CHAPTER 2

Creating a Classroomwide Executive Function Culture That Fosters Strategy Use, Motivation, and Resilience

LYNN MELTZER and SURINA BASHO

> The students loved the strategies, and they all felt that they benefited from them. Students felt empowered, and I saw their skills become more internalized as they independently created their own organizational and memory strategies to study for their social studies and science tests.
>
> —FIFTH-GRADE TEACHER

Children become strategic learners when the schools they attend teach strategies explicitly and systematically, and require them to approach their classwork and homework strategically. A culture of strategy use in every classroom and across entire school systems ensures that students actively apply executive function strategies to all tasks. Within these types of classrooms, students experience themselves as important and valuable members of a community where they learn strategies from one another. When school systems and families foster the same values and emphasis on learning strategies, students' persistence, resilience, and academic success are promoted. Each child becomes part of an integrated classroom system, or a "child-in-classroom" (Bronfenbrenner, 1979; Doll, Zucker, & Brehm, 2004).

This chapter provides an overview of the key principles that are important for creating "strategic classrooms" and a classroomwide focus on executive function processes. We expand on the reasons *why* strategies that address executive function processes should be taught as part of the classroom curriculum. We then focus on *how* to create strategic classrooms by using key principles and approaches. Within this section, we also take a closer look at peer tutoring and peer mentoring in the classroom as ways of increasing students' motivation and engagement. Next, we

discuss *what* specific executive function strategies can be embedded into content areas such as writing, reading, and math. We also provide a calendar that outlines strategy instruction focused on executive function processes across the school year. Finally, we discuss selected strategies that can be used to teach executive function processes within the context of writing, studying, and test taking.

WHY SHOULD INSTRUCTION IN EXECUTIVE FUNCTION STRATEGIES BE INTEGRATED INTO THE CLASSROOM CURRICULUM?

> When you go to class, even if you don't get the way the teacher's teaching, you might use strategies to turn it around and understand it your way, so you don't feel as dumb. Some kids, if they don't know that, they're just going to assume that they're dumb. They just might skip and not come to the class.
>
> —JOE, 11TH GRADER

As Joe's comments indicate, many students internalize their struggle with schoolwork as "*I'm not smart enough*," "*I feel dumb*," or "*I'm just lazy*." Classroom teachers can empower students to take control of the learning process and to go beyond the "not smart" or "stupid" label by helping them to understand *how* they learn and *how* to apply strategies. In order to achieve this goal, teachers must ensure that strategies are systematic, consistent, and embedded in the classroom curriculum (Deshler et al., 2001; Hattie, Biggs, & Purdie, 1996). In other words, a "culture of strategy use" must be created in their classrooms (see Figure 2.1).

Over the past two decades, research has consistently indicated the importance of strategy instruction for enhancing students' conceptual understanding, their transfer and creative use of knowledge, and their ability to reflect on their own learning processes (Brown, 1997; Deshler, Schumaker, & Lenz, 1984; Pressley & Woloshyn, 1995). Studies have also shown that successful learners use effective strategies to process information (Brown & Campione, 1986; Harris & Gra-

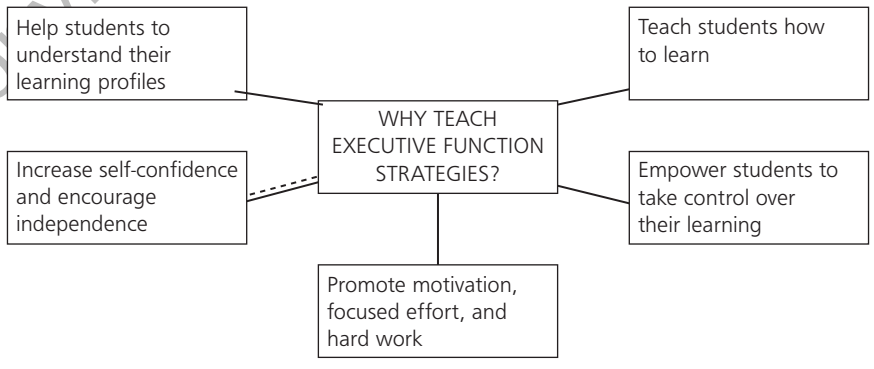


FIGURE 2.1. Why teach strategies that address executive function processes?

ham, 1992; Meltzer, 1993; Palincsar, Winn, David, Snyder, & Stevens, 1993; Pressley, Goodchild, Fleet, Zajchowski, & Evans, 1989). In fact, findings suggest that explicit instruction plays a critical role in helping all students to use metacognitive strategies to learn more easily (Deshler et al., 2001; Ellis, 1997; Harris & Graham, 1996; Graham & Harris, 2003; Meltzer et al., 2004a; Swanson, 1999; Zimmerman & Schunk, 2001).

Executive function strategies help students to go beyond the content that is being taught, so that learning is process-based rather than only outcome-based (Meltzer & Krishnan, 2007). Students need to learn *how* to set goals, plan, and prioritize; *how* to organize materials and information; *how* to remember and mentally recall previously learned information; *how* to "juggle" information in their minds; *how* to shift approaches in learning and problem-solving situations; and *how* to monitor themselves and check their work. All these executive function processes can be taught at all grade levels and applied to all content areas. For example, a strategy for writing a social studies report in the fourth grade can also be used for writing term papers in high school and college. In other words, although the content changes across the grades, the process or *how* of learning remains consistent across grade levels and content areas (Meltzer et al., 2006).

HOW CAN EXECUTIVE FUNCTION STRATEGIES BE TAUGHT IN THE CLASSROOM?

> Homework and tests are easier if you use more strategies. They help you see what types of things you need to work on a lot and what things you don't.
>
> —LESLIER, NINTH GRADER

As students develop an understanding of their strengths and weaknesses, as well as the demands of each learning situation, they realize the importance of executive function processes for academic success. When they use strategies that address the core executive function processes, they also become independent learners and flexible thinkers, and can more easily bypass their weaknesses while using their strengths to learn efficiently.

General Principles

Research on the implementation of strategy instruction has mostly consisted of evaluations of students with learning disabilities in one-on-one and small remedial groups, rather than in general education classrooms (see Swanson & Hoskyn, 1998, for a review). Relatively few models exist for integrating strategy instruction systematically into the classroom environment. However, some classroom-based strategy instruction models and programs have emerged, such as the Kansas intervention model (Deshler, Ellis, & Lenz, 1996; Deshler & Schumaker, 1988), the

Benchmark model (Gaskins & Pressley, 2007; Pressley & Woloshyn, 1995), the SRSD model (Graham & Harris, 2003; Reid, 1996), the *Drive to Thrive* program (Meltzer et al., 2004c, 2007b; Meltzer & Krishnan, 2007; see Chapter 1), and the *SMARTS* (Success, Motivation, Awareness, Resilience, Talents, & Strategies) mentoring program (Gray, 2007; Gray, Meltzer, & Upton, 2008; Meltzer, 2007). Although each of these approaches includes a broad range of strategies and systems, a number of them address executive function processes. Several general principles for effective strategy instruction have been revealed through the use of these models/programs and are listed in Table 2.1.

More specific principles, important for creating a culture of strategy use in the classroom, are derived from our Research Institute for Learning and Development (ResearchILD) findings, as well as the meta-analysis of Swanson (1999). These principles include the following:

- Direct and explicit explanations of key concepts and vocabulary should be provided, so that students can access the information.
- The steps involved in learning specific strategies should be modeled.
- "Think-alouds" can be used to show students how to think about or approach a problem.
- Information should be broken down into manageable chunks or steps.
- Background information should be discussed to scaffold new concepts, so that all students have the same level of understanding.
- The goal of strategy use should be clear to both the teacher and the students (e.g., students should understand and apply at least one memory strategy independently on a test).
- Teachers should assess whether the goals are being met on a regular basis (e.g., track the number of times students spontaneously use a strategy in class).
- Teachers should assess whether students are using strategies effectively on a regular basis.

TABLE 2.1. Principles of Effective Strategy Instruction

- Strategy instruction should be directly linked with the curriculum.
- Strategies should be taught in a structured, systematic way, using scaffolding and modeling.
- Metacognitive awareness should be taught explicitly so that students develop an understanding of their profiles of strengths and weaknesses.
- Students' motivation and self-understanding should be addressed, to ensure that they generalize their use of strategies.
- Strategy instruction should address students' individual learning styles, motivation, and willingness to work hard—all critical for building the cycle of academic success.
- Hard work and effort should be encouraged and rewarded, as students initially need to work extremely hard to learn and use new strategies. Determination, persistence, and resilience are important, so that they do not feel overwhelmed by this initial effort.
- Time should be provided for practicing and applying strategies.
- Opportunities should be provided for students to extend and generalize strategies to a range of different tasks.

Day-to-Day Practice

When introducing a new strategy to students, it is essential to be systematic and to follow the general day-to-day practice guidelines outlined in Table 2.2. To ensure that students understand what, when, and how to use appropriate strategies, each teacher needs to create a classroom environment that is goal-oriented, fosters metacognition, and provides daily opportunities for students to use strategies to maximize their potential. The suggestions given in the next few pages provide a more detailed guide for teachers.

Set Goals for the Year, Month, Week, and Day

It is important for teachers to define explicit and measurable goals for strategy instruction. We recommend that teachers create overall goals for the year, as well as monthly, weekly, and daily goals. Setting goals provides a focus for instructional efforts and a framework within which to work. Consider these examples:

- *Goal for the year*: To ensure that each student in the class ends the year with at least five strategies he or she uses consistently. This should include one strategy from each of the five core executive function areas (i.e., planning, organizing, remembering, shifting, and self-checking).
- *Goal for the month*: To teach one organizational strategy each week.
- *Goal for the week*: To integrate a shifting strategy into the lesson plan.
- *Goal for the day*: To name and model specific strategies a few times over the course of the day.

One way for teachers to monitor whether they are meeting their goals in teaching executive function strategies is to use the Measure of Teacher Practice (MTP) questionnaire (Meltzer et al., 2007b). This questionnaire helps teachers reflect on and assess the extent to which they are teaching these strategies in the different academic areas. Figure 2.2 shows the application of the MTP to writing.

TABLE 2.2. Teaching Executive Function Strategies: General Guidelines for Day-to-Day Practice

1. Ensure that students understand what each strategy is.
2. Ensure that students understand what the strategy is used for.
3. Help students understand when to use the strategy.
4. Help students understand how to use the strategy.
5. Model the strategy for students.
6. Ask students to try using a specific strategy, either as a whole class, in pairs, or in small groups.
7. Have students reflect on how well the strategy worked for them as learners.

Measure of Teacher Practice (MTP)

Teacher: _____ Date: _____

Grade: _____

Please rate the extent to which you teach strategies systemarlcally when you teach writing. Please rate yourself on a 1–3 scale (1 = Seldom taught, 2 = Sometimes taught, 3 = Systematically taught).

Planning			
Break down instruction and assignments into manageable steps.	1	2	3
Provide scaffolding for initiating writing assignments.	1	2	3
Organizing			
Give explicit instruction about organization, relative to genre.	1	2	3
Provide graphic organizers, maps, and webs for teaching organization of ideas.	1	2	3
Prioritizing			
Provide procedure checklists to prioritize important steps for the writing process.	1	2	3
Offer explicit instruction regarding key elements of writing.	1	2	3
Remembering/Juggling information mentally			
Use mnemonics/crazy phrases to help students remember and juggle key steps in writing.	1	2	3
Encourage the use of strategies to help students to juggle information mentally.	1	2	3
Shifting			
Provide instruction for varied vocabulary use and transition phrases.	1	2	3
Teach shifting strategies for multiple outcomes, audiences, and genres.	1	2	3
Self-checking			
Use teacher- and student-made checklists for editing work.	1	2	3
Provide class time and direct instruction for revision of written work.	1	2	3

Please rate whether or not you include the following in your classroom instruction (0 = No, 1 = Yes).

Grading of written assignment includes credit for strategy use.	0	1
Visual reminders of strategy use are posted in the classroom.	0	1
Time is allocated for discussion of strategy use among students.	0	1
Time is allocated for students to reflect on personal strategy use.	0	1
Strategy use is personalized to students' academic needs and learning styles.	0	1

FIGURE 2.2. The Measure of Teacher Practice (MTP) in the writing area.

Establish a Starting Point for Tracking Progress

At the start of the school year, teachers will want to know each student's level of metacognitive awareness and strategy knowledge. A barometer reading can be taken of how much students know about strategies and what they think of themselves as learners. Teachers can develop their own questionnaires or can use the MetaCOG instruments discussed in Chapter 1 (Meltzer et al., 2001; Meltzer & Krishnan, 2007; Miller et al., 2001). As described there, the ME asks students to rate how hard they work and how well they do in selected academic areas, such as reading, writing, math, homework, studying for tests, and long-term projects. On the STRATUS, students are required to reflect on and to rate their use of strategies in the key executive function processes. Once teachers know where students are starting from, it is easier to evaluate and track the students' progress over time and then adjust the baseline to their learning needs. Teachers can also rate their students' effort and strategy use on the *TPSE* (again, see Chapter 1) and can compare their own ratings with their students' self-ratings on the ME. Establishing a baseline for understanding students' use of executive function strategies allows teachers to plan instruction more easily. This also helps teachers to determine the consistencies and inconsistencies between their own perceptions and those of their students. As Chapter 1 has shown (see Figure 1.5 there), students and their teachers often have very different perceptions of the students' performance.

Allow Adequate Time for Strategy Instruction in the Classroom

It takes time to teach students what executive function strategies are, why we use them, and what different types of strategies exist. As a result, it may feel as though strategy instruction takes too much time to implement in the classroom, compared to focusing only on the content. However, once the foundation has been laid for strategy instruction, less and less time is needed to integrate strategies into the curriculum. Furthermore, time is saved for teachers as students become more efficient, more accurate, and more effective. Consistency over time, as well as effort on both teachers' and students' parts, will ensure that strategy use becomes automatic. The approaches described below provide practical, easy-to-implement systems for making strategy use count in the classroom.

Foster Metacognition in Students

Teachers can make strategy use a required part of their curriculum by grading students on the processes and strategies they have used to reach their goals, in addition to the end product. The suggestions listed below provide practical, easy-to-implement systems for fostering metacognitive thinking in students and only involve a minimal amount of extra work for teachers.

STRATEGY REFLECTION SHEETS

Teachers can require students to use strategy reflection sheets for selected assignments, so that they gradually become accustomed to reflecting about *how* they learn and documenting their approaches informally (see the examples in Figures 2.3, 2.4a, and 2.4b). Each homework assignment or test should include a strategy reflection sheet at the end, for students to record the strategies they have used to complete assignments or to study for tests. When teachers count students' strategy use as part of the grade, the students begin to value the reflection process. It should be noted that teaching students to complete these strategy reflection sheets takes a little time, because it requires students to become metacognitive learners by thinking about *how* they think and learn.

As is evident from Figure 2.3, strategy reflection sheets can use a multiple-choice format, so that students do not have to rely on their expressive language skills to explain their thinking. Alternatively, students can be required to explain their thinking in more detail, using the open-ended format of the examples shown in Figures 2.4a and 2.4b.

STRATEGY NOTEBOOKS

All students can develop personalized notebooks in which they jot down the strategies that work best for them. These notebooks provide students with a place where they can easily store and refer to their favorite strategies, so that practice is made easier.

Drive to Thrive

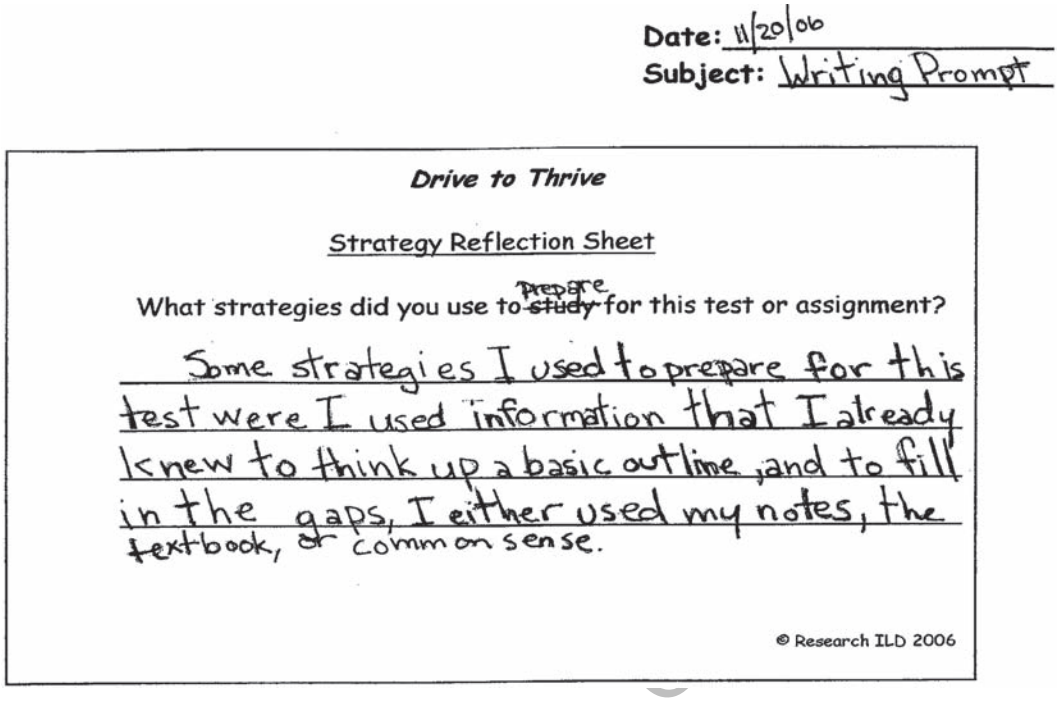
Strategy Reflection Sheet

Check off the strategies you used to study for this test.

_____ Flash cards/Strategy cards	_____ Two-column notes
_____ Triple Note Tote (*BrainCogs*)	_____ Mapping/webbing
_____ Acronyms	_____ Discuss with a parent/friend
_____ Crazy Phrases (*BrainCogs*)	_____ STAR strategy

_____ Other _____

FIGURE 2.3. Strategy reflection sheet with multiple-choice format to scaffold and teach strategy use.


Date: 11/20/06
Subject: Writing Prompt

Drive to Thrive

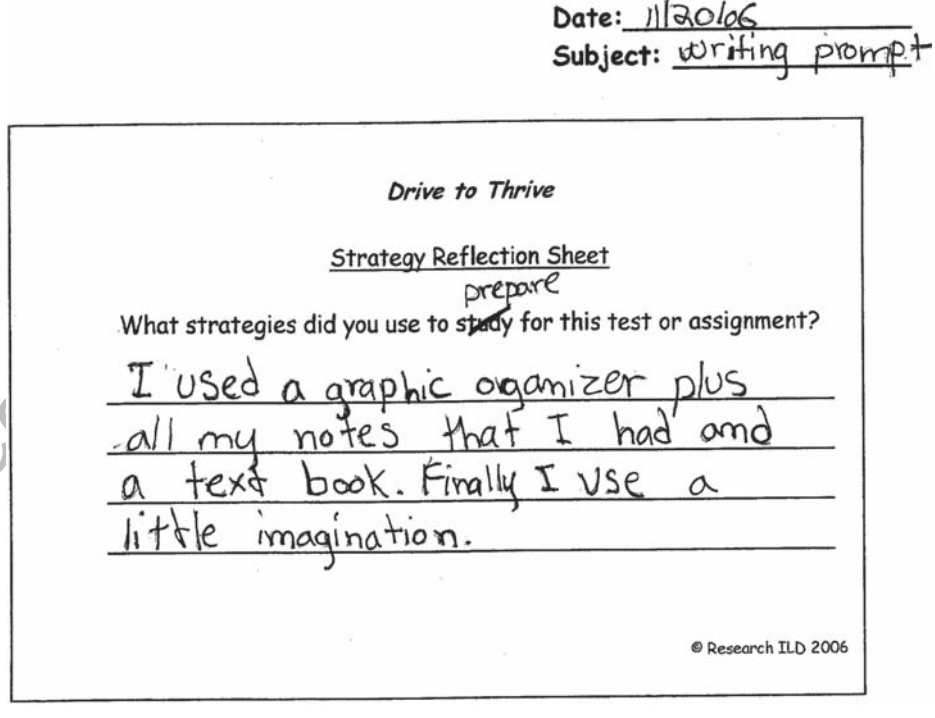
Strategy Reflection Sheet

What strategies did you use to ~~study~~ prepare for this test or assignment?

Some strategies I used to prepare for this test were I used information that I already knew to think up a basic outline, and to fill in the gaps, I either used my notes, the ~~textbook,~~ or common sense.

© Research ILD 2006

FIGURE 2.4a. A sixth grader's strategy reflection sheet to assess strategy use for studying and taking tests.


Date: 11/20/06
Subject: writing prompt

Drive to Thrive

Strategy Reflection Sheet

What strategies did you use to ~~study~~ prepare for this test or assignment?

I used a graphic organizer plus all my notes that I had and a text book. Finally I use a little imagination.

© Research ILD 2006

FIGURE 2.4b. A fifth grader's strategy reflection sheet to assess strategy use for homework.

CHARTS AND GRAPHS OF STUDENT PERFORMANCE

To motivate students to use strategies, teachers can help students track their progress and strategy use by charting or graphing their performance on homework, tests, projects, and writing assignments.

PERSONALIZED ERROR CHECKLISTS

Students can also keep personalized checklists on their desks as reminders of the importance of checking strategies. These lists can include steps to check off before turning in a test, before finishing writing an essay, and before completing a math problem.

OTHER TECHNIQUES FOR ENCOURAGING STUDENTS' SELF-REFLECTIONS

Teachers can help students to access previous memories of success by asking leading questions, such as "Do you remember how easy the last vocabulary test was when you used a particular strategy? Why don't you try that again?" or "Do you remember the last time you made an outline before writing your essay? Wasn't it much easier to write when your ideas were organized?"

All these classroom techniques encourage students to reflect on how well each of the strategies has worked for them, and to review the strategies that best match their individual profiles of strengths and weaknesses.

Create a Strategic Classroom Environment

Students learn best when they gain knowledge through exploration, active learning, and visual imagery (Marzano, 2003). They need an opportunity to work through the process of experimenting and assessing the effectiveness of each strategy. They also need time in the classroom to learn and apply different executive function strategies. The following classroom-based systems help students to become metacognitive learners.

STRATEGY-OF-THE-WEEK DISPLAY BOARDS

Weekly classroom displays can be created to represent effective strategies used by students. At the start of each week, teachers can introduce a new strategy on the display board and can refer to this strategy throughout the lessons.

A STRATEGY WALL

One wall in the classroom can be dedicated to examples of students' use of executive function strategies. The key here is to make the strategies stand out in the

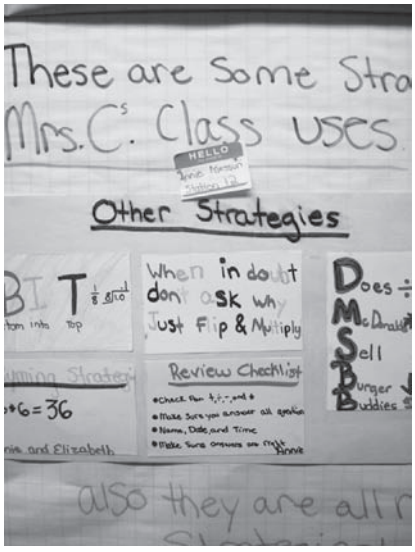


FIGURE 2.5. Example of a strategy wall in a fifth-grade classroom.

classroom, so that the students have daily visual reminders of effective strategies (see Figure 2.5).

STRATEGY-SHARING DISCUSSIONS

Teachers can create daily or weekly discussion times where students share their favorite personalized strategies from that week's classwork and homework. During these strategy-sharing discussions, students can teach other students their own strategies, and this process fosters metacognition and self-reflection. Teachers can also provide numerous examples of ways to apply strategies to everyday life (e.g., mnemonics for remembering a grocery list, crazy phrases for remembering the correct sequence for the months of the year, cartoons for remembering difficult vocabulary).

Practice, Practice, and More Practice!

STRATEGY PRACTICE LABS

Practice labs offer a chance for students to apply the different strategies they have been taught. With practice, the use of many strategies will become automatic, and students will also begin to recognize the efficacy of specific strategies for selected tasks. For example, one class period per week can be designated as strategy lab time, and students can experiment with a learning strategy that is useful for the content material.

MODELING STRATEGY USE THROUGHOUT THE SCHOOL DAY AND ACROSS SUBJECT AREAS

Once students are able to assess which strategies work for them, they need to practice using the strategies with homework, classwork, and tests. For instance, teachers can create opportunities for students to use the vocabulary related to strategies by requiring that students:

- Discuss with each other how they can use specific strategies.
- Organize folders for different subjects.
- Practice making strategy notecards for new vocabulary.
- Practice using acronyms to remember important dates and events in history.

Make Strategy Use Count

As suggested earlier, strategy use should be included in the grading system across content areas. In other words, a small percentage of the grade should be assigned for students' use of selected strategies, and the remainder can focus on accuracy as well as content knowledge.

HOMEWORK

Homework assignments can include strategy reflection sheets or notecards, where students record the executive function strategies they use when they complete their reading, writing, or math homework, or when they study. For instance, instead of only writing down vocabulary words and their definitions, students could be required to select the five most difficult words and to create a memory strategy such as a Triple Note Tote card (see later discussion). In addition to using strategy reflection sheets or cards, students can be required to prepare a presentation about their favorite homework strategy. A grade can be assigned for how well each student explains the strategy and demonstrates how it works. For example, fifth graders who were involved in our *Drive to Thrive* study described their uses of strategies as follows:

- "I have a checklist for what I need to bring home with me."
- "I use Triple Note Tote to learn vocabulary and the colonies for social studies."
- "For social studies, I use crazy phrases before the test."
- "I use ANN E. BOA from BrainCogs."
- "I use webbing for the MCAS [Massachusetts Comprehensive Assessment System] open response."

EFFORT GRADES

An effort grade can be assigned to indicate how frequently students use strategies to prepare and study for their tests. This can also serve as a tracking system for teachers to document whether students' approaches to studying for tests change and improve over time.

TEST PREPARATION AND TEST-TAKING STRATEGIES

Strategies used to study and complete tests should receive additional credit. Students should be required to use strategies to answer selected questions on tests, and part of the grade should be assigned for their use of strategies.

Getting "Buy-In" from Students

One of the most important underpinnings of successful strategy instruction is to get "buy-in" from students, so that they feel invested in using appropriate strategies. A powerful approach is to show students how specific strategies can improve their performance. For instance, within the first week of school, students can be given a challenging test that requires the use of working memory strategies to do well. After the test, students can be taught a number of different memory strategies (e.g., the crazy phrases, acronyms, and cartoon strategies from BrainCogs). Students can be required to practice and use the strategies in class. When the teacher feels that students understand the memory strategies and can apply them, then the same test can be given again. After the teacher has scored the second test, students can review their scores on both tests, to compare their performance with and without the use of the memory strategies. Students will then have evidence of how strategies can improve their performance in school and on tests.

There are likely to be some students who feel they do not need strategies to help them in school because they already do well. It is important to help them understand that tasks will become more complex and challenging in high school and college, and that executive function strategies are essential for their continued academic success. All students—including high achievers, low achievers, and students with diagnosed learning and attention problems—need to learn strategies, particularly in the earlier grades, so that they can prepare for the fast pace and heavy organizational demands of academic work in the higher grades.

Strategy Group, Pair, Share

Strategy instruction should be provided in whole groups, small groups, and pairs. Just as teachers group students carefully for content area instruction, they also need to group students carefully for strategy instruction. Work on differentiated instruction (Tomlinson, 1999; Tomlinson, Brimijoin, & Narvaez, 2008) has shown

that grouping students should be a dynamic process that depends on students' (1) content knowledge, (2) expertise, and (3) strategy preferences. In other words, students can be grouped together flexibly to learn a specific skill or strategy. These groups can be formed and disbanded for a variety of purposes. For instance, a student who is a second-language learner could be paired with a student who is a fluent speaker when the class practices using a specific strategy. The second-language learner then receives one-on-one support when practicing the strategy.

The Power of Peer Tutoring and Peer Mentoring

Peer mentoring and peer tutoring are powerful ways of teaching strategies and have significantly more positive effects on students' academic achievement, self-esteem, social competency, and peer relationships than teacher instruction alone (Mastropieri et al., 2001; Mastropieri & Scruggs, 2000). Furthermore, structured peer-tutoring programs have been shown to be extremely effective for students with and without learning difficulties (Fuchs, Fuchs, & Burish, 2000).

BrainCogs Squad is one example of an effective peer-tutoring system that is designed to facilitate strategy instruction in groups of students. It has been used effectively with middle school and high school students as part of ResearchILD's *Drive to Thrive* and *SMARTS* programs (Meltzer et al., 2007b). A BrainCogs Squad consists of approximately five to six students who are selected by the teacher to be peer tutors and are trained to navigate the BrainCogs software, apply the learning strategies, work with their peers, and assist teachers in using BrainCogs. BrainCogs is a multimedia system for teaching 13 strategies in the five key executive function areas (ResearchILD & FableVision, 2003) (see Figures 2.6a and 2.6b).

The BrainCogs Squad peer-tutoring system helps to create a bottom-up approach for teaching strategies that increases students' "buy-in," as well as their willingness to make the effort needed to use strategies in their classwork and homework. Each BrainCogs Squad peer tutor meets with five other students once a week for 1 hour to teach, review, and apply the selected strategy of the week. The 13 strategies are taught by the teacher and the BrainCogs Squad captains over the course of 13–26 weeks, depending on whether or not specific strategies need to be reviewed and practiced. Over these 13 weeks, the "buzz" created by the BrainCogs Squad in the class motivates students to learn and apply executive function strategies to their schoolwork, as the following comments by fifth graders in a *Drive to Thrive* classroom indicate:

"I like BrainCogs Squad because . . .
"The people that are teaching you may be your friends, and I think it's pretty cool."
"It's very helpful for studying."
"I understood the strategies better when my friend explained them to me."
"I could memorize something easily, using crazy phrases and cartoons."

FIGURE 2.6a. The five executive function areas covered in BrainCogs. From ResearchILD and FableVision (2003). Copyright 2003 by ResearchILD and FableVision. Reprinted by permission of ResearchILD.

The Five Cogs

The five "cogs" in this CD-ROM represent different cognitive processes for learning and studying. There are 13 total strategies taught within the program, grouped according to the different cogs.

remembering

- Crazy phrases – make up a wacky sentence to help remember names, places, or events in a specific order.
- Acronyms - a real or nonsense word where each letter in the word is the first letter of something you're trying to remember.
- Cartoons – a picture you draw that helps you remember key information.

organizing

- Strategy cards – an index card with a question and a strategy for remembering the answer on one side, and the answer on the other.
- Triple Note Tote – a chart to use for taking notes from a textbook.
- Mapping & Webbing – a visual way to organize main ideas and supporting details.

prioritizing

- 1-2-3 Blastoff! – helps you relax, read carefully and begin a test.
- Red Flag – a mark to make on a test next to any question that's too hard to answer right away.
- ANN E. BOA – an acronym to help find seven tricky words on tests.

shifting

- Shifty Words – see more than one meaning in a word by shifting the accent or making nouns into verbs and vice versa.
- Shifty Images – find the meaning of a word by looking for clues in the surrounding words.

checking

- Your Personal Checklist – make a list of the usual mistakes you tend to make on a test.
- RE-view – how to change your focus at the end of a test so checking your answers is more successful.

FIGURE 2.6b. Thirteen strategies in five executive function areas can be effectively taught using a peer-tutoring model embedded in a strategic classroom culture. From ResearchILD and FableVision (2003). Copyright 2003 by ResearchILD and FableVision. Reprinted by permission of ResearchILD.

"When friends are teaching, it is way more laid back."
"You can learn new things about organizing things."

Similarly, the BrainCogs Squad captains who provide the peer tutoring feel empowered, as reflected in these comments:

"I like being a BrainCogs Squad peer tutor because . . . "
"I love all of it! Running the program is a lot of fun."
"I like being able to teach others."
"I like getting to help other people."
"Things get taught in a language kids can understand."
"It makes it easier because they're your friends, so you know how to work with them."

The BrainCogs Squad captains help to spark effort, motivation, and persistence among both themselves and their classmates. The peer-tutoring model increases student engagement, which in turn influences student motivation and achievement of classroom goals (Ryan & Deci, 2000). Furthermore, the BrainCogs Squad program turns the teaching and learning of strategies over to the students themselves. As a result, the students feel more invested in using these strategies and are willing to put forth more effort into learning, applying, and reviewing strategies. BrainCogs Squad has been an extremely successful component of the *Drive to Thrive* classrooms, and our research findings have demonstrated the sustainability of a classroom program that includes a peer-tutoring component focused on teaching executive function strategies (Meltzer et al., 2007a; Meltzer et al., 2010; Noeder, 2007).

Model Lesson Plans for Creating Strategic Classrooms

For teachers who plan their school year with a focus on creating a *Drive to Thrive* culture in their classrooms, it may be helpful to follow the broad time frame and series of lesson plans in Table 2.3. As this table shows, teachers can focus on each of the five executive function areas for approximately 2 months at a time. Teachers are encouraged to use this table as a guide and to teach these executive function processes flexibly on a continuing basis. A variety of techniques can be used, including software programs such as BrainCogs and Essay Express (ResearchILD & FableVision, 2005), which provide systematic and explicit presentations of strategies addressing the core executive function processes. In addition, teachers can scaffold the strategies and can require students to apply them to a range of tasks spanning nonacademic and academic areas. For instance, one idea is to have students plan and present a "strategy fair" at the end of the year, where they can creatively share with other classes what they have learned about executive function strategies.

TABLE 2.3. Timeline for Teaching Executive Function Strategies over the Course of One School Year

September to mid-October

Overview: Laying the foundation for strategy instruction

- *Barometer reading*: Establish where your students are in their understanding of strategies and metacognition (e.g. use the ME and STRATUS from the MetaCOG, as well as reflection sheets).
- *Create buy-in*: Give your students a challenging test at the beginning of the first week. A week later, after you have introduced and modeled a memory strategy, give students the same test and require them to use strategies to complete the test. Have them compare their "before" and "after" scores.
- *Introduce strategy language and define the following concepts and terms*: Strategies; executive function processes used in the classroom (e.g., organizing, prioritizing, memorizing, checking, shifting); metacognition; self-reflection.
- *Model strategies*: Explicitly model a few strategies for the students, to help them understand what they are.
- *Establish a strategic classroom*: This includes setting up strategy notebooks, a strategy board at the front of the classroom, a strategy wall, strategy reflection sheet routines, strategy-sharing discussions, and a BrainCogs Squad.
- *Student reflection*: Ask students to reflect on what they have learned. For instance, what terms did they have difficulty learning? Are there concepts they did not understand? What can they do to understand the concepts/terms better? Students should be asked to reflect on their learning consistently, to promote metacognition.

Mid-October to end of November

Overview: Memory strategies

- *Barometer reading*: Assess where your students are in their understanding of executive function strategies and metacognition (e.g., give them a test on the concepts and terms, and/or use reflection sheets).
- *Introduce and define memory strategies with an emphasis on working memory strategies*: Introduce crazy phrases, acronyms, and cartoons from the BrainCogs software, and/or use the memory strategies from Chapter 5.
- *Model memory strategies*: Explicitly model *what, when*, and *how* strategies can be used for retrieving information and mentally "juggling" details. Model for students how to be metacognitive learners by demonstrating (e.g., in a think-aloud) how to approach a problem and apply a strategy.
- *Active student learning*: Give students time in the classroom to learn the memory strategies and to apply them. Let them individually (or in dyads and groups) work through the process of exploring, experimenting, and assessing the effectiveness of each strategy.
- *Reinforce memory strategies*: Embed general and working memory strategies into lesson plans; use practice labs; require evidence of strategy use on homework/tests; have the BrainCogs Squad review and apply the selected strategy of the week with other students.
- *Student reflection*: Ask students to reflect on what they have learned. For instance, what memory strategy worked the best for them and why? For what kinds of problems could they use memory strategies?
- *Challenge students*: After your students have mastered the different strategies, challenge them to come up with their own strategies. That is, make them think critically about what works best for themselves as learners. Have the students share their original strategies with other students.

Beginning of December to mid-February

Overview: Organizing strategies

- *Barometer reading*: Assess where your students are in their understanding and use of general and working memory strategies (e.g., give them a test on the different types of memory strategies they learned and when/how to use them, and/or use reflection sheets). If you find that the students need more instruction and practice time with the strategies, then do not move on. Once you feel they understand the concepts and can apply them, then move forward.

(cont.)

TABLE 2.3. *(cont.)*

- *Introduce and define organization strategies*: For example, you can introduce strategy cards, Triple Note Tote, and mapping/webbing from the BrainCogs software, and/or use the organizing strategies from Chapter 4.
- *Model organizing strategies*: Explicitly model *what, when*, and *how* organizing strategies are used. Also model for students how to be metacognitive learners by demonstrating (e.g., in a think-aloud) how to approach a problem and apply a strategy.
- *Active student learning*: Give students time in the classroom to learn the organizing strategies and to apply them. Let them individually (or in dyads and groups) work through the process of exploring, experimenting, and assessing the effectiveness of each strategy.
- *Reinforce organizing strategies*: Embed organizing strategies into lesson plans (e.g., Triple Note Tote can be used for taking notes in class); use practice labs; require evidence of strategy use on homework/tests; have the BrainCogs Squad review and apply the selected strategy of the week with other students.
- *Student reflection*: Ask students to reflect on what they have learned. For instance, what organizing strategy worked the best for them and why? For what kinds of problems could they use organizing strategies?
- *Challenge students*: After your students have mastered the different strategies, challenge them to come up with their own strategies. That is, make them think critically about what works best for themselves as learners. Challenge the students to teach their strategy to other students or to the class. Then have a discussion about what worked and what didn't.

Mid-February to beginning of April

Overview: Prioritizing strategies

- *Barometer reading*: Assess where your students are in their understanding and use of organizing strategies (e.g., give them a test on the different types of organizing strategies they learned and when/how to use them, and/or use reflection sheets). If you find that the students need more instruction and practice time with the strategies, then give them more time before moving on.
- *Introduce and define prioritizing strategies*: For example, you can introduce 1-2-3 Blastoff!, Red Flag, and ANN E. BOA from the BrainCogs software, and/or use the prioritizing strategies from Chapter 3.
- *Model prioritizing strategies*: Explicitly model *what, when*, and *how* prioritizing strategies are used. Also model for students how to be a metacognitive learner by demonstrating (e.g., in a think-aloud) how to approach a problem and apply a strategy.
- *Active student learning*: Give students time in the classroom to learn the prioritizing strategies and to apply them. Let them individually (or in dyads and groups) work through the process of exploring, experimenting, and assessing the effectiveness of each strategy.
- *Reinforce prioritizing strategies*: Embed prioritizing strategies into lesson plans; use practice labs; require evidence of prioritizing strategy use on homework and tests; have the BrainCogs Squad review and apply the selected strategy of the week with other students.
- *Student reflection*: Ask students to reflect on what they have learned. For instance, what prioritizing strategy worked the best for them and why? For what kinds of problems could they use prioritizing strategies?
- *Challenge students*: After your students have mastered the different strategies, challenge them to come up with their own strategies. That is, make them think critically about what works best for themselves as learners. Challenge the students to teach their strategy to other students or to the class. Then have a discussion about what worked and what didn't.

Beginning of April to mid-May

Overview: Shifting and checking routines

- *Barometer reading*: Assess where your students are in their understanding and use of prioritizing strategies (e.g., give them a test on the different types of prioritizing strategies they learned and when/how to use them, and/or use reflection sheets). If you find that the students need more instruction and practice time with the strategies, then give them more time before moving on.
- *Introduce and define shifting and checking strategies*: For example, you can introduce shifty words, shifty images, personal checklists, and RE-view from the BrainCogs software, and/or use the shifting and checking strategies from Chapters 6 and 7.

(cont.)

TABLE 2.3. *(cont.)*

- *Model shifting and checking strategies*: Explicitly model *what, when*, and *how* shifting and checking strategies are used. Also model for students how to be a metacognitive learner by demonstrating (e.g., in a think-aloud) how to approach a problem and apply a strategy.
- *Active student learning*: Give students time in the classroom to learn the shifting and checking strategies and to apply them. Let them individually (or in dyads and groups) work through the process of exploring, experimenting, and assessing the effectiveness of each strategy.
- *Reinforce shifting and checking strategies*: Embed shifting and checking strategies into lesson plans; use practice labs; require evidence of shifting and/or checking strategy use on homework and tests; have the BrainCogs Squad review and apply the selected strategy of the week with other students.
- *Student reflection*: Ask students to reflect on what they have learned. For instance, what shifting or checking strategy worked the best for them and why? For wahat kinds of problems could they use shifting and checking strategies?
- *Challenge students*: After your students have mastered the different strategies, challenge them to come up with their own strategies. That is, make them think critically about what works best for themselves as learners. Challenge the students to teach their strategy to other students or to the class. Then have a discussion about what worked and what didn't.

Mid-May to June

Overview: Review of all strategies

- *Barometer reading*: Assess where your students are in their understanding and use of *all* the strategies (e.g., give them a test on the different types of strategies they learned and when/how to use them, and/or use reflection sheets). If you find that the students need more instruction and practice time with certain strategies, then provide classwide instruction as well as BrainCogs Squad peer instruction.
- *Strategy fair*: Your students can create a "strategy fair" where they display their favorite strategies and demonstrate their use to other classes in their school. This provides an incentive for the students to review the strategies they have learned over the past year.
- *Student reflection*: Ask students to reflect on what they have learned about strategies during the school year. As a class, you can discuss how to continue to use strategies the following school year, so that your students hold onto what they have learned.

WHAT EXECUTIVE FUNCTION STRATEGIES SHOULD BE EMBEDDED IN THE CURRICULUM ACROSS SUBJECT AND CONTENT AREAS?

> I learned very specific strategies that allowed me to succeed in school and in life today like multicolumn notes. These were a lifesaver for me. My notes would look scattered on a page. With this system, I made a hierarchy of information and had it structured around itself and I could relate it to things. . . . So if I had a history test I could think back to that note page and it all fitted into place—as opposed to remembering a liquefied gobble of notes that I had picked up here and there along the way.
>
> —BRANDON, COLLEGE GRADUATE

Reading comprehension, writing, math problem solving, summarizing, note taking, long-term projects, studying, and test taking all require students to integrate and organize multiple subprocesses simultaneously and to shift approaches on an ongoing basis. Success in all these academic areas is dependent on students' ability to make use of executive function processes in the five core areas. When strategies are embedded in the teaching of reading, writing, math, and content area material, it is possible to address these key executive function processes, as shown in Figure 2.7 and Table 2.4.

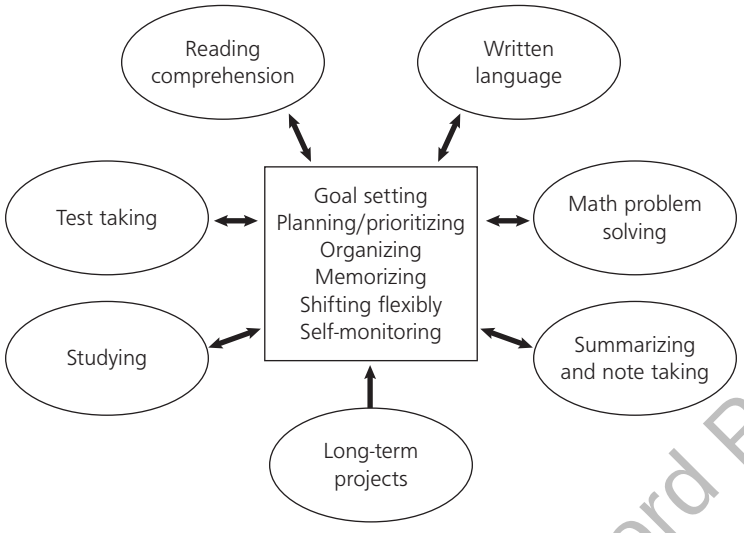


FIGURE 2.7. Core executive function processes that affect academic performance.

In the section below, we summarize a few of the strategies that can be used to teach writing, the basis for most academic work from the early grades into college. Because our 21st-century schools now emphasize strong writing skills as a requirement for academic success, we discuss strategies that can be incorporated into daily writing instruction as well as note taking, studying, and test taking. Teachers can use this discussion as guidance for strategy instruction in other academic areas (e.g., math, social studies, science). When these strategies are successfully incorporated into instruction, they increase the likelihood of future strategy use and academic success (Graham & Harris, 2003; Harris & Graham, 1996; Harris, Graham, & Mason, 2003; Meltzer et al., 2007b; Reid & Lienemann, 2006; Scardamalia & Bereiter, 1985; Zimmerman & Risemberg, 1997).

Writing

> I used BOTEC right now when I was doing my English test. I described it—Brainstorm, Organization, Thesis, Elaborate, Conclusion . . .—you know. Then I just attacked the thesis and examples first, and the rest just came.
>
> —LEVON, 11TH GRADER

Not only are writing skills heavily emphasized in today's schools, but standards-based tests, including the SAT, now incorporate a required writing section. As a result of this shift, students from late elementary school onward are frequently required to complete lengthy writing assignments, long-term projects, and essay tests that rely on executive function processes. Writing can be an overwhelming process for many students, because it requires the coordination and integration of a broad range of cognitive processes and skills, including memory, planning, generating text, and editing/revising their work (Flower et al., 1990; Flower, Wallace,

TABLE 2.4. Embedding Executive Function Processes and Strategies across Curriculum Areas

Curriculum area	Executive function processes involved	Strategies
Reading comprehension	*Planning*	• Use monthly calendars to plan and break down the reading of longer texts.
	Prioritizing	• Have students use active reading strategies that ask them to look for and mark specific aspects of the text (characters, setting, themes, etc.).
	Organizing	• Require students to use Post-it notes to summarize each chapter of a novel.
	Organizing	• Have students use story organizers to summarize stories for book reports.
	Shifting	• Have students predict different endings to a story.
Written language	*Planning*	• Require students to plan long-term writing assignments by using monthly and weekly calendars and setting short-term "due dates" for themselves.
	Prioritizing	• Have students use graphic organizers for brainstorming, prioritizing, and organizing ideas.
	Organizing	• Provide templates or specific guidelines for writing thesis statements, introductions, body paragraphs, and conclusions.
	Self-checking	• Help students develop personalized editing checklists based on previous assignments. Provide a specific rubric for students to check their work.
	Shifting	• Emphasize how to shift from the main ideas to supporting details when writing.
Studying and test taking	*Planning*	• Have students plan their study schedule for upcoming tests.
	Organizing	• Have students take notes from the textbook in a question–answer or Triple Note Tote format for later use as a study tool.
	Shifting	• Teach students to rephrase topic sentences as questions, and to use context clues to understand ambiguities and to interpret questions.
	Memorizing	• When requiring students to take notes and to study history or biology, teach them to develop their own acronyms or crazy phrases to help them to retrieve and manipulate the information.
	Self-checking	• Allow students to bring personalized checklists to tests, to remind them to check for their own common errors.

Norris, & Burnett, 1994). Many students also struggle to organize their ideas for writing, and they need the writing process to be broken down explicitly with organizers and templates that match both the goals of the assignment and their learning styles (Graham & Harris, 2003; Harris & Graham, 1996). They benefit when they are systematically taught strategies that address executive function processes (Bruning & Horn, 2000; MacArthur, Graham, & Fitzgerald, 2006; Ransdell & Levy, 1996; Zimmerman & Risemberg, 1997).

Writing templates and graphic organizers need to be explicitly structured in such a way that students can translate their ideas into paragraph form. These graphic organizers can be used successfully for different content areas and genres

of writing, including book reports, persuasive essays, descriptive paragraphs, news articles, summaries, reflections, and narratives (Schunk & Swartz, 1993). Graphic organizers taught in middle school to help students plan and prioritize their ideas for essay writing can be extrapolated to more complex reports and papers at the high school and college levels (see Chapter 1). Rubrics like the one in Figure 2.8, from the *Drive to Thrive* program, can help teachers and students to analyze the writing process and embed executive function strategies in their teaching. For instance, the Figure 2.8 rubric can be used by teachers to explain, teach, and grade the writing process. In turn, students can use this type of rubric to provide structure when they are required to write a paper or complete an essay question on a test.

Students often struggle to break down the writing process into manageable components, and they benefit from strategies that help them to analyze, structure, and remember the steps involved. Strategies that provide such structure help students to plan, organize, prioritize, and check their work, so that writing a paper does not feel as overwhelming. BOTEC, a strategy from Essay Express (ResearchILD & FableVision, 2005), helps students to approach the writing process systematically through Brainstorming, Organizing, generating a Topic sentence (or Thesis), providing supportive Evidence (of Elaborating), and generating a Conclusion. Figure 2.9 illustrates a template for one part of the BOTEC strategy (marshaling evidence). When students experience success as a result of using a strategy such as BOTEC, they are more willing to apply the strategy to more complex writing assignments and projects.

As part of their writing assignments, students can also be required to complete and submit strategy reflection sheets. Strategy reflection sheets that incorporate structured questions and a multiple-choice format remind students of the range of strategies they can apply in producing and editing their written work (see Figure 2.10). When students understand the range of appropriate strategies, they can then be required to complete open-ended strategy reflection sheets (see Figure 2.11), which give them opportunities to use strategies creatively. Also, when they are given credit for using these strategies, they are more likely to make the effort needed to continue this process.

Note Taking, Studying, and Taking Tests

Summarizing, note taking, and studying are extremely challenging for students with learning difficulties, because all these tasks require the coordination and integration of multiple subskills and processes. On timed tasks, these students experience even more difficulty, and their performance often does not match their intellectual ability.

Strategies that help students to streamline and structure a large volume of information can make a significant difference in their performance. Strategies for organizing, prioritizing, and memorizing information are extremely important,

***Drive to Thrive*: Writing Rubric**

Executive Function Processes	Below Average	Needs Improvement	Proficient	Exemplary Performance	Earned Points
Planning	**1 point** Little or no evidence of planning.	**2 points** A planning sheet is included, but it is incomplete.	**3 points** Student includes an outline or graphic organizer that is partially filled out. Planner is somewhat related to final essay.	**4 points** Student includes completely filled-out outline or graphic organizer, and final essay reflects its use.	
Organizing	**1 point** Student does not include a rough draft.	**2 points** Student includes a partially completed rough draft that does not follow an organizational plan.	**3 points** Student includes a rough draft that roughly follows his/her outline or graphic organizer.	**4 points** Student includes a rough draft that is well organized and follows the planning tool.	
Shifting	**1 point** Student shows no changes from the rough draft to the final draft.	**2 points** Only slight evidence of improvement is seen between the rough and final drafts.	**3 points** Student makes at least two changes beyond spelling and punctuation in the final draft.	**4 points** The student takes a different point of view in the final draft, or makes at least three major improvements between the rough draft and the final draft.	
Prioritizing	**1 point** Essay includes no transition words to show sequence, contrast, or relative importance of ideas.	**2 points** Essay includes only transition words, such as "and," "also," and "but."	**3 points** Essay includes two more sophisticated transition words that indicate sequence, importance, or contrast, such as "however," "on the other hand," "another example," etc.	**4 points** Essay includes more than two transition words to connect ideas or paragraphs.	
Checking	**1 point** Student does not submit a checklist with the writing project.	**2 points** Student checks for a few mistakes but not for others.	**3 points** Student checks off the checklist to indicate that he/she checked most of the items on the list.	**4 points** Student submits checklist indicating that he/she has checked for each item on the list. Student's writing reflects no errors that are listed on the checklist.	
				Score:	

FIGURE 2.8. Writing rubric from the *Drive to Thrive* program. Adapted from Meltzer, Sales Pollica, and Barzillai (2007b). Copyright 2007 by The Guilford Press. Adapted by permission.

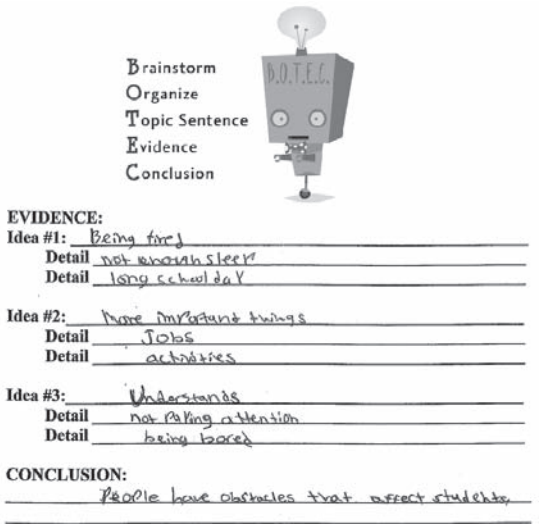


FIGURE 2.9. A ninth grader in the *SMARTS* program uses the BOTEC strategy to organize evidence for a project presentation about reducing the homework load in school. The template is from ResearchILD and FableVision (2005). Copyright 2005 by ResearchILD and FableVision. Reprinted by permission of ResearchILD.

Strategy Reflection Sheet

What strategies did you use for this writing assignment?

_____ BOTEC	_____ Personalized checklist
_____ Mapping and webbing	_____ Sentence starters
_____ Graphic organizer	_____ Introduction template
_____ Linear outline	_____ Other

© ResearchILD 2004

FIGURE 2.10. Strategy reflection sheet for writing: Structured questions that scaffold the writing process.

Strategy Reflection Sheet

What strategies did you use for this writing assignment?

_____

_____

© ResearchILD 2004

FIGURE 2.11. Strategy reflection sheet for writing: Open-ended questions.

as these reduce the load on working memory and improve efficiency as well as accuracy.

In this section, we briefly summarize a few strategies that are particularly useful for a wide range of academic tasks; Chapters 3–7 describe specific strategies for each of the five executive function areas in greater detail. Graphic organizers and three-column note-taking systems help students to organize and memorize information simultaneously. One example is the Triple Note Tote strategy (from BrainCogs; ResearchILD & FableVision, 2003), which can be used for taking notes, summarizing, and memorizing information in content areas such as key terms or new vocabulary. In all cases, the major concept is written in the first column, important details in the second column, and a paired visual–verbal strategy for remembering the information in the third column (see Figures 2.12a and 2.12b).

Students also benefit from memory strategies such as mnemonics and crazy phrases for organizing information, reducing the memory load, and retrieving information for tests or projects. For example, when students are required to study the states and their capitals for a test, crazy phrases and personalized diagrams help them to chunk the information for easier recall (see Chapter 5 for more specific examples). Finally, personalized error checklists help students to edit and correct their written work during homework and tests. Once students analyze their most common errors, they can develop a checklist and an acronym to help them to remember the items on the list, so they can check their work independently. Although general checklists work for many students, personalized checklists help students to be aware of and search for their own most common errors (Dunlap & Dunlap, 1989). One student may consistently make spelling errors but may have no difficulty with organization; another may have the opposite profile. Figure 2.13 illustrates a personalized checking strategy developed by a fifth grader who used a crazy phrase and acronym to remember his most frequent errors and the details he needed to check. Personalized checklists like this one are useful for all students, whether or not they have difficulty completing their homework accurately, make careless errors on tests, have difficulty with the mechanics of writing, or struggle to remember the steps in a math problem.

CONCLUSION

When schools build an executive function culture across classrooms, they empower students to learn *how* to learn and *how* to solve problems flexibly—processes that are critically important for success in the global world we now live in. When schools and families foster the same emphasis on learning strategies, persistence and a strong work ethic are promoted, and these should lead to academic and life success. As students learn effective approaches to their work, their motivation, self-confidence, and resilience also increase.

Definitions

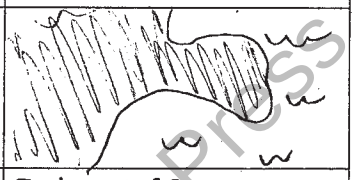
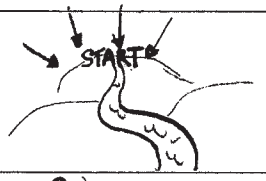
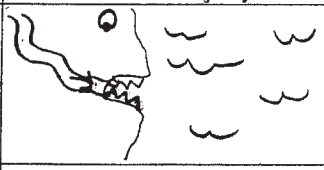
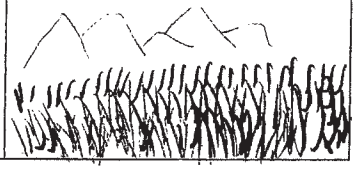
Term	Definition	Example/Strategy
River Basin	An area of land drained by a river and its tributaries often surrounded by land of higher elevation	**Amazon basin**
Peninsula	A narrow strip of land surrounded on 3 sides by water	
Isthmus	A narrow strip of land connecting 2 larger pieces of land	Isthmus of Panama
Elevation	height of the land	elevator
River source	the start of a river usually in the highlands	
River mouth	the place where the river flows into a larger body of water	
Plateau	a flat land at high elevation	
Plain	an area of level land usually at low elevation and often covered by grasses	

FIGURE 2.12a. Triple Note Tote strategy from BrainCogs. The template is from ResearchILD and FableVision (2003). Copyright 2003 by ResearchILD and FableVision. Reprinted by permission of ResearchILD.

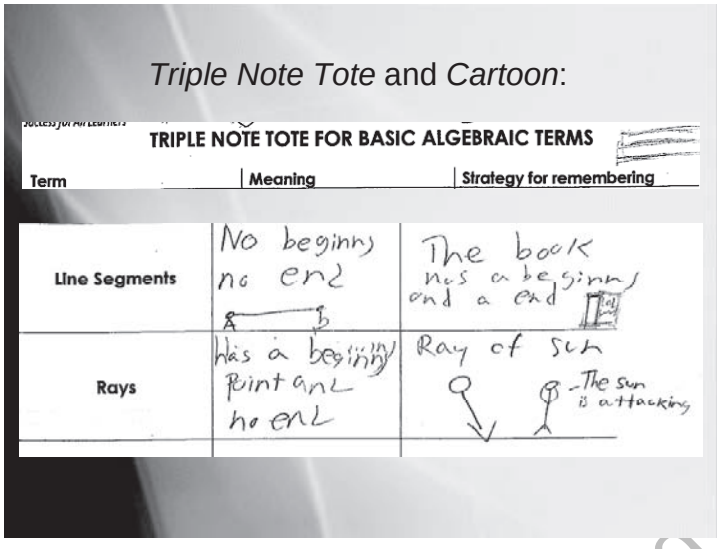


FIGURE 2.12b. Triple Note Tote strategy from BrainCogs. The template is from ResearchILD and FableVision (2003). Copyright 2003 by ResearchILD and FableVision. Reprinted by permission of ResearchILD.

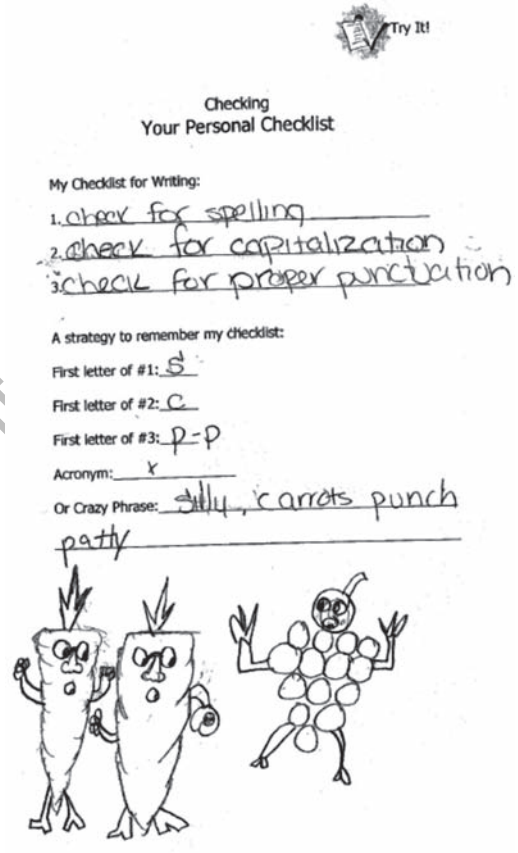


FIGURE 2.13. A fifth grader's personalized checklist for writing. The checklist itself is from ResearchILD and FableVision (2003). Copyright 2003 by ResearchILD and FableVision. Reprinted by permission of ResearchILD.