

## What is Cognitive Strategy Instruction?

GO FOR IT

Cognitive strategy instruction (CSI) is an explicit instructional approach that teaches students specific and general cognitive strategies to improve learning and performance by facilitating information processing. CSI embeds metacognitive or self-regulation strategies in structured cognitive routines that help students monitor and evaluate their comprehension. The ability to identify and utilize effective strategies is a necessary skill for academic success. Many students, especially students with learning disabilities (LD), are ineffective and inefficient strategic learners. CSI enables students to become strategic and self-regulated learners (Dole, Nokes, & Drits, 2009; Pressley, Woloshyn, Lysynchuk, Martin, Wood, & Willoughby, 1990). Using proven procedures associated with explicit instruction including process modeling, verbal rehearsal, scaffolded instruction, guided and distributed practice, and self-monitoring, students learn, apply, and internalize a cognitive routine and develop the ability to use it automatically and flexibly (Montague & Dietz, 2009). The metacognitive component of CSI helps students focus on the task and regulate and monitor their performance (Palincsar & Brown, 1984). Instruction in self-regulation strategies promotes strategy maintenance and generalization.

Although CSI has been applied to a variety of academic tasks, this *Current Practice Alert* will highlight its applications in comprehending expository text, writing opinion essays, and solving math word problems. Regardless of the domain in which CSI is used, the approach follows a consistent format: Teachers (a) develop and activate background knowledge of students, (b) describe and discuss the strategy, (c) model application of the strategy, (d) have students memorize the strategy, (e) support students' use of the strategy, and (f) move students toward independent use of the strategy (Harris, Graham, Brindle, & Sandmel, 2009). The theoretical underpinnings of CSI are rooted in both cognitive and behavioral theories of learning. Cognitive behavior modification, as described by Meichenbaum (1977), influenced the stages utilized in the CSI approach and the use of self-talk to change behavior. Social development theory (Vygotsky, 1978) supported purposeful teacher-student interactions and the use of modeling that demonstrates how individuals think and behave as they engage in academic tasks.

## For Whom is CSI Intended?

Much of the research on CSI has focused on students with LD, but studies also have demonstrated its effectiveness for students with other disabilities such as spina bifida (Coughlin & Montague,

2010) and Asperger's Syndrome (Whitby, 2009). Additionally, research has determined that CSI can benefit many students without disabilities who struggle academically (e.g., Harris, Graham, & Mason, 2006; Montague, Enders, & Dietz, 2011b). CSI can facilitate both simple and complex tasks for learners and, thus, is appropriate for a variety of tasks across age groups. As noted, an important component of CSI instruction is teaching students self-regulation strategies. Although these strategies begin developing when children are young, they typically mature sometime during adolescence and early adulthood (Kass & Maddux, 2005; Smith, 2004). Consequently, various applications of CSI have been implemented effectively with students in elementary, secondary, and postsecondary settings (Wong, Harris, Graham, & Butler, 2003). CSI also seems to have an impact on students' self-efficacy, motivation, and attitude toward learning.

## How Adequate is the Research Knowledge Base?

For more than three decades, CSI has been used across academic domains and tasks with students of varying age and ability groups and has consistently shown its positive effects on student learning. A meta-analysis reviewing 30 years of intervention research with students with LD identified CSI and direct instruction as the two most effective instructional approaches for students with LD (Swanson, Hoskyn, & Lee, 1999). These two approaches have many common instructional procedures such as modeling, cueing and prompting, corrective and positive feedback, controlling task difficulty, sequencing instruction, and directed questioning. School-based research repeatedly has established the effectiveness of CSI. For example, the University of Kansas Center for Research on Learning developed and researched numerous learning strategies to enhance content learning for adolescents with LD (for a review, see Schumaker & Deshler, 2003).

The teaching method for CSI is explicit instruction, which incorporates validated instructional practices (Swanson et al., 1999) and utilizes a highly interactive, sequenced approach consisting of guided instruction and practice leading to internalization of the strategic routine and independent performance of the task over time. CSI also explicitly incorporates components addressing students' motivation, self-efficacy, and attitudes. The content of the strategic routine varies according to the academic domain or task. To illustrate application of CSI with students with LD, we use three tasks: (a) comprehending expository text (Klingner, Vaughn, Arguelles, Hughes, & Leftwich, 2004), (b) writing an opinion essay (Harris & Graham, 2009), and (c) solving math word problems (Montague, Enders, & Dietz, 2011a). For research

reviews of the CSI interventions across these three academic domains and tasks, see Jitendra, Burgess, and Gajria, 2011; Harris and Graham, 2009; and Montague and Dietz, 2009. It is important to remember that students differ considerably in ability, achievement, motivation, interest, and other characteristics that may facilitate or impede learning. Therefore, it is important to tailor CSI to meet the strengths and needs of individual children.

## Comprehending Expository Text

Collaborative Strategic Reading (CSR) is a research-based procedure for improving understanding of expository text by upper elementary and middle school students in inclusive classrooms (Klingner et al., 2004; Vaughn et al., in press). The foundational CSR strategies are summarizing, questioning, and comprehension monitoring. CSR uses a CSI interactive format to facilitate strategy application before, during, and after reading text. Students work in cooperative groups as Leader, Clunk Expert, Gist Expert, and Question Expert to guide the group in meaningful discussions during the following comprehension activities. Box 1 shows the basic steps in the procedure.

### Collaborative Strategic Reading Steps

#### Before Reading

##### Preview

- Guide students in activating background knowledge, making predictions, and identifying the purpose (i.e., discuss the title, section and paragraph headings, illustrations, maps, tables, and so forth).
- Identify key vocabulary and proper nouns.

#### During Reading

**Click and Clunk** (*Understanding = click, Need help to understand = clunk, Use fix-up strategies.*)

- Reread the sentence for context clues.
- Reread the sentences before and after the “clunk.”
- Look at the word structure for root words and affixes.

**Get the Gist** (*Paraphrase main idea.*)

- Restate main idea.
- Provide supporting details.

#### After Reading

##### Wrap-up

- Formulate questions about the passage.
- Review main ideas.
- Write one or two of the most important ideas.

*Box 1: An example of a reading comprehension procedure*

## Writing an Opinion Essay

Self-Regulated Strategy Development (SRSD) in writing is a framework that combines the CSI model with evidence-based recommendations for writing instruction to improve students’ planning, production, and revision of text (Harris & Graham, 2009). Instruction using SRSD follows the six steps of CSI (i.e., develop and activate background knowledge, discuss the strategy, model it, memorize it, support it, and perform it independently), but the specific strategy to be taught depends on the genre of interest. For example, the example in Box 2 shows routine for writing an opinion essay. The mnemonic, POW-TREE, helps students remember the strategy and guides them as they formulate and write the essay.

Students learn to develop background knowledge and set a purpose through a teacher-guided discussion on opinion writing. The teacher models use of the strategy for students by thinking

out loud while employing the self-regulation steps (i.e., self-instruction, self-questioning, and self-monitoring). Graphic organizers, cue cards, and pictures support instruction. The teacher provides guided practice until the students are able to use POW-TREE independently. For more information about this strategic routine, see [TeachingLD.org](http://TeachingLD.org) for DLD/DR *Current Practice Alert #17* on SRSD.

### The POW-TREE Strategy

- P** – Pick an idea.
- O** – Organize notes.
- W** – Write and say more.
- T** – Topic sentence.
- R** – Reasons – at least three.
- E** – Explain each reason.
- E** – Ending.

*Box 2: An example of an SRSD strategy*

## Math Problem Solving

*Solve It!* (Montague, 2003) is a CSI intervention that teaches students the cognitive processes and self-regulation strategies that are necessary to solve math word problems effectively and efficiently. This CSI routine shown in Box 3 includes seven cognitive processes (read, paraphrase, visualize, hypothesize, estimate, compute, and check) and corresponding self-regulation strategies that guide students as they give themselves instructions, ask themselves questions, and monitor their performance as they solve problems. Following the CSI framework, students first discuss why problem solving is important and the importance of becoming better problem solvers, thus establishing the purpose for learning *Solve It!* Then students are introduced to the routine and required to reach 100% mastery in memorizing the seven cognitive processes. The teacher then models the routine while solving word problems, using a think-aloud process that demonstrates how successful problem solvers think and behave. Students are given weekly practice sessions and become models for other students. The research on *Solve It!* has shown it to be effective for all learners, but particularly beneficial for students with LD when instruction is embedded in the curriculum and distributed over time (Montague et al., 2011a; Montague et al., 2011b).

## How Practical is CSI?

CSI can be used with individual students, small groups, or in the context of inclusive classrooms by embedding it into the school or district curriculum. However, CSI requires a commitment from the teacher as well as the students, who must see the value of the strategy in order for them to fully embrace it and invest the time and energy needed to apply it successfully across various academic domains and tasks. They need to “perceive not only the link between effective strategy use and subsequent successful learning outcomes but also their own agency in forging the link” (Wong et al., p. 383). Finally, teachers must select strategies with care, considering their overall usefulness to students. Students are most effective when they have a few strategies that they utilize with ease as opposed to an array of strategies that are less well understood. For students to become independent in using the strategies they have learned across situations and settings (for them to generalize), it is important that multiple teachers across multiple

settings encourage strategy use, model how to use and adapt strategies in various situations, and reinforce students when they use strategies appropriately. When implemented correctly, CSI has been shown to substantially improve academic performance. Its emphasis on strategic learning and self-regulation promotes generalization across settings, situations, and academic domains. One major advantage of using CSI is its flexibility. Based on student needs, teachers can modify the strategic routine to address particular strengths and deficits of students. It is this versatility that makes CSI so effective for all types of learners.

### Solve It! - Math Problem Solving Processes and Strategies

#### READ (for understanding)

**Say:** Read the problem. If I don't understand, read it again.

**Ask:** Have I read and understood the problem?

**Check:** For understanding as I solve the problem.

#### PARAPHRASE (your own words)

**Say:** Underline the important information.  
Put the problem in my own words.

**Ask:** Have I underlined the important information?  
What is the question?  
What am I looking for?

**Check:** That the information goes with the question.

#### VISUALIZE (a picture or a diagram)

**Say:** Make a drawing or a diagram.  
Show the relationships among the problem parts.

**Ask:** Does the picture fit the problem?  
Did I show the relationships?

**Check:** The picture against the problem information.

#### HYPOTHESIZE (a plan to solve the problem)

**Say:** Decide how many steps and operations are needed.  
Write the operation symbols (+, -, x, and /).

**Ask:** If I . . . , what will I get? If I . . . , then what do I need to do next?  
How many steps are needed?

**Check:** That the plan makes sense.

#### ESTIMATE (predict the answer)

**Say:** Round the numbers, do the problem in my head, and write the estimate.

**Ask:** Did I round up and down? Did I write the estimate?

**Check:** That I used the important information.

#### COMPUTE (do the arithmetic)

**Say:** Do the operations in the right order.

**Ask:** How does my answer compare with my estimate?  
Does my answer make sense?  
Are the decimals or money signs in the right places?

**Check:** That all the operations were done in the right order.

#### CHECK (make sure everything is right)

**Say:** Check the plan to make sure it is right.  
Check the computation.

**Ask:** Have I checked every step?  
Have I checked the computation? Is my answer right?

**Check:** That everything is right. If not, go back.  
Ask for help if I need it.

Box 3: An example of a cognitive strategy routine for mathematics instruction

From Montague (2003). Copyright by Exceptional Innovations.  
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## How Do I Learn More?

We have provided references to books, Websites, and articles and chapters in addition to the Alert references that provide more detailed information regarding CSI applications.

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## About the Alert Series

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