, 2001). Finally, many valuable resources summarize the research on cognitive and neurobiological processes associated with specific academic skill deficits (e.g., Feifer & Della Toffalo, 2007; Flanagan

& Alfonso, 2011; Fletcher-Janzen & Reynolds, 2008; Fletcher et al., 2007; Hale & Fiorello, 2004; Miller, 2010, 2013).

The research summarized in Rapid Reference 1.4 includes primarily studies on the relations among the various CHC broad and narrow cognitive abilities and specific neuropsychological processes and the major areas of achievement—namely, reading, math, and writing. Rapid Reference 1.4 shows that narrow abilities subsumed by Gc (lexical knowledge, language development, listening ability, general information), Gsm (memory span, working memory capacity), Ga (phonetic coding), Glr (associative memory, meaningful memory, naming facility), and Gs (perceptual speed) were found to be significantly and most consistently related to reading achievement. Similarly, narrow abilities within these same broad abilities were found to be related to writing achievement. Narrow abilities within the areas of Gf, Gc, Gsm, Glr, and Gs were found to relate significantly to math achievement, with Gf (induction and general sequential reasoning) showing a stronger relation to this academic area than either reading or writing.

A review of Ayden's DOTI form (Table 1.2) shows three areas of cognitive deficit and areas of academic skill deficiency in reading, math, and writing. Based on the information summarized in Rapid Reference 1.4, it appears that there is an empirically supported relationship between Ayden's cognitive weakness in Gs and his academic fluency in reading and math. There also seems to be an empirically supported relationship between his weakness in Ga (viz., the narrow Phonetic Coding ability) and his spelling ability and reading fluency (i.e., inefficient phonetic strategies slows down reading, thereby interfering with comprehension). Finally, Ayden has weaknesses in both the learning efficiency and retrieval fluency aspects of Glr, both of which are empirically related to higher level application of basic academic skills. Ayden's deficit in Glr and relative weakness in Gf together affect reading comprehension, math problem solving, and written expression adversely.

Step 3: Review Manifestations of Cognitive Weaknesses and Organize Secondary Data, Identify Initial Targets for Intervention, and Identify Types of Academic Skill Deficits for Remediation Using the DOTI Form

Once empirically established relations between cognitive and academic areas are identified, practitioners should consult Rapid References 1.5 to 1.13 to determine whether the identified cognitive-academic relationships are ecologically valid. These rapid references will prove particularly useful when organizing secondary data in the DOTI form. Secondary data include any information that can relate potentially to a specific aspect of the student's cognitive functioning that was not already included as primary data. Such information might include data obtained

Rapid Reference 1.5 General and Specific Manifestations of Fluid Reasoning (Gf) Weaknesses

CHC Broad Cognitive Abilities/Neuropsychological Functions

Fluid Reasoning (Gf)

Novel reasoning and problem solving; ability to solve problems that are unfamiliar.
 Processes are minimally dependent on prior learning.
 Involves manipulating rules, abstracting, generalizing, and identifying logical relationships.
 Fluid reasoning is evident in inferential reasoning, concept formation, classification of unfamiliar stimuli, categorization, and extrapolation of reasonable estimates in ambiguous situations (Schneider & McGrew, 2012).
 Narrow Gf abilities include Induction, General Sequential Reasoning (Deduction), and Quantitative Reasoning.

Brief Definition

General Manifestations of Cognitive/Neuropsychological Weakness

Difficulties with:

Higher-level thinking and reasoning
 Transferring or generalizing learning
 Deriving solutions for novel problems
 Extending knowledge through critical thinking
 Perceiving and applying underlying rules or process(es) to solve problems

Specific Manifestations of Cognitive/Neuropsychological Weakness

Reading Difficulties:

Drawing inferences from text
 Abstracting main idea(s)

Math Difficulties:


Reasoning with quantitative information (word problems)
 Internalizing procedures and processes used to solve problems
 Apprehending relationships between numbers

Writing Difficulties:

Essay writing and generalizing concepts
 Developing a theme
 Comparing and contrasting ideas

Rapid Reference 1.6 General and Specific Manifestations of Crystallized Intelligence (Gc) Weaknesses

CHC Broad Cognitive Abilities/Neuropsychological Functions	Brief Definition	General Manifestations of Cognitive/Neuropsychological Weakness	Specific Manifestations of Cognitive/Neuropsychological Weakness
Crystallized Intelligence (Gc)	Breadth and depth of knowledge and skills that are valued by one's culture. Developed through formal education as well as general learning experiences. Stores of information and declarative and procedural knowledge. Reflects the degree to which a person has learned practically useful knowledge and mastered valued skills (Schneider & McGrew, 2012). Narrow Gc abilities include General Verbal Information, Language Development, Lexical Knowledge, Listening Ability, Information about Culture, Communication Ability, and Grammatical Sensitivity.	Difficulties with: Vocabulary acquisition Knowledge acquisition Comprehending language or understanding what others are saying Fact-based/informational questions Using prior knowledge to support learning Finding the right words to use/say	Reading Difficulties: Decoding (e.g., word student is attempting to decode is not in his/her vocabulary) Comprehending (e.g., poor background knowledge about information contained in text) Math Difficulties: Understanding math concepts and the "vocabulary of math" Writing Difficulties: Grammar (syntax) Bland writing with limited descriptors Verbose writing with limited descriptors Inappropriate word usage Language Difficulties: Understanding class lessons Expressive language—"poverty of thought"

 **Rapid Reference 1.7 General and Specific Manifestations of Auditory Processing (Ga) Weaknesses**

CHC Broad Cognitive Abilities/ Neuropsychological Functions	Brief Definition	General Manifestations of Cognitive/ Neuropsychological Weakness	Specific Manifestations of Cognitive/ Neuropsychological Weakness
Auditory Processing (Ga)	<p>Ability to analyze and synthesize auditory information.</p> <p>One narrow aspect of Ga is a precursor to oral language comprehension (i.e., parsing speech sounds or Phonetic Coding).</p> <p>In addition to Phonetic Coding, other narrow Ga abilities include Speech Sound Discrimination, Resistance to Auditory Stimulus Distortion, Memory for Sound Patterns (and others related to music).</p>	<p>Difficulties with:</p> <ul style="list-style-type: none"> Hearing information presented orally, initially processing oral information Paying attention especially in the presence of background noise Discerning the direction from which auditory information is coming Discriminating between simple sounds Foreign-language acquisition 	<p>Reading Difficulties:</p> <ul style="list-style-type: none"> Acquiring phonics skills Sounding out words Using phonetic strategies <p>Math Difficulties:</p> <ul style="list-style-type: none"> Reading word problems <p>Writing Difficulties:</p> <ul style="list-style-type: none"> Spelling Note-taking Poor quality of writing

Rapid Reference 1.8 General and Specific Manifestations of Long-Term Storage and Retrieval (Glr) Weaknesses


CHC Broad Cognitive Abilities/Neuropsychological Functions	Brief Definition	General Manifestations of Cognitive/Neuropsychological Weakness	Specific Manifestations of Cognitive/Neuropsychological Weakness
Long-Term Storage and Retrieval (Glr)	<p>Ability to store information (e.g., concepts, words, facts), consolidate it, and fluently retrieve it at a later time (e.g., minutes, hours, days, and years) through association.</p> <p>In Glr-tasks, information leaves immediate awareness long enough for the contents of primary memory to be displaced completely. In other words, Glr-tasks (unlike Gsm tasks) do not allow for information to be maintained continuously in primary memory (Schneider & McGrew, 2012).</p> <p>Glr abilities may be categorized as either "learning efficiency" or "fluency." Learning efficiency narrow abilities include Associative Memory, Meaningful Memory, and Free Recall Memory; fluency narrow abilities involve either the production of ideas (e.g., Ideational Fluency, Associational Fluency), the recall of words (e.g., Naming Facility, Word Fluency), or the generation of figures (e.g., Figural Fluency, Figural Flexibility) (Schneider & McGrew, 2012).</p>	<p>Difficulties with:</p> <ul style="list-style-type: none"> Learning new concepts Retrieving or recalling information by using association Performing consistently across different task formats (e.g., recognition versus recall formats) Rapid retrieval of information Learning information quickly Paired learning (visual-auditory) Recalling specific information (words, facts) Generating ideas rapidly 	<p>Reading Difficulties:</p> <ul style="list-style-type: none"> Accessing background knowledge to support new learning while reading Slow to access phonological representations during decoding Retelling or paraphrasing what one has read <p>Math Difficulties:</p> <ul style="list-style-type: none"> Memorizing math facts Recalling math facts and procedures <p>Writing Difficulties:</p> <ul style="list-style-type: none"> Accessing words to use during essay writing Specific writing tasks (compare and contrast; persuasive writing) Note-taking Idea generation/production <p>Language Difficulties:</p> <ul style="list-style-type: none"> Expressive—circumlocutions, speech fillers, "interrupted" thought, pauses Receptive—making connections throughout oral presentations (e.g., class lecture)

Rapid Reference 1.9 General and Specific Manifestations of Processing Speed (Gs) Weaknesses

CHC Broad Cognitive Abilities/ Neuropsychological Functions	Brief Definition	General Manifestations of Cognitive/ Neuropsychological Weakness	Specific Manifestations of Cognitive/ Neuropsychological Weakness
Processing Speed (Gs)	<p>Speed of processing, particularly when required to focus attention for 1–3 minutes.</p> <p>Usually measured by tasks that require the ability to perform simple repetitive cognitive tasks quickly and accurately.</p> <p>Narrow Gs abilities include Perceptual Speed, Rate-of-Test-Taking, Number Facility, Reading Speed, and Writing Speed (note that the latter two abilities are also listed under other broad CHC domains, including Grw).</p>	<p>Difficulties with:</p> <ul style="list-style-type: none"> Efficient processing of information Quickly perceiving relationships (similarities and differences) between stimuli or information) Working within time parameters Completing simple, rote tasks quickly 	<p>Reading Difficulties:</p> <ul style="list-style-type: none"> Slow reading speed, which interferes with comprehension Need to reread for understanding <p>Math Difficulties:</p> <ul style="list-style-type: none"> Automatic computations Computational speed is slow despite accuracy Slow speed can result in reduced accuracy due to memory decay <p>Writing Difficulties:</p> <ul style="list-style-type: none"> Limited output due to time factors Labored process results in reduced motivation to produce <p>Language Difficulties:</p> <ul style="list-style-type: none"> Cannot retrieve information quickly—slow, disrupted speech; cannot get out thoughts quickly enough Is slow to process incoming information, puts demands on memory store that can result in information overload and loss of meaning

Rapid Reference 1.10 General and Specific Manifestations of Visual Processing (Gv) Weaknesses

CHC Broad Cognitive Abilities/ Neuropsychological Functions	Brief Definition	General Manifestations of Cognitive/ Neuropsychological Weakness	Specific Manifestations of Cognitive/ Neuropsychological Weakness
Visual Processing (Gv)	<p>Ability to analyze and synthesize visual information.</p> <p>The ability to make use of simulated mental imagery (often in conjunction with currently perceived images) to solve problems (Schneider & McGrew, 2012).</p> <p>There are many narrow Gv abilities, some of which include Visualization, Speeded Rotation, Closure Speed, Flexibility of Closure, Visual Memory, and Spatial Scanning.</p>	<p>Difficulties with:</p> <ul style="list-style-type: none"> Recognizing patterns Reading maps, graphs, charts Attending to fine visual detail Recalling visual information Appreciation of spatial characteristics of objects (e.g., size, length) Recognition of spatial orientation of objects 	<p>Reading Difficulties:</p> <ul style="list-style-type: none"> Orthographic coding (using visual features of letters to decode) Sight-word acquisition Using charts and graphs within a text in conjunction with reading Comprehension of text involving spatial concepts (e.g., social studies text describing physical boundaries, movement of troops along a specified route) <p>Math Difficulties:</p> <ul style="list-style-type: none"> Number alignment during computations Reading and interpreting graphs, tables, and charts <p>Writing Difficulties:</p> <ul style="list-style-type: none"> Spelling sight words Spatial planning during writing tasks (e.g., no attention to margins, words that overhang a line) Inconsistent size, spacing, position, and slant of letters

 *Rapid Reference 1.1.1 General and Specific Manifestations of Short-Term Memory (Gsm) Weaknesses*

CHC Broad Cognitive Abilities/ Neuropsychological Functions	Brief Definition	General Manifestations of Cognitive/ Neuropsychological Weakness	Specific Manifestations of Cognitive/ Neuropsychological Weakness
Short-Term Memory (Gsm)	Ability to hold information in immediate awareness and use or transform it within a few seconds.	<p>Difficulties with:</p> <ul style="list-style-type: none"> Following multistep oral and written instructions Remembering information long enough to apply it Remembering the sequence of information Rote memorization Maintaining one's place in a math problem or train of thought while writing 	<p>Reading Difficulties:</p> <ul style="list-style-type: none"> Reading comprehension (i.e., understanding what is read) Decoding multisyllabic words Orally retelling or paraphrasing what one has read <p>Math Difficulties:</p> <ul style="list-style-type: none"> Rote memorization of facts Remembering mathematical procedures Multistep problems and regrouping Extracting information to be used in word problems <p>Writing Difficulties:</p> <ul style="list-style-type: none"> Spelling multisyllabic words Redundancy in writing (word and conceptual levels) Identifying main idea of a story Note-taking

 *Rapid Reference 1.12 General and Specific Manifestations of Attention Weaknesses and Examples of Recommendations and Interventions*

CHC Broad Cognitive Abilities/Neuropsychological Functions	Brief Definition	General Manifestations of Cognitive/ Neuropsychological Weakness	Specific Manifestations of Cognitive/ Neuropsychological Weakness
Attention	<p>Attention is a complex and multifaceted construct used when an individual must focus on certain stimuli for information processing. In order to regulate thinking and to complete tasks of daily living such as schoolwork, it is necessary to be able to attend to both auditory and visual stimuli in the environment. Attention can be viewed as the foundation of all other higher-order processing. Attention can be divided into five subareas: selective/focused attention, shifting attention, divided attention, sustained attention, and attentional capacity (Miller, 2013).</p> <p>It is important to identify the exact nature of the attentional problem(s) prior to selecting an intervention, teaching strategies, modifying the curriculum, or making accommodations.</p>	<p>Easily distracted Lacks attention to detail; makes careless mistakes Difficulty discerning demands of a task (e.g., where to begin or how to get started) May only be able to attend to task in short intervals Difficulty changing activities Difficulty applying a different strategy when task demands change Difficulty attending to more than one thing or task at a time Cannot perform well when faced with multiple stimuli or an abundance of detail</p>	<p>Reading Difficulties: Loses his or her place easily Easily distracted while reading Does not pick up important details in text</p> <p>Math Difficulties: Does not consistently attend to math signs Frequent mistakes on word problems</p> <p>Writing Difficulties: Has difficulty completing long assignments; difficulty following timelines</p>

Rapid Reference 1.13 General and Specific Manifestations of Executive Functioning Weaknesses and Examples of Recommendations and Interventions

CHC Broad Cognitive Abilities/Neuropsychological Functions	Brief Definition	General Manifestations of Cognitive/Neuropsychological Weakness	Specific Manifestations of Cognitive/Neuropsychological Weakness
<p>Executive Functioning</p>	<p>Executive functioning is often understood as two broadly conceptualized areas that are related to the brain's frontal lobes: cognitive control and behavioral/emotional control. The cognitive aspects of executive functioning include concept generation (Gc/Glr); problem solving (Gf); attentional shifting (attention; Gs); planning; organizing; working memory (Gsm); and retrieval fluency (Glr). The behavioral/emotional aspects of executive functioning relate to the inhibitory controls of behavior (e.g., impulsivity, regulation of emotional tone, etc.) (see Miller, 2010).</p>	<p>Difficulty with: Learning new activities, generating concepts, and solving problems Identifying goals and setting goals Planning (e.g., begins project without necessary materials; does not allocate sufficient time to complete task) Sequencing (e.g., may skip steps in multistep problems) Prioritizing (e.g., not sure what's important when taking notes) Organization (e.g., loses important papers; fails to turn in completed work; creates unrealistic schedule) Initiation (e.g., has difficulty getting started on tasks, assignments, etc.) Pace (e.g., often runs out of time on seatwork and exams; has difficulty completing homework due to unrealistic timeline) Shifting between activities flexibly; coping with unforeseen events Self-monitoring (e.g., doesn't check to insure that each step was completed; doesn't check work before submitting it) Emotional control (e.g., may exhibit inappropriate or over-reactive response to situations)</p>	<p>Reading Difficulties: Sequencing; telling a story chronologically Prioritizing; extracting main idea and other important information Problem solving; drawing inferences from text</p> <p>Math Difficulties: Sequencing; remembering order of operations Prioritizing; figuring out what is important when solving word problems Shifting; attending to math signs on a page</p> <p>Writing Difficulties: Generating ideas to write about Sequencing a story Prioritizing main events in a story</p>

Source: Adapted from Leslie E. Packer (Schoolbehavior.com); see also Packer and Pruitt's book, *Challenging Kids, Challenged Teachers* (Woodbine Press, 2010).

via observation, rating scales, record reviews, work sample analysis, and/or interviews. For example, if a mother reports, in a parent intake interview, that her son has *difficulty remembering* to take necessary items to a recurring event (e.g., soccer practice), this information can be considered secondary data and recorded in the Gsm section, given its potential relationship to memory. Similarly, if a mother reports that her daughter is highly anxious during essay exams, this information may be recorded in the Glr section, given that anxiety may interfere with retrieval of learned information.

To help build a knowledge base about the general and specific ways in which cognitive weaknesses manifest in real-world performance, particularly academic performances, Flanagan and colleagues (2013) developed Rapid References 1.5 to 1.13. These rapid references describe ways in which deficits in broad CHC abilities manifest in real-world performance (e.g., classroom activities). Rapid References 1.12 and 1.13 describe manifestations of deficits in attention and executive functions, respectively. It is important to note that these rapid references do not represent an exhaustive list of manifestations. Rather, they assist practitioners in extending their thinking beyond standardized test scores by considering how cognitive deficits impact learning in multiple settings (e.g., classroom and home).

Rapid References 1.5 to 1.13 are organized into four columns. For example, Rapid Reference 1.5 shows that the first column, “CHC Broad Cognitive Abilities/Neuropsychological Functions,” identifies a CHC broad cognitive ability or neuropsychological process, in this case, Fluid Reasoning (Gf). The second column, “Brief Definition,” provides a brief definition of the broad ability or process along with a list of narrow abilities subsumed by the broad ability. The third column, “General Manifestations of Cognitive/Neuropsychological Weakness,” lists the types of difficulties that can be expected to manifest generally when there is a weakness in the cognitive domain. For example, difficulties with higher level thinking, problems with generalizing learning, and difficulty with rule application during problem solving may be evident when an individual has a weakness in Gf. “Specific Manifestations of Cognitive/Neuropsychological Weaknesses” are listed in the fourth column and typically center on the types of difficulties that may be seen in specific academic domains (e.g., reading, writing, math). Rapid Reference 1.5 shows that individuals with a weakness in Gf may have difficulties drawing inferences from text (reading comprehension), apprehending relationships between numbers (math application), and developing a theme when writing (written expression), to name a few.

When secondary data sources reveal that cognitive deficits manifest in specific academic areas as expected based on the information in Rapid References 1.5 to 1.13, the empirically supported cognitive-academic relationships have ecological

validity, which is critical for tailoring interventions effectively. *Ecological validity* refers to “the relation between real-world phenomena and the investigation of these phenomena in experimental contexts” (Shmuckler, 2001, p. 420). In SMAARTI, this relationship is akin to an empirically supported below-average cognitive-achievement consistency, where the relationship is supported by real-world manifestations—an important marker for specific learning disability identification (see Flanagan et al., 2013).

It is important to keep in mind that secondary data need not be consistent with standardized test results (i.e., primary data) to be included in the DOTI form. That is, while convergence among data sources provides ecological validity for standardized test findings, a lack of convergence calls into question the validity of the primary data, which is equally important and suggests a need to evaluate the primary data more carefully (e.g., approach to tasks, sufficiency of evaluation, malingering). It is also important to realize that even when secondary data converge as expected with primary data, such as in the example of the boy who repeatedly forgot his soccer gear, alternative hypotheses may also be tested. For example, rather than a Gsm deficit, this student may have difficulties with attention or organization—characteristics that may warrant a different approach to intervention as compared to a Gsm deficit.

Additional secondary data may include information obtained via a work sample analysis, parent–teacher interviews, observations, error analysis, or records review (e.g., report cards, classroom tests, teacher notes/comments). For example, if a practitioner reviewed several math tests with low scores, the scores may be entered in the Quantitative Knowledge (Gq) domain in the normative weakness column (e.g., “math quiz 3/10/13—score 63; math quiz 4/2/13—score 59”). Similarly, practitioner comments from work sample analysis may be included (e.g., “10 spelling errors out of a 25-word writing sample” may be entered for the Writing domain [Grw-W] in the normative weakness column).

Table 1.3 shows that secondary data in the form of parent and teacher reports about Ayden’s academic performance converge with standardized test data in the areas of Glr, Ga, and Gs. For example, Ayden’s teacher reported that he has difficulty working within time limits and his mother reported that he is slow to complete his homework. Both of these reports are consistent with his observed weakness in the cognitive area of Gs, thus providing ecological validity evidence for the observed Gs deficit. Table 1.3 also shows that Ayden’s teacher indicated that he does better on multiple-choice tests as compared to essay tests. Such an observation is consistent with an individual with Glr difficulties, as essay tests require recall of information, whereas multiple choice tests require recognition, thereby minimizing the demands on Glr.

As shown in Table 1.3, the DOTI form also provides space for practitioners to hypothesize about the cognitive and academic areas that may need to be targeted for intervention. For example, when it is hypothesized that a cognitive domain should be targeted for intervention, then the practitioner should make a note of whether he or she believes the intervention should focus on *Modification* (instructional or curricular), *Accommodation*, *Remediation*, *Compensation*, or some combination thereof, using the letters *M*, *A*, *R*, and *C*, respectively. For young children in particular, when academic weaknesses are found, intervention is primarily of the remedial type. While cognitive weaknesses should also be targeted for remediation in young children given brain plasticity (e.g., Fletcher-Janzen & Reynolds, 2008), depending on the area of weakness, young children may also need modifications to instruction, for example, to minimize the effect of the cognitive weakness, thereby allowing greater access to the curriculum. Worthy of note is that identification of strengths assists in determining what interventions may circumvent or limit the impact of a weakness.

Table 1.3 shows that Ayden's Gs deficit was a target for intervention. Specifically, the evaluator hypothesized that it may be necessary to make accommodations for Ayden's Gs deficit as well as make modifications to instruction or the curriculum in an attempt to minimize the effects of this deficit.

When it is determined that an academic weakness should be targeted for intervention, then the practitioner should make a note of the type of skill that is targeted for remediation. For example, the practitioner can use the letters *B*, *F*, and *H* to designate the skill as either a *Basic* (or foundational) skill, a *Fluency* skill, or a *Higher* level (applied) skill, respectively. A deficit in a foundational skill suggests a need for basic skill building via explicit teaching designed to remediate the weakness (e.g., teaching a student how to subtract double-digit numbers). A fluency deficit suggests that basic skills, while present, are not automatic. Therefore, fluency deficits suggest the need for practice. When fluency deficits exist, it is important to examine whether the use of inefficient strategies may be interfering with the development of fluency (e.g., finger counting). Difficulties with higher level application of skills (e.g., reading comprehension, math problem solving, written expression) can be directly related to lower level deficits or they can reflect a breakdown in the student's ability to analyze or synthesize skills within an academic domain to problem solve or otherwise demonstrate higher

CAUTION

Cognitive deficit may not manifest in a specific academic area.

Table 1.3 DOTI Form for Ayden Murphy with Primary and Secondary Data

CHC Cognitive/Academic Ability or Processing Domain	Normative Weakness and Information About Intervention	Within Normal Limits	Normative Strength and Information About Intervention
Fluid Reasoning (Gf)	Fluid Reasoning Factor = 88 ± 4 Teacher Report: sometimes has difficulty generalizing what he has learned		
Target for Intervention? Crystallized Intelligence (Gc)	C (Compensation) Comprehension-Knowledge = 95 ± 4		
Target for Intervention? Long-Term Storage and Retrieval (Glr)	Long-Term Storage and Retrieval = 77 ± 5 Teacher Report: seems to do better on multiple-choice tests as compared to essays; difficulty remembering previously taught information Parent Report: spends hours studying—more than his friends; often has difficulty getting out what he wants to say		
Target for Intervention?	M (Modification) A (Accommodation) C (Compensation)		
Short-Term Memory (Gsm)		Short-Term Memory = 96 ± 6	
Target for Intervention? Visual Processing (Gv)		Visual Processing = 107 ± 4 TOC Orthographic Ability = 103 ± 3	

Teacher Report: seems to do better with visual information (e.g., charts and graphs in math and science)
Ayden: “I love to draw.”
 Emphasize in program planning to the extent possible

Target for Intervention?

Auditory Processing (Ga)

Auditory Processing = 72 ± 5

Reading Specialist: does not use phonetic strategies consistently; relies more on visual features and contextual cues to decode

Teacher Report: mishears words frequently

R (Remediation)

Processing Speed = 84 ± 4

Teacher Report: has difficulty working within time limits

Parent Report: takes a long time to complete homework

A (Accommodation)

M (Modification)

Target for Intervention?

Reading (Grw-R)

Passage Comprehension = 70 ± 5

Teacher Report: has difficulty retelling what he has read for monthly book reports

Reading Fluency = 83 ± 5

Reading Specialist and School Psychologist Observation: oral reading is slow and laborious

Ayden: “I can’t read fast.”

H (Higher Level Application)

F (Fluency)

Type of Skill Targeted

Writing (Grw-W)

Writing Samples = 74 ± 6

Teacher Report: does not use vocabulary words in writing assignments; note-taking is difficult for him—verbatim note-taking as opposed to paraphrasing

Letter-Word Identification = 90 ± 4

Spelling = 87 ± 5

Writing Fluency = 95 ± 5

Table 1.3 (Continued)

CHC Cognitive/Academic Ability or Processing Domain	Normative Weakness and Information About Intervention	Within Normal Limits	Normative Strength and Information About Intervention
Type of Skill Targeted Mathematics (Gq)	<p>H (Higher Level Application) Applied Problems = 81 ± 4 Parent and Teacher Reports: difficulty with word problems Fluency = 80 ± 4 Teacher Report: slow but accurate Classroom Tests: Grade of "D" on all Mad Math Minutes</p>	<p>B (Basic Skill) - spelling Calculation = 107 ± 4</p>	
Type of Skill Targeted Other	<p>H (Higher Level Application) Ayden has recently begun to avoid reading for pleasure and seems to be developing anxiety related to reading aloud in school</p>		<p>Ayden is highly motivated to learn and puts forth considerable effort in all educational activities; does well with hands-on activities Capitalize on his motivation and incorporate interests into remedial activities</p>
Target for Intervention?			

level thinking. Students who have difficulty with higher level skills often respond well to instructional aids and techniques such as graphic organizers, modeling, and procedural mnemonics.

Step 4: Consider Tertiary Data, Which Are Comprised of Information About Factors That Affect Learning and Achievement and That Are Largely External to the Student (i.e., Extrinsic)

At this step of SMAARTI, practitioners already have a good understanding of the nature of the student's learning difficulties based on primary and secondary data sources. However, additional data most likely need to be considered for tailoring interventions to meet a student's unique learning needs. Four categories of tertiary data, meaning data that are largely external to the student, should be considered prior to tailoring interventions, namely classroom instruction, instructional materials, environment, and strategies. A brief description of each category follows.

With regard to *classroom instruction*, practitioners should consider how factors such as pacing of instruction, timing and nature of feedback, responsiveness to students' questions, and quality of student-teacher interaction, for example, affect learning and achievement for the student in question. *Instructional materials* include the tools of teaching with which the student directly interacts and includes such things as textbooks, workbooks, electronic media (software programs, applications), and consumables (e.g., worksheets). Attention to instructional materials may assist in identifying factors that can inhibit learning (e.g., small font embedded in most graphics for a student with a visual perceptual difficulty, a large amount of text, visuals, and callouts on a page for a student with attention difficulties) or facilitate learning (e.g., use of an audio glossary on a published textbook's website to assist a student with weaknesses in vocabulary, phonemic awareness, and basic decoding skills). Factors in the home or school environment may also exacerbate or minimize the impact of a student's cognitive weaknesses and, therefore, should be considered carefully. Relevant *environmental* factors refer to the student's classroom or home physical space, including desk arrangements (student's and teacher), room acoustics, environmental noise, lighting, temperature, use of resources (e.g., classroom learning aids such as posters, word walls), and classroom/home displays (e.g., homework board, bulletin boards of student work). Finally, *strategies* include any method or plan that is explicitly taught to or used by the student in an effort to compensate for cognitive weaknesses or deficits, thereby facilitating learning and achievement. Data relevant to each of these categories are gathered typically via classroom observations and teacher/parent/student interviews.

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It is important to realize that most classroom observations and interviews are conducted prior to a comprehensive evaluation. Therefore, during an initial classroom observation or interview, the practitioner is not necessarily primed to gather tertiary data in an effort to determine what factors might facilitate learning or exacerbate learning difficulties because the specific nature and presumptive cause of the learning problem are not yet known or understood well. As such, it may be necessary to conduct additional classroom observations or interviews after the practitioner has a more complete understanding of the various and specific presumed causes of the student's learning difficulties. Moreover, it is likely that most practitioners are not very familiar with the instructional materials used by the teacher and student (e.g., textbooks, electronic media, worksheets) and, therefore, they are not in a position to give guidance on how certain features of instructional material may facilitate learning for a student. Therefore, practitioners should make an effort to familiarize themselves with relevant instructional materials.

Rapid References 1.14 to 1.20 include information, organized according to the four categories described earlier, that will assist practitioners in gathering tertiary data and considering these data for the purpose of tailoring interventions for students with specific cognitive weaknesses or deficits. There is one rapid reference for each of seven broad CHC cognitive abilities. For example, Rapid Reference 1.17 includes recommendations for a student like Ayden, whose learning difficulties are affected adversely by a deficit in Long-term Storage and Retrieval. To ensure that the adverse effects that a Glr weakness has on learning are minimized, the practitioner should consult this rapid reference to gain knowledge about how to intervene and tailor instruction for Ayden. Furthermore, when reviewing the information in this rapid reference, the practitioner should consider factors and strategies that capitalize on a student's area of relative strength. For example, Ayden has a relative strength in Visual Processing (Gv). Therefore, relevant recommendations include pairing verbal information with visuals, organizing materials to be learned using visual aids, and providing visual reminders (Post-its, color-coded systems). It is important to note that the information contained in Rapid References 1.14 to 1.20 is not meant to be exhaustive. For more information about recommendations for students with cognitive ability and processing weaknesses or deficits, see the other chapters in this book or other relevant resources (e.g., Mather & Jaffe, 2002). Copies of Rapid References 1.14 to 1.20 may be downloaded from the CD that accompanies this book.

Rapid Reference 1.14 Recommendations That May Facilitate Learning and Aid in Bypassing or Minimizing the Effects of a Fluid Reasoning (Gf) Deficit

Classroom Instruction	Instructional Materials	Environmental	Strategies
Use demonstrations to externalize the reasoning process (think-alouds)	Expanded answer keys containing the "reason" for correct/incorrect choices	Problem-solving charts (hanging or taped to desk)	Use metacognitive strategies (mnemonics that are memorable and that accurately represent the learning task)
Gradually offer guided practice (e.g., guided questions list) to promote internalization of procedures or process(es)	Guided lists for implementing procedures, formulas	Procedural charts/lists (hanging or taped to desk)	Use tools that help them categorize objects and concepts to assist in drawing conclusions (e.g., graphic organizers, concept maps)
Offer targeted, explicit feedback	Models/examples	Preferred seating arrangements that provide easy access to a peer model with strong reasoning skills (e.g., for cooperative learning activities)	Listen to and separate the steps in completing a problem from the actual content used in a problem
Offer opportunities for learning formats that allow for reasoning to be modeled for the student (e.g., cooperative learning, reciprocal teaching)	Text features (boldface, italics)		
Compare new concepts to previously learned concepts (same vs. different)	Graphic organizers that allow for a visual depiction of relationships between and among concepts		
Use analogies, similes, metaphors, paired with concrete explanations, to support understanding when presenting tasks (e.g., "We are going to learn our math facts with <i>lightning speed</i> ; that means we are going to learn them <i>fast</i> !")	Manipulatives to demonstrate relationships (e.g., part to whole relationships)		

Rapid Reference 1.15 Factors That May Facilitate Learning and Aid in Bypassing or Minimizing the Effects of a Crystallized Intelligence (Gc) Deficit

Classroom Instructional Factors	Instructional Materials	Environmental Factors	Strategies
Provides an environment rich in language and experiences	Contains chapter Glossaries	Word-of-the-day calendar	Use KWL strategy to increase background knowledge
Incorporates frequent practice with and exposure to words	E-Glossaries available	Word walls	Use context when reading to ascertain meaning
Reads aloud to children	Provides vocabulary building activities (print or online)		Capitalize on opportunities to practice new words (listening for their use in television shows and other media, purposely using them in conversation)
Varies reading purpose (leisure, information)	Contains tools for priming background knowledge (e.g., Harcourt)	Distraction-free seating	Engage in activities such as word searches containing related terms (e.g., travel terms) and crosswords (note: puzzlemaker.com can create customized puzzles)
Works on vocabulary building	Includes story starters	Closed doors	Write a new word and its definition along with a drawing
Teaches morphology	Includes text features (boldface, italics)	Closed windows	
Capitalizes on opportunities to define words within instruction (e.g., "the composition of igneous rock, that is, <i>what it is made of</i> , is...")	Availability of video clips		

Includes supportive modalities (e.g., visuals, gestures) to increase understanding of language used	Audio glossaries
Embeds instruction within a meaningful context (e.g., relating words to learner experiences, increasing listening ability through game-like format)	Dictionaries
Develops vocabulary through naturalistic extension of language (e.g., if a student asks, "Can I start my work," the teacher might respond, "Yes, you can begin your work," naturally building synonym knowledge)	Thesaurus
Uses extension and expansion strategies (Mather, Lynch, & Richards, 2001)	Encyclopedias
	Use vocabulary cartoons (Burchers, 2000)
	Use text talks

Rapid Reference 1.16 Factors That May Facilitate Learning and Aid in Bypassing or Minimizing the Effects of an Auditory Processing (Ga) Deficit

Classroom Instructional Factors	Instructional Materials	Environmental Factors	Strategies
<p>Enunciates sounds in words in an emphatic manner when teaching new words for reading or spelling</p> <p>Uses instructional techniques (e.g., work preview/text preview) to clarify unknown words</p> <p>Provides instructional supports (e.g., guided notes) during note-taking activities</p> <p>Builds in time for clarification questions related to “missed” or “misheard” items during lecture</p> <p>Shortens instructions</p> <p>Makes an effort to minimize background noise via the use of instructional commands (e.g., work quietly, refrain from talking with your neighbor)</p> <p>Repeats or rephrases questions asked by other students to ensure that all students “hear” the question that is associated with the teacher’s given response</p> <p>Emphasizes sight-word reading</p> <p>Pauses when delivering oral instruction to allow time for student to process auditory information</p>	<p>Video clips</p> <p>Read aloud texts/features</p> <p>Audio glossaries</p> <p>Supplement oral instructions with written instructions</p> <p>Phonemic awareness activities</p> <p>Electronic textbooks</p> <p>Guided notes, graphic organizers</p>	<p>Rules for talking and listening</p> <p>Spelling lists</p> <p>Closed doors</p> <p>Closed windows</p> <p>Distraction-free seating</p> <p>Noise minimizers (carpet, noise-reducing headphones)</p> <p>Preferential seating (close to teacher, away from heaters, fans)</p> <p>Localize sound source for student by standing closer when delivering instructions</p>	<p>Use comprehension monitoring (e.g., Does the word I heard/read make sense in context?)</p> <p>Engage in self-advocacy (e.g., asking for information to be repeated and/or clarified in regard to the misheard part)</p> <p>Physically positioning oneself toward/close to the speaker</p> <p>Attending to speaker’s mouth and/or gestures, facial expressions, during the delivery of information</p> <p>Recording notes via audio methods to allow a mechanism for being able to fill in notes for completeness</p> <p>Following along with written directions/text during the provision of oral instruction</p> <p>Practicing spelling lists with visually based techniques</p> <p>Use visualization strategies to remember things</p> <p>Use written mediums (e.g., email, text) to preserve content/integrity of information communicated</p>

Rapid Reference 1.17 Factors That May Facilitate Learning and Aid in Bypassing or Minimizing the Effects of a Long-Term Storage and Retrieval (Ltr) Deficit

Classroom Instructional Factors	Instructional Materials	Environmental Factors	Strategies
Uses close-ended questions, yes/no, true/false	Guided lists for implementing procedures, formulas	Procedural charts	Organizes material to be learned using visual aids (e.g., diagrams, flowcharts), auditory aids (e.g., chunking), or other tangibles (e.g., flash cards)
Uses consistent instructional routines	Practice guides	Word walls	Makes connections by relating material to be learned to oneself
Offers repeated practice with and review of newly presented information	Online review	Desk organizers	Relates concepts to be learned to one another via tools such as a concept map
Teaches memory strategies and encourages their use (verbal rehearsal to support encoding, use of mnemonic devices; Dehn, 2010)	Glossaries (electronic, audio, printed)	External memory aids (lists, audible timers)	Creates a schedule for distributed practice of material to be learned
Uses multiple modalities when teaching new concepts (pair written or visual with verbal information) to support dual recoding (Dehn, 2010)	Study guides	Calendars with visual references to due dates	Plans for regular review of material
Limits the amount of new material to be learned; introduces new concepts gradually and with a lot of context	Review sheets	Visual reminders (Post-its, color-coded systems)	Rehearses material to be learned via recitation, repetition

(continued)

<p>(continued)</p> <p>Is mindful of when new concepts are presented</p> <p>Makes associations between newly learned and prior information explicit</p> <p>Uses lists to facilitate recall (prompts)</p> <p>Expands vocabulary to minimize impact of word retrieval deficits</p> <p>Builds in wait-time for student when fluency of retrieval is an issue</p> <p>Uses text previews to "prime" knowledge</p> <p>Provides background knowledge first before asking a question to "prime" student for retrieval</p>	<p>Dictionaries (to support word retrieval)</p> <p>Thesaurus (to build vocabulary and minimize impact of retrieval weaknesses)</p>	<p>Quiet environment or noise-reduction aids (headphones, cubicles, study carrels)</p> <p>Preferential seating to minimize distractions when encoding</p>	<p>Studies and completes homework in a designated location with necessary materials</p> <p>Uses active learning strategies (note-taking, flash cards, concept maps, chunking) in review sessions</p> <p>Studies and reviews learning material immediately prior to sleeping</p> <p>Uses organizational strategies such as semantic clustering (Dehn, 2010)</p> <p>Uses verbal association strategies (e.g., elaboration; Dehn, 2010)</p> <p>Implements dual coding strategies (visual to verbal and vice versa)</p> <p>Engages in self-testing</p> <p>Uses specific strategies for academic tasks (e.g., PQRS, for reading comprehension; Dehn 2010)</p>
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Rapid Reference 1.18 Factors That May Facilitate Learning and Aid in Bypassing or Minimizing the Effects of a Processing Speed (Gs) Deficit

Classroom Instructional Factors	Instructional Materials	Environmental Factors	Strategies
Focuses on features of work products that are unrelated to time parameters (e.g., quality or accuracy of a response)	Practice guides	Clocks	Plan for long-term projects by using a realistic schedule that allows for consistent movement toward completion
Repeated practice	Online review	Written schedules	Preview important parts of text (end-of-chapter questions, title, subtitles, glossary, or terms) to facilitate reading speed
Offers speed drills	Use computer activities that require quick, simple decisions	Desk organizers	Apply planning and time management strategies for reading activities
Extended time	Books on tape		Use an outlining strategy for note-taking
Reduces the quantity of work required (including homework)	Online activities/games (e.g., http://www.academickillbuilders.com/games/)		
Increases wait-times both after questions are asked and after responses are given			
Choral repeated reading			

Rapid Reference 1.19 Factors That May Facilitate Learning and Aid in Bypassing or Minimizing the Effects of a Visual Processing (Gv) Deficit

Classroom Instructional Factors	Instructional Materials	Environmental Factors	Strategies
Provide oral explanation for visual concepts	Video clips	Color-coded Information	Uses orthographic strategies for decoding (e.g., word length, shape of word); Uses "cover-copy-compare" technique—go to: http://www.amblesideprimary.com/ambleweb/lookcover/lookcover.html
Reviews spatial concept and supports comprehension through use of hands-on activities and manipulatives (e.g., using models to demonstrate the moon's orbital path).	Enlarged text (via online zoom feature or alternative print copy of textbook, worksheet)	Preferential seating aimed at allowing the student to access visual material (e.g., smart board) manipulatives, visual aids, and other materials to support learning	Capitalizes on intact or strong auditory skills during learning/studying (e.g., uses phonemic skills for decoding tasks)
Provides verbal label for visual representations (e.g., "The shaded red bars represent women's votes; the green bars represent men's votes")	Highlights margins during writing tasks	Assigned note-taking buddy	Pairs visual information with verbal (mnemonics)
Provides written copies of oral instructions, lectures	Provides direct handwriting practice	Readers or scribes, where needed	Labels visual charts/graphs with verbal labels
Auditory cueing to supplement visual information/cues (e.g., "Look at the bar graph for weekly sales")	Provides visual supports (graphic organizers, graph paper)	Reduce visual distraction	Highlights or color codes important information

Provides graph-paper to assist with number alignment	Alternative lighting (natural light, non-fluorescent lighting)	Uses aids to support visual tracking (finger, index card, ruler)
Books on tape		Spaces items on a page
Text-to-speech technology (screen and text readers)		Uses applications or supports that allow for enlargement of fonts
Reading/scanning pens		Uses note-taking strategies (e.g., Cornell, outlining)

Rapid Reference 1.20 Factors That May Facilitate Learning and Aid in Bypassing or Minimizing the Effects of a Short-Term Memory (Gsm) Deficit

Classroom Instructional Factors	Instructional Materials	Environmental Factors	Strategies
Offers repetition of information	Practice guides	Color-coded information	Apply rote strategies (e.g., basic rehearsal, simple repetition) for information to be learned in the short-term
Reviews information and newly presented concepts often	Guided study	Math-facts tables (e.g., multiplication)	Encourage use of relational strategies (e.g., mnemonics)
Delivers information in manageable parts	Online review	Written schedules	Use elaborative rehearsal (associating new information with prior knowledge)
Evidences use of consistent instructional routines	Flash cards	Visual schedules (e.g., pictures)	Semantic rehearsal (creating a sentence using things to be remembered)
Uses meaningful stimuli to assist with encoding and allow for experiential learning (i.e., learning while doing)	Multisensory materials to facilitate encoding	Written reminders (homework)	Chunking
Provides opportunities for repeated practice and review			Paraphrasing
Provides supports (e.g., lecture notes, guided notes, study guides, written directions) to supplement oral instruction			Visual mnemonics (imagery, pegwords, loci, keyword method; Dehn, 2008)

<p>Breaks down instructional steps for student</p> <p>Provides visual support (e.g., times table) to support acquisition of basic math facts</p> <p>Outlines math procedures for student and provides procedural guides or flashcards for the student to use when approaching problems</p> <p>Highlights important information within a word problem</p> <p>Has students write all steps and show all work for math computations</p> <p>Uses writing programs or techniques that emphasize drafting first (e.g., Draft Builder 6)</p> <p>Teaches chunking strategies</p>	<p>Chaining</p> <p>First-letter mnemonics</p> <p>Use tangible reminders (alams, to-do lists, calendar schedules)</p> <p>Apply specific academic strategies (e.g., write out all math computations, use a calculator, spellchecker)</p>
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Step 5: Integrate Data From All Previous Steps, Design and Implement an Intervention, and Monitor Its Effectiveness

In this final step, practitioners integrate all data from Steps 1 through 4 to design and document an intervention. As seen in Rapid Reference 1.21, the SMAARTI Planning Form is organized into five columns. Practitioners should use information from the DOTI form to assist in planning and selecting educational strategies and tailoring interventions.

Ayden has several academic areas targeted for intervention. Ayden's difficulties in reading, math, and writing are related partly to associated cognitive weaknesses. The manifestations of these weaknesses and specific interventions and recommendations for addressing them appear in Rapid Reference 1.21.

Ayden's difficulties in reading decoding appear to be related partly to his weakness in phonetic coding. These difficulties appear to be maintained partly by the fact that Ayden does not apply phonetic coding strategies and, instead, relies on the visual features of words in an attempt to decode them. While he has been fairly successful with this strategy and has acquired sight-word decoding skills (e.g., Letter Word Identification, SS = 90, Average), he is struggling in content areas, such as social studies and science, where new technical terms are introduced (e.g., *symbiotic*, *injustice*) that do not lend themselves easily to visual analysis. To support his decoding, and subsequent comprehension, it is suggested that Ayden use *audio glossaries* that accompany his science and social studies texts so that he can hear the words and definitions read aloud to him before he begins a new lesson. Beyond audio glossaries, an environmental accommodation, namely *preferential seating*, is suggested for Ayden. This is primarily due to Ayden's reported concerns with reading aloud in front of his classmates. Given his concern of social repercussions of his reading weaknesses (e.g., feeling embarrassed in front of his peers), Ayden is less likely to access teacher support to assist him in decoding unknown words. Preferential seating, close to the teacher's desk, can allow Ayden to access help more inconspicuously and can allow his teacher to monitor his need for help (e.g., she can have a bird's-eye view of his reading behaviors, such as pausing, that might suggest a difficulty with decoding). Finally, the *Great Leaps* program, which is presently used by Ayden's reading specialist, is recommended for continued use given its applicability to his age, his familiarity with and motivation in the program, and its focus on building fluency. Notwithstanding, because the phonemic awareness component of the program is primarily presented in the earlier grades, a *supplemental phonemic awareness activity* is being suggested for Ayden to be used at each reading session. This activity can be obtained via the use of the Month-by-Month Phonics and Vocabulary workbook.

Rapid Reference 1.21 Review of Ayden's Cognitive Weakness—Academic Weakness Relationships

Academic Targets for Intervention (Step 1)	Suggested Remedial Program	Related Cognitive Weakness(es) (Step 2)	Manifestations of Cognitive Weakness(es) (Step 3)	Suggested MARC Interventions and Recommendations (Step 4)
Reading Decoding	Great Leaps Month-by-Month Phonics and Vocabulary, Grade 5 (Cunningham, Loman, & Arens, 2007)	Ga—Phonetic Coding	Does not use phonetic strategies consistently	Audio glossaries Preferential seating
Reading Fluency	Great Leaps	Gs, Glr	Reading is slow and laborious	Shortened passages Text preview
Reading Comprehension	Great Leaps	Glr, Gf	Has difficulty retelling what he has read in monthly book reports	Think-alouds Cooperative reading Cause/effect graphic organizers
Math Fluency	Arcademics	Gs	Is accurate but slow	Abbreviated math minutes with charting (continued)

*(continued)***Math Problem Solving**

Glr, Gf Difficulty with word problems

Math mnemonics
Math concept card
Procedural chart

Folding-in technique; cover-copy-compare

Mishears words frequently

Ga—Phonetic Coding

Word wall
Speller
Spelling dictionary with graph**Written Expression**

Inspiration

Glr, Gf

Does not use newly learned vocabulary in writing assignments; note-taking is verbatim

Preferential seating
Sentence strips
Word bank
Word wall
Thesaurus
Feedback
Guided notes

While Great Leaps can also be used to address Ayden's difficulties with reading fluency, two additional recommendations, namely *shortened passages* and *text preview*, are recommended. The modification of shortened passages during class-wide independent reading is recommended primarily because Ayden's reading is described consistently as slow and laborious. Further, given his concerns about reading more slowly than his peers, Ayden has attempted to compensate by rushing through the reading, which has always resulted in difficulty with comprehension questions. When he reads at a more measured pace, he typically does not finish the passage and, as a result, often needs to answer the reading questions at home, which then necessitates a full rereading of the passage, thereby lengthening the amount of time spent in homework. Shortened passages can build his confidence by allowing him to finish his work at a similar rate as his peers, can facilitate his comprehension of the passages as it reduces the perceived need to rush, and, finally, can make a more efficient use of homework time as he will only need to read new material (if the remaining part of the assignment is still required of him). To further support his reading fluency, it is suggested that Ayden engage in a text preview whereby he reviews the chapter or passage title, headings, and new vocabulary prior to being tasked with reading a passage during class. While shortened passages can accommodate partly Ayden's weakness in Gs, the text previews can serve as a primer that can circumvent the impact of his Glr weakness (e.g., speed of lexical access).

In terms of reading comprehension, in addition to the Great Leaps program, it is recommended that Ayden's teacher continue to use *cooperative reading groups*, but pair him with a student with strong reasoning skills who can serve as a model during guided *think-alouds* (e.g., activities that help externalize the reasoning process by explicitly pointing out connections during reading, such as characters' feelings and their behaviors). To facilitate Ayden's comprehension and encoding of what he has read, and circumvent the full impact of his reasoning difficulties, it is also recommended that he use *graphic organizers* during reading tasks, specifically those that allow for relationships (e.g., cause and effect) to be readily seen.

Based on the evaluation data, Ayden has a specific weakness in processing speed (Gs) that impacts not only reading fluency, but also the automaticity with which he completes math problems. As described by his teacher, when Ayden completes "mad math minutes" with the class, he is always the last one working and rarely, if ever, completes a full sheet. As a result, Ayden has become averse to this daily math practice and has begun to show signs of escape/avoidance (e.g., asks to use the bathroom, repeatedly drops his pencil on the floor during the timed minute). To build Ayden's confidence and facilitate his engagement with this task, it is

suggested that the *math minutes be abbreviated* (20 problems instead of 30). Additionally, it is recommended that Ayden *graph his progress* in terms of total numbers of items completed in a minute and total number of items accurate. Given that Ayden's accuracy is already high, it is expected that this latter number will be consistently high, thereby providing an immediate opportunity for positive feedback and reinforcement. The abbreviated sheet is expected to positively impact the total number of items completed, thereby building Ayden's confidence. The daily graphing will allow Ayden to focus on his individual progress rather than use his peers as a benchmark for judging himself. Finally, this format (graphing) capitalizes on Ayden's reported interest in working with visuals and is expected to be motivating in and of itself.

To further strengthen Ayden's automaticity with math facts, repeated practice in the home is recommended. Rather than focus on drill and practice via traditional methods (flashcards), a fun, web-based program, called *Arcademics*, is recommended. This website has several math games, presented in an arcade-like format. The *Arcademics* games are particularly attractive as a home-based intervention as they are also available as apps on the iPad, which increases the mobility of this intervention, an important consideration for Ayden, who spends two days a week at his grandmother's home after school. The games, such as *Jet-Ski* addition, provide visual feedback as well as audio feedback to Ayden relating to the accuracy and speed of his response (e.g., his jet-ski is propelled forward, at a fast pace, with accurate and quick responding).

Beyond fluency, Ayden's deficits within the areas of reasoning (Gf) and retrieval (Glr) limit his ability to apprehend patterns or underlying rules within problems as well as to retrieve procedures necessary to complete problems. To circumvent the impact of these weaknesses, it is recommended that Ayden be taught specific *mnemonics* to assist him with retrieving steps or sequences necessary to compute problems (e.g., PDMAS) and that he use a *math concept card* that is organized into four quadrants with each of four operations represented (i.e., addition, subtraction, multiplication, and division) along with associated words that denote each operation (e.g., "in all," "sum," "in total," "altogether" would appear under the addition symbol). Together, these supports are intended to facilitate Ayden's ability to identify the computations and/or procedures required to complete math word problems.

In writing, several interventions are recommended for Ayden. An initial recommendation is to allow Ayden to use *Inspiration software* during independent writing tasks. This visually based writing software program allows Ayden to capitalize on his relative Gv strength and can help circumvent the impact of his Gf weakness as it allows him to see relationships between concepts/ideas given the

graphic organizer type format. Additional recommendations such as providing Ayden with *word banks* during the completion of specific tasks (e.g., answering end-of-chapter questions and/or short-answer test questions in content areas such as science or social studies) are offered. To facilitate his self-advocacy skills, it is suggested that Ayden be reminded of, and encouraged to reference, his classroom *word wall*, which contains a cumulative listing of weekly vocabulary words. It is hoped that this classroom resource will encourage Ayden to use newly learned vocabulary in his weekly writing assignments. Given that increasing one's vocabulary can minimize the full impact of a retrieval deficit, building Ayden's vocabulary is important. One way to achieve this is through implementing an instructional recommendation that involves having Ayden's teacher provide *feedback* on his writing by circling specific words and offering another term that is similar in meaning as well as circling one or two terms for which Ayden can offer an alternative. To accomplish this, Ayden can use a *thesaurus* to locate the circled terms and then select, from the listed choices, another word that would be equally effective in communicating his thoughts. Beyond a physical thesaurus, Ayden can be taught to use the thesaurus function in Microsoft Word.

Presently, Ayden takes notes verbatim as his retrieval difficulties impact his ability to quickly paraphrase what the teacher is saying and it also impacts the sequencing/organization of his thoughts. To address the latter issue, *sentence strips* are recommended during writing tasks. Use of such strips allows Ayden to write discrete thoughts or facts, as they come to mind, and then physically manipulate the strips into an organized, cohesive sequence, after he has generated discrete thoughts. To address his difficulty with paraphrasing or summarizing, *guided notes* are recommended. Such a support can help circumvent the impact of Ayden's GLr weakness. Further, guided notes can minimize memory demands during note-taking, thereby allowing Ayden to more fully attend to the lesson. Finally, the earlier recommendation for preferential seating is relevant to addressing Ayden's note-taking difficulties in that it can minimize any auditory distractions that might otherwise increase the frequency with which he mishears words. Further, it allows him and the teacher to have easy access to one another. As such, Ayden can more privately secure assistance with writing tasks and the teacher can discreetly check in with him during such tasks.

To address Ayden's spelling weaknesses and maximize the utility of the classroom word wall, Ayden can be reminded to reference this wall to assist him with spelling recently learned words. It is also suggested that Ayden be encouraged to use the *spellchecker function* on computer-based writing assignments. Based on his mastery of words, Ayden will be asked to build a *spelling dictionary*, generating an entry for each newly mastered word. Finally, it is

suggested that his reading teacher use the *folding-in technique* with Ayden to build his sight-word reading/spelling skills. This technique aims to increase spelling/reading skills via a flashcard method that involves presenting 10 words, seven of which are known and three of which are “unknown.” This 70/30 ratio of known to unknown results in consistently high rates of success during the task, with the aim of improving Ayden’s confidence and motivation. To reinforce the words presented by his reading teacher, a recommendation to allow Ayden repeated practice via a *cover-copy-compare* web-based program is offered. With this program, Ayden’s mother can build a word list containing the 10 words used in the folding-in technique. The computer program will show each word in isolation, then after Ayden right clicks the “cover” button, a hand will swipe in from the left side of the screen to cover the word, at which point Ayden will type the word and select the “compare” button. The hand will retract and the correctly spelled word will be revealed for comparison.

Practitioners should develop a plan for monitoring interventions and evaluating their benefit. Depending on their use and benefit, practitioners will summarize an outcome of the recommendations and suggest next steps. The next steps can involve one of three actions, Retain (RT), Refine (RF), or Reduce/Eliminate (RD/E). If the recommendation is being used and is working, the recommendation can be retained. If an element of the recommendation is not particularly effective or if there is an identified factor that can maximize its effectiveness, it can be refined. Finally, if the intended benefit is achieved (e.g., spelling accuracy increases substantially and consistently) or if the intensity of the recommendation can be adjusted, the support can be eliminated and/or reduced. It is important to distinguish between refining and reducing. A reduction of a support does not involve changing the support; rather, it involves modifying the frequency or intensity with which the support is delivered. A refinement involves changing an aspect of the recommendation.

SUMMARY

School psychologists and other practitioners involved in the assessment of students with learning difficulties routinely collect data related to students’ social, emotional, behavioral, academic, and cognitive functioning. Parent intakes, classroom observations, teacher and student interviews, administration of standardized tests, and record reviews represent routine assessment activities. Despite the time and effort necessary to collect these data, they are rarely integrated in a systematic manner for use in tailoring interventions. Rather, data from comprehensive evaluations are used typically to determine a student’s eligibility for special

education services. While eligibility decisions are important and often drive the delivery of intervention resources, it is difficult to make sound choices regarding the nature and type of intervention needed for any given student without a detailed review of multiple data sources, including data gathered from cognitive assessment.

This chapter described a *Systematic Method of Analyzing Assessment Results for Tailoring Interventions (SMAARTI)* for students with learning difficulties. This method allows practitioners to define targets for intervention via a careful, research-based analysis of a student's quantitative and qualitative cognitive and academic strengths and weaknesses. The steps of SMAARTI assist the practitioner in understanding evidence-based connections between below-average cognitive and academic deficits and determining qualitative manifestations of observed cognitive weaknesses or deficits in real-world (e.g., classroom) performances. Once a student's unique below-average cognitive-academic consistencies are determined, SMAARTI assists the practitioner in tailoring interventions for the student. Ultimately, SMAARTI encourages practitioners to collect multiple data sources using multiple data gathering methods to ensure that any intervention that is recommended for a student is targeted specifically to his or her unique learning needs.

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TEST YOURSELF



1. **The evidence-based programs listed on sites such as What Works Clearinghouse (WWC) and the Florida Center for Reading Research (FCRR), and implemented with a student, serve as an example of:**
 - a. A modification
 - b. An accommodation
 - c. Remediation
 - d. Compensation
2. **When do you engage in SMAARTI?**
 - a. As a pre-referral step
 - b. During an initial evaluation
 - c. After a student fails to respond to evidence-based interventions
 - d. All of the above
3. **A comprehensive evaluation includes, but is not limited to, which of the following:**
 - a. Educational history and current academic performance
 - b. Familial factors and medical history
 - c. Cognitive performance
 - d. Behavioral and social-emotional functioning
 - e. All of the above are part of a comprehensive evaluation

(continued)

(continued)

- 4. All of the following are examples of primary evaluation data except:**
 - a. Standardized cognitive and academic scores
 - b. Progress monitoring data
 - c. Scores from district-wide testing programs
 - d. Data from work sample analysis
- 5. True or False?: Information relating to instructional materials used with a student is an example of tertiary data.**
- 6. Secondary data typically provides information about characteristics that are**
 - a. Related to the child's instructional materials
 - b. Related to the child's instructional environment
 - c. Related to intrinsic characteristics of the child him- or herself
 - d. Operating in the child's home environment
- 7. Step 3 of SMAARTI involves which of the following?**
 - a. Reviewing manifestations of cognitive weaknesses
 - b. Organizing secondary data
 - c. Identifying types of academic skill deficits
 - d. Identifying initial targets for intervention
 - e. All of the above
- 8. Aligning math problems vertically as opposed to horizontally, having a student dictate responses to a scribe, or providing a student with a separate room to complete work all serve as an example of:**
 - a. A modification
 - b. An accommodation
 - c. Remediation
 - d. Compensation
- 9. Reducing the amount of material that a student is required to learn, simplifying material to be learned, or requiring a student to answer only a subset of a specific type of question on a mixed facts sheet all serve as an example of:**
 - a. A modification
 - b. An accommodation
 - c. Remediation
 - d. Compensation
- 10. Teaching a student to use mnemonic devices or to outline and use graphic organizers is an example of:**
 - a. A modification
 - b. An accommodation
 - c. Remediation
 - d. Compensation

11. True or False?: Understanding cognitive weaknesses and their relation to academic weaknesses is necessary for program planning in the SMARTI approach.

Answers: 1. c; 2. d; 3. e; 4. d; 5. T; 6. c; 7. e; 8. b; 9. a; 10. d; 11. T