

Chapter 1

Strategies for Teaching Writing to Foster Critical Thinking Across the Disciplines

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Learning to write across different disciplines for different purposes is a complex process that requires critical thinking, disciplinary knowledge, and rhetorical problem solving. Teaching writing in a way that fosters these higher-order analytical skills is equally challenging. To ensure students write effectively across different disciplines, teachers need to use a variety of strategies to foster critical thinking and to scaffold instruction to help students navigate the complexity of writing across disciplines and genres. This chapter provides instructional guidance and practical strategies to support students' writing and literacy development across various disciplines. The following questions guide the content of the chapter:

GUIDING QUESTIONS

1. Why teach writing and reading strategies across the disciplines?
2. What types of writing are frequently taught in the disciplines?
3. How can teachers use writing-to-learn strategies across the disciplines to promote critical thinking?
4. How can teachers integrate writing-to-learn strategies into more extended process writing assignments?
5. What action steps can teachers take to integrate writing into their content-area instruction?

Why Teach Writing and Reading Across the Disciplines?

Writing plays a central role in students' skill development in the areas of academic language, disciplinary knowledge, and critical thinking (Graham et al., 2020). The significance of writing across different disciplines is emphasized by Graham and Perin (2007), who assert that writing effectively in various contexts is “not just an option for young people—it is a necessity” because it is “a predictor of academic success and a basic requirement for participation in civic life and in the global economy” (p. 3). Moreover, the importance of writing as a job requirement has grown as labor increasingly involves transforming knowledge into a usable, shareable form (Bazerman et al., 2017). To sum up, students' success in college and beyond depends heavily on their ability to write and communicate well in disciplinary contexts (Council of Writing Program Administrators et al., 2011).

Despite its importance for academic and career success, writing is one of the most challenging skills to develop. The act of writing is complex and multidimensional. It involves multiple processes related to cognitive and affective factors and is shaped by the rhetorical situations in which it takes place (Bazerman et al., 2017). Developing proficiency in writing across the disciplines requires students to communicate with diverse audiences across different content areas (Zawacki & Rogers, 2012). The differences in disciplinary literacy and distinct rhetorical situations add to the complexity and the multidimensionality of writing as students need to develop specialized knowledge and skills to communicate effectively within each discipline. This means writing in a literature class is different from writing in a history or a science class. For example, “Historians study past events through an examination of primary documents and secondary sources; whereas scientists analyze, especially, exacting experimental and observational evidence and logic” (Shanahan & Shanahan, 2012, p. 12). Thus, students need to understand the nature of inquiry in the discipline, details of relevant genres, and what constitutes “evidence” across disciplines.

To better support students in writing across different disciplines, it is crucial to take a cross-curricular approach that promotes sustained writing support, clear objectives and expectations for writing development, and consistent and conscientious effort to improve students' writing skills across classes and content areas. Thus, all teachers need to develop strategies to address the challenges students face in their writing. Such an instructional agenda is critical in a contemporary educational context where a growing number of multilingual learners and marginalized students are striving to become better writers and communicators (Zawacki & Rogers, 2012).

An important pedagogical question, then, is how teachers across the disciplines in a secondary education context can support diverse students with different literacy needs, backgrounds, and experiences to become proficient writers who are well versed in the specialized language and conventions of writing across various disciplines. The IES Practice Guide *Teaching Secondary Students to Write Effectively* recommends integrating reading and writing in all disciplines as one of the most beneficial approaches to helping students develop writing skills across the curriculum in diverse contexts (Graham et al., 2016). Research indicates that using writing as a learning tool during reading instruction leads to better reading outcomes (Graham & Hebert, 2010). At the same time, using reading as a learning tool for elaborating on ideas leads to better writing outcomes (Tierney & Shanahan, 1991).

When taught together, reading and writing engage students in a greater use and variety of cognitive strategies than do reading and writing taught separately (Tierney & Shanahan, 1991, p. 272). This exposure to and practice of cognitive strategies promotes and enhances critical thinking. Hence, the IES Practice Guide also recommends, “Teaching students to use cognitive strategies is one way to develop their strategic thinking skills, ultimately helping them to write more effectively” (Graham et al., 2016, p. 9). Cognitive strategies are acts of mind, or thinking tools, such as planning and goal setting, tapping prior knowledge, making connections, monitoring, forming interpretations, reflecting and relating, evaluating, and so forth; research indicates readers and writers use these tools to construct meaning (Olson, 2011). Numerous reports from policy centers and blue-ribbon panels “implicate poor understanding of cognitive strategies as the primary reason why adolescents struggle with reading and writing” (Conley, 2008, p. 84). Further, research conducted over the past 15 years on the content of college courses and instructor expectations indicates that cognitive strategy use is the key to college and career readiness (Conley, 2013).

Although Graham and Perin (2007) note the dearth of experimental studies conducted with low-achieving writers from low-income families in inner-city settings, and especially with low English-language proficiency, evidence also exists of the positive impact of cognitive strategy instruction on the literacy of English learners (ELs). Short and Fitzsimmons (2007) hypothesize that strategy instruction is especially effective for ELs with an intermediate level of English proficiency because it provides them with an explicit focus on language, increases their exposure to academic texts, makes the texts they read comprehensible, gives them multiple opportunities to affirm or correct their understanding and use of language, assists them in retrieving new language features and in using these features for academic purposes, and provides them with the means

of learning language outside of class. In short, explicitly teaching strategic reading and writing behaviors to ELs can help them engage with complex texts and convey those interpretations in well-reasoned essays with compelling claims, judged to be higher in quality and displaying more depth of interpretation and better idea organization (Fitzgerald, 2017; Olson et al., 2023).

Judith Langer (2011) maintains that generalized cognitive strategies are actually critical thinking moves that everyone can access when solving problems. However, domain-specific cognitive strategies help students to be disciplinary critical thinkers and “to learn to think and act—and eventually know—in disciplinary ways” (Langer, 2011, p. 43). A growing body of research indicates that taking a cognitive strategies approach to literacy in the disciplines can have a positive impact on middle and high school students’ ability to construct meaning from and with texts (De la Paz et al., 2014; Nokes et al., 2007; Fang, 2006; Spence et al., 1995). In the sections that follow, we will provide specific activities teachers can implement in the classroom to integrate writing and reading instruction to promote students’ cognitive strategy use and foster critical thinking. These activities will reinforce students’ ability to learn content within the disciplines and help develop their disciplinary thinking while offering opportunities to practice and improve their academic writing.

What Types of Writing Are Frequently Taught in the Disciplines?

In any typical secondary school setting, students take at least five different subject matter classes each term, with each class demanding different types of writing assignments from students. In their English language arts class, they might be expected to analyze a short story or a poem, while in social studies, they might be asked to summarize or explain the causes of a historical event. In mathematics class, they use theorems to prove geometric truths, while in physics class, they use angles and the formula for velocity to predict the trajectory of a small marble as they launch it off a ramp and then submit a lab report about it. This all goes to say that students are expected to understand these many genres of writing and communicate them effectively in their daily classes. And although students write more in English language arts than in any other class, they write more for their other subjects combined than they do for English (Applebee & Langer, 2011).

A genre or writing type is a specific category of writing with an identifiable form and function (Coffin, 2013). For example, a narrative tells a story, either real or imagined, that is designed to entertain, inform, or instruct; it follows an event sequence with a beginning, middle, and end.

It can be written from multiple points of view and contains rich, descriptive language. Informational writing, the conveying of factual information about a nonfiction topic, uses more objective language than a narrative. It often involves the synthesis of information from multiple sources, uses textual structures like description, sequence, compare/contrast, cause and effect, and problem/solution as organizational devices and may include textual features like maps, timelines, photos, and graphs to clarify the written text. Argument writing involves not only delivering factual information but also presenting reasoned opinions supported by evidence from sources. It often acknowledges opposing positions on an issue and offers rebuttal.

The Common Core State Standards (CCSS) state, “To be college- and career-ready writers, students must take task, purpose, and audience into careful consideration, choosing words, information, structures, and formats deliberately” (National Governors Association, 2010, p. 23, Appendix A). In other words, students need to learn how to appropriately respond to the multitude of writing situations they will encounter throughout their lives. For example, the CCSS describes the different purposes for argument writing across three disciplines as follows:

In English language arts, students make claims about the worth or meaning of a literary work or works. They defend their interpretations or judgments with evidence from the text(s) they are writing about. In history/social studies, students analyze evidence from multiple primary and secondary sources to advance a claim that is best supported by the evidence, and they argue for a historically or empirically situated interpretation. In science, students make claims in the form of statements or conclusions that answer questions or address problems. Using data in a scientifically acceptable form, students marshal evidence and draw on their understanding of scientific concepts to argue in support of their claims. (National Governors Association, 2010, p. 23, Appendix A)

The common thread across English, history/social studies, and science is the use of data/evidence from primary and secondary sources to come to conclusions or form interpretations. Each discipline has its own purposes, discourse, and conventions when it comes to constructing arguments.

As students advance through the grade levels, there is less emphasis on reading and writing about literary narratives and more focus on informational texts. For instance, 12th graders are expected to read 70% informational texts and 30% literary texts across all of their classes (U.S. Department of Education, 2009) and engage in writing tasks for the purposes of persuasion (40%) and explanation (40%) more than to convey experiences (20%) (U.S. Department of Education, 2012). Thus,

the more exposure students at all grade levels have to different genres, the better prepared they will be.

In *Envisioning Knowledge*, Judith Langer (2011) argues that in order to develop students' critical thinking, it is important to conceptualize, analyze, compare, synthesize, evaluate, justify, and theorize as readers and writers. These acts of mind encourage students to move beyond reporting factual knowledge to transforming this knowledge (Bereiter & Scardamalia, 1987) and communicating it using the accepted conventions of each respective discipline. Every disciplinary classroom can provide opportunities for students to engage in these ways of thinking through writing and reading tasks.

The English language arts curriculum in U.S. secondary schools emphasizes four widely encompassing genres: narrative, literary analysis, informational, and argumentative. It is in an English class where students are introduced to myriad literary texts, including fiction (e.g., fantasy, fables, science fiction) as well as nonfiction texts such as news reports, feature articles, and biographies. Each of these genres has its own conventions or "universally accepted forms" that need to be taught. The social sciences have also developed certain writing genres unique to their discipline, particularly for synthesizing evidence from multiple sources to defend a claim. Document-based questions (DBQs) are widely assigned in history classes and challenge students to use the given texts to respond to an essential question. Applebee and Langer (2011) surveyed history teachers and found that they valued their students' abilities to write: explanations, critical analyses, application of concepts to new situations, analyses and syntheses of multiple texts, responses and interpretations of sources, summaries, and definitions of concepts or terms.

The written genres found in science classrooms reflect the standards of the discipline, such as "making observations, experimenting, developing claims based on evidence, and communicating those findings to a larger community" (Nachowitz, 2013, p. 94). Moreover, the way these findings are shared must meet the expectations of the scientific community in order to be considered valid and reliable, which reflects how knowledge is developed in the discipline. Similarly, math has its own language (Nasir et al., 2008). Students are taught to read numbers, signs, and symbols in math classes a certain way and sometimes in a certain order. Their ability to make sense of problem sets and word problems and also their ability to interpret graphs, tables, and charts is contingent on their knowledge of the content and language (Fang, 2012). The genres that are often present in assignments for students are working on problem sets, interpreting the language of word problems, elaborating on and defending mathematical proofs using theorems (especially in geometry), and taking notes that help them review procedural methods while

developing mathematical reasoning and problem-solving skills. When it comes to writing in mathematics classrooms, the predominant genre is asking students to write “the justification for why a particular mathematical statement is true or a conclusion is accurate” (Mastroianni, 2013, p. 91). This genre challenges students to defend their conclusions and to translate symbols into words.

Barone and Eisner (2004) believe that the written genres in visual and performing arts (VAPA) “tended toward the literary or quasi-literary, employing formats associated with, for example, poetry, critical essays, plays, novels, biographies or autobiographies, and collections of life stories” (p. 97). They also note that arts-based writing utilizes language in particular ways that are “evocative, contextual, and vernacular” (p. 97). Writing in VAPA courses promotes the idea of both form and function as a way to communicate ideas, themes, and creativity.

This brief summary of the different forms, functions, and expectations of written communication across the disciplines is by no means exhaustive. However, it is evident that some of these genres cut across different domains, whereas others have their own unique place in the curriculum and are what experts utilize in the “real world.” Table 1.1 presents the different genres assigned in typical secondary classrooms across the United States.

These genres and types of writing across various disciplines provide students with opportunities to develop habits of mind unique to each discipline but also ways to transfer their learning from one discipline to the next (Ritchart, 2015).

How Can Teachers Use Writing-to-Learn Strategies Across the Disciplines to Promote Critical Thinking?

Provided in the following section is a range of expressive writing-to-learn strategies teachers across the disciplines can implement in their classrooms to help students interact with a text and each other in order to construct meaning. That is, they are designed to serve as a “tool for learning rather than as a means to display acquired knowledge” (Applebee, 1981, p. 10). The concept of expressive writing to learn comes from James Britton and colleagues (1975), who conducted a foundational study on the development of writing abilities in secondary school. In their 3-year study of 65 secondary schools in England, they identified three types of writing (or what they called “function” categories) that students were asked to undertake: transactional writing to inform or instruct, poetic writing to create and imagine, and expressive writing to learn and discover. Tom Newkirk (2009) has identified expressive writing-to-learn

TABLE 1.1. Genres and Types of Writing Across Disciplines by the Three Purposes of Writing

Content	Research and reports	Arguments	Narratives
English	<ul style="list-style-type: none">• Annotated bibliography• Book reports	<ul style="list-style-type: none">• Opinion editorial• Literary analysis	<ul style="list-style-type: none">• Autobiography• Short story• Biographies• Poems• Plays
Math	<ul style="list-style-type: none">• Solutions• Problem sets	<ul style="list-style-type: none">• Proofs	<ul style="list-style-type: none">• Math story
Science	<ul style="list-style-type: none">• Lab reports• Problem sets	<ul style="list-style-type: none">• Problem solution	<ul style="list-style-type: none">• Observations
Social science	<ul style="list-style-type: none">• Timelines• Annotations• Headnotes• Footnotes	<ul style="list-style-type: none">• Change and continuity• Cause and effect• DBQ	<ul style="list-style-type: none">• Point of view• Family history
VAPA	<ul style="list-style-type: none">• Review	<ul style="list-style-type: none">• Critiques	<ul style="list-style-type: none">• Performer biography
Any subject	<ul style="list-style-type: none">• Emails• Instructions• Lists• Memos• Exposition• Research paper• Short responses	<ul style="list-style-type: none">• Business letter	<ul style="list-style-type: none">• Anecdotes• Testimonials• Journals• Reflections

Note. Based on the 22 writing tasks Kiuvara and colleagues outlined in their 2009 study.

strategies as “maybe one of the best ideas of all” because rather than just using writing to show what one has learned, expressive writing enables students to “expose their thinking” (p. 7), thus creating “a provisional first draft of ideas” (Britton et al., 1975, p. 145). Several of the strategies we showcase have been developed by the Pathway to Academic Success Project, a comprehensive writing intervention that takes a cognitive strategies approach to developing students’ text-based argument writing. This intervention has been shown to enhance writing outcomes for all secondary students, but particularly for students of culturally diverse backgrounds and ELs (Olson et al., 2017, 2023). These strategies often involve brief responses that are usually ungraded, making them easy for teachers in the disciplines to integrate into their instruction in order to help students engage in inquiry, analyze and form interpretations, plan and goal set, focus on self-assessment, and revise ideas and reflect. They can also serve as prewriting for more extended writing assignments.

Writing to Motivate Students to Engage in Inquiry

In response to the CCSS, many states have renewed interest in promoting an inquiry stance in the classroom (Beach et al., 2015) to enhance the connection between reading and writing skills. However, in reality, conducting high-level research and analysis in order to produce engaging, complex written responses to such inquiries is challenging for many students. Students also cite the lack of connection between the curriculum and their own interests as a reason why they do not commit to reading complex texts or responding in equally complex ways (Daniels et al., 2015). To increase interest and motivation and provide students with multiple entry points into the curriculum, offering them low-stakes writing-to-learn strategies and getting students to use cognitive strategies can enhance their investment in reading and writing and reinforce their learning and retention of content (Ainsworth, 2010). In Graham and colleagues' (2023) meta-analysis of writing treatments of students in grades 6–12, engaging students in inquiry resulted in statistically significant effect sizes for all writing outcomes. Strategies that can be used to engage in inquiry should have features that promote curiosity and provide room for student interpretation. In the following sections, we highlight two writing exercises that will engage students in cognitive strategy use to foster inquiry.

See/Think/Wonder

This activity encourages students to make careful observations and form thoughtful interpretations of any visual media. By prompting students to slow down their thinking and contemplate, teachers can stimulate students' curiosity and set the stage for inquiry. To engage students in the See/Think/Wonder strategy, teachers select an image (e.g., a piece of art, photograph, video clip) that can be analyzed in depth. During instruction, teachers display the image on the board or pass out copies to their students. While students are observing the visual media, teachers can ask their students to respond to the following questions: (1) What do you see? What details stand out to you? (2) What do you think is happening? (3) What evidence can you provide? and (4) What makes you wonder, and does this raise any questions for you?

After the designated time, students respond to the questions in their journals or share their thoughts in paired or whole-class discussions. Figure 1.1 is a See/Think/Wonder response from a secondary history classroom after they watched a video clip about the internment of Japanese American citizens during World War II.

Having students first visualize and notice what they see (“I see . . .”) from the newsreel before making interpretations allows students to



	<p>Watch this 1943 newsreel and type your observations. Watch about 4 minutes of it.</p>
	<div style="display: flex; align-items: flex-start;"> <div style="flex: 1;">  </div> <div style="flex: 2; padding-left: 10px;"> <p>I see . . .</p> <ul style="list-style-type: none"> • A man explaining what's happening to the Japanese Americans • Shows images of where they would be relocated • Shows government officials and bank owners helping the Japanese before they were sent to the camps • “Cheerfully,” “wholeheartedly,” said loyal Japanese who felt it was necessary for the better of America <p>I think . . .</p> <ul style="list-style-type: none"> • Uses words like <i>mass migration</i> and <i>relocation</i> to make the internment camps sound less harsh and more positive <p>I wonder . . .</p> <ul style="list-style-type: none"> • How did Japanese Americans feel after realizing the American government sugarcoated what was happening? </div> </div>

FIGURE 1.1. A See/Think/Wonder response about the internment of Japanese American citizens.

participate in a low-stakes activity; summarizing or monitoring their understanding of what they hear and see has no right or wrong answer. Then, as they start to form interpretations and evaluate (“I think . . .”) what they have noticed, their interest in asking questions and seeking out answers about self-generated questions (“I wonder . . .”) increases. Self-generated observations and questions motivate students to launch a deeper inquiry into a topic of study because they are genuinely interested in learning.

Note Taking/Note Making

Note Taking/Note Making is a strategy to encourage students to think critically about what they are learning—to question, sort through, puzzle over, clarify, solve problems, or comment on information. It allows them to think aloud on paper as they make observations about notes they are making about their subject or topic of study. Teachers can instruct

students to make a T-chart and, in the left-hand column of a piece of paper, record what they are learning (e.g., take lecture notes, record the results of experiments, work through the steps of a problem, copy down a passage of text, etc.). In the right-hand column, students take notes that record their thoughts, questions, reactions, and conjectures about the reading and/or activity they are engaging in. The note-making column (i.e., the right-hand column) may be cognitive, affective, or a mixture of the two. Figure 1.2 is a sample T-chart of a student’s observation about flipping coins and the ratio of heads to tails.

Being metacognitive and trying to make sense of notes in this activity is also highly engaging for students because they are given opportunities

Note taking	Note making
<div>1. What is the ratio of heads to the total number of flips after the first 25 flips? H/F: 14/25 What is the ratio for tails? T/F: 11/25</div> <div>2. What is the ratio of heads to the total number of flips after the first 50 flips? H/F: 22/50 What is the ratio for tails? T/F: 28/50</div> <div>3. What is the ratio of heads to the total number of flips in the second fifty flips? H/F: 27/50 What is the ratio for tails? T/F: 23/50</div> <div>4. What is the overall ratio of heads to the total number of flips after 100 flips? H/F: 49/100 What is the ratio for tails? T/F: 51/100</div> <div>5. What can you predict about future flips?</div>	<div>1. Heads seem to fall more often than tails.</div> <div>2. Now, tails are occurring more often than heads.</div> <div>3. The ratio is even close to .5, although heads came up more often than tails.</div> <div>4. The more we flipped, the more even the ratio got.</div> <div>5. Maybe in the next round, the result would be in favor of heads. However, if we keep doing it, the ratio will eventually come out as 1:2.</div>
<div>What theory can you conclude from your note taking and note making? As the number of flips increases, the ratio of heads and the ratio of tails to the total number of flips comes closer and closer to being 50% for each. In other words, there is a 1 out of 2 chance that either side will come up.</div>	

FIGURE 1.2. Sample note-taking/note-making response.

to revise meaning, reflect and relate, and even evaluate what they are thinking as they continue to problem solve through an iterative process. The act of asking questions and summarizing their overall interpretation of what they see in their notes also provides an opportunity for students to engage in using expressive writing to begin to form a theory around the topic of study. This type of problem solving also motivates students as they construct meaning to formulate an answer.

Writing to Read, Analyze, and Form Interpretations

The CCSS, and other state standards, prioritize the ability to “read closely to determine what the text says explicitly and to make logical inferences from it” (p. 10) and to “write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence” (National Governors Association, 2010, p. 18). To meet these standards, students must move from reading and literally understanding what the text says to analyzing what the text means and forming thoughtful interpretations as well as transition from summary or “knowledge telling” in writing to “knowledge transformation” (Bereiter & Scardamalia, 1987). As mentioned previously, writing about reading can improve reading comprehension, foster critical thinking, and deepen disciplinary content knowledge (Graham et al., 2016).

Cognitive Strategy Bookmarks

Another way to integrate reading and writing to motivate students to become more interpretive readers and analytical writers is to use Cognitive Strategy Bookmarks. Prior to introducing students to these bookmarks, the teacher will need to introduce the concept of a cognitive strategy. To make this comprehensible, the teacher might say:

“We are going to learn about what experienced readers and writers do when they make meaning out of words. They use something called cognitive strategies. ‘Cognitive’ means thinking and ‘strategies’ are tools people use to solve a problem. So, a cognitive strategy is a thinking tool. Inside your head, you have a lot of cognitive strategies or thinking tools that you use to make sense of what you read and write. It’s almost like there’s a little voice inside your head that talks to you while you’re reading and writing. It tells you when you’re confused or when you understand something. It helps you to make pictures in your head or to decide to reread something before going forward.” (in Olson, 2011, p. 22)

The teacher can then pass out the bookmarks for students to use while annotating a text. Sentence starters such as “At first I thought _____, but now I” or “This is relevant to my life because _____” give students a point of departure and invite them to expand upon their thinking. Note that domain-specific cognitive strategies can be added to bookmarks for different disciplines, and general strategies can be adapted. For example, adopting an alignment in English language arts can be renamed “historical perspective taking” in history (see Figure 1.3) and making predictions can become “hypothessizing” in science. Students can use their Cognitive Strategy Bookmarks to annotate the texts they are reading. To engage students in deeper critical thinking, they can be asked to keep Reader Response Logs, in which they select key passages, identify the cognitive strategy they are using, and write about the meaning of what they have just read.

Cognitive Strategy Bookmarks can also be used by students in writing groups to respond to each other’s writing. Sentence starters like “A golden line for me is . . .” or “I really got into the story when . . .,” shared either orally or in writing, can help enable peers to assist the writer in determining if they have communicated their message effectively as well as give them ideas for revision. The effect size for strategy instruction for writing quality was among the highest in Graham and colleagues’ (2023) meta-analysis on what works in secondary writing instruction.

Say, Mean, Matter

Say, Mean, Matter is another pedagogical strategy that helps students think out loud on paper, explore ideas, form interpretations, draw conclusions, and express opinions. This strategy can be used in a variety of subject areas to facilitate students’ construction of meaning from the texts they are reading. It is effective for all grade levels and students—from ELs to honors students—and can be applied to interpret academic texts, fiction, and visual material as well. It is also a powerful prewriting strategy for text-based argument writing. The Say, Mean, Matter strategy is designed to focus students’ reading and/or examination of a text first on literally what the text *says*, followed by what is important about the text (or what it *means*) and then on why the passage or visual is significant within the text as a whole and/or beyond the context of the text itself—in other words, why it *matters*. Generally, students use this strategy with a trifold graphic organizer that allows them to plot their interpretations of the text and see the levels of meaning it provides.

- *Say*. The “Say” column includes important quotations or unclear passages, sentences, or phrases from the reading. Initially, as students

Cognitive Strategies Sentence Starters

Planning and Goal Setting

- My purpose is . . .
- My top priority is . . .
- I will accomplish my goal by . . .

Tapping Prior Knowledge

- I already know that . . .
- This reminds me of . . .
- This relates to . . .

Asking Questions

- I wonder why . . .
- What if . . .
- How come . . .

Making Predictions

- I bet that . . .
- I think . . .
- If _____, then . . .

Visualizing

- I can picture . . .
- In my mind I see . . .
- If this were a movie . . .

Making Connections

- This reminds me of . . .
- I experienced this once when . . .
- I can relate to this because . . .

Summarizing

- The basic gist is . . .
- The key information is . . .
- In a nutshell, this says that . . .

Adopting an Alignment

- The character I most identify with is . . .
- I really got into the story when . . .
- I can relate to this author because . . .

Forming Interpretations

- What this means to me is . . .
- I think this represents . . .
- The idea I'm getting is . . .

Monitoring

- I got lost here because . . .
- I need to reread the part where . . .
- I know I'm on the right track because . . .

Clarifying

- To understand better, I need to know more about . . .
- Something that I still not clear is . . .
- I'm guessing that this means _____, but I need to . . .

Revising Meaning

- At first I thought _____, but now I . . .
- My latest thought about this is . . .
- I'm getting a different picture here because . . .

Analyzing the Author's Craft

- A golden line for me is . . .
- This word/phrase stands out for me because . . .
- I like how the author uses _____ to show . . .

Reflecting and Relating

- So, the big idea is . . .
- The conclusion I'm drawing is . . .
- This is relevant to my life because . . .

Evaluating

- I like/don't like _____ because . . .
- My opinion is _____ because . . .
- The most important message is _____ because . . .

FIGURE 1.3. Two content-area versions of the Cognitive Strategies Bookmark with sentence starters (ELA above; history/social studies on facing page).

Cognitive Strategies Sentence Starters

Planning and Goal Setting

- My purpose [for reading this source] is . . .
- My top priority is . . .
- I will accomplish my goal by . . .

Sourcing

- Because this author was _____, I think they wrote/created this to . . .
- Because this source is _____ and created in _____, I think . . .
- This source is reliable/unreliable because . . .

Tapping Prior Knowledge

- I already know that . . .
- This relates to . . .
- During this time, people were concerned with . . .

Asking Questions

- I wonder why . . .
- Why did the author write this? Who was the audience?
- Why did _____ happen?

Making Predictions/Hypothesizing

- I bet that . . .
- Because _____, I think . . .
- If _____, then . . .

Visualizing

- I can picture . . .
- In my mind I see . . .
- If this were a movie . . .

Making Connections

- This reminds me of . . .
- I can relate this to my life or to another historical period because . . .
- I think this person was influenced by . . .

Historical Contextualization/Perspective Taking

- At the time this was written/created, people were concerned with . . .
- From _____'s perspective, I can understand . . .
- Given the historical context, I think _____ really matters because . . .

Summarizing

- The basic idea of this source is . . .
- The key information is . . .
- In a nutshell, this says that . . .

Forming Interpretations

- This helps us understand _____ because . . .
- Given these sources, one potential interpretation is . . .
- This is significant because . . .

Corroboration

- I need to check another source because . . .
- Another source that confirms/challenges my understanding of this historical event is . . .
- Although this says _____, other pieces of evidence show . . .

Analyzing the Author's Craft

- The phrase _____ helped me understand . . .
- The author uses _____ language in order to . . .
- A significant phrase related to the historical question is . . .

Monitoring

- I got lost here because . . .
- I know I'm on the right track because . . .
- I need to check another source because . . .

Clarifying

- To understand, I need to know more about . . .
- Something that is still not clear is . . .
- I'm guessing this means _____, but I need to . . .

Revising Understanding

- At first, I thought _____, but now I think . . .
- My latest idea about this is . . .
- I'm getting a different picture here because . . .

Reflecting and Relating

- What this tells me about the question is . . .
- So what this tells me about history is . . .
- This is relevant to my life because . . .

Evaluating

- I think this is/is not relevant because . . .
- This argument is effective/ineffective because . . .
- The best evidence to support my interpretation is _____ and _____ because . . .

FIGURE 1.3. (continued)

learn to use this strategy, the teacher provides the text passage. Later, as students continue analyzing this text or other texts, they choose passages or visuals that stand out or confuse them. The “Say” column addresses any of these questions: *What does the text say? (quote and/or paraphrase) What happened? Who is speaking to whom?*

- *Mean.* The “Mean” column requires students to read between the lines, going beyond the literal analysis of what the text is saying. Students must consider first what the text says and then determine what meaning it has for the reader or viewer. The “Mean” column addresses any of these questions: *What does the text mean? What does the text say between the lines? What does the author mean?*

- *Matter.* The “Matter” column is the most abstract and difficult for students. Students reflect on the text to determine the significance of the quotation to the whole of the text, to themselves, to others, and/or to other texts beyond this one. The “Matter” column addresses any of these questions: *Why does it matter to me or others? Why is this important? What is the significance to the text as a whole? Me? Society? The world?*

Figure 1.4 illustrates a Say, Mean, Matter response to a passage from Abraham Lincoln’s Gettysburg Address.

Say	Mean	Matter
<p>“Four score and seven years ago our fathers brought forth on this continent a new nation, conceived in liberty, and dedicated to the proposition that all men are created equal.” (November 19, 1863)</p> <p><i>It says our country was founded based on the concepts of liberty and equality.</i></p>	<p><i>Lincoln uses biblical language to reference the Declaration of Independence, signed 87 years before, reminding his audience at the Gettysburg Civil War Cemetery that the United States was created in the pursuit of liberty for all men—men who are all created equal. His speech ties the abolition of slavery to the principles on which the nation was conceived.</i></p>	<p><i>By referencing both the Bible and the Declaration of Independence, Lincoln is signaling that if his audience trusts the words in those documents, then they should trust his words as well. His objective is to motivate them to demonstrate “increased devotion to that cause” for which these soldiers died, the cause of freedom and equality. These are noble goals that we are still struggling to achieve today.</i></p>

FIGURE 1.4. Say, Mean, Matter response to Abraham Lincoln’s Gettysburg Address.

In terms of cognitive strategy use, Say, Mean, Matter moves from summary to interpretation to reflecting, relating, and evaluating. Once students have completed the deep reading for this strategy, they can use their notes to structure and write an evidence-based argument essay. The Say, Mean, Matter graphic organizer keeps track of details from the text and provides practice in interpreting and commenting on the text. The paper's claim derives from the "Matter" column, supported by quotations from the "Say" column. The "Mean" column provides commentary and explanation for the quotations.

Writing to Plan and Goal Set

An important characteristic of strategic readers and writers is that they plan and set goals. Goal setting involves creating steps to engage in specific behaviors, and this is most effective when goals are specific, reasonably challenging, and proximal (Lockett et al., 1981). In terms of teaching students strategies for improving their writing, the inclusion of planning, goal setting, and self-assessment improves the quality of students' writing (Graham et al., 2012).

DO/WHAT Chart

One of the first challenges that students encounter when beginning to write in any discipline is making sense of the prompt. How students conceive of and define the problem of writing has been shown to have a tremendous effect on the writing they produce. To help students navigate prompts and determine what they are being asked to do, they can be taught a planning and goal-setting strategy that involves the creation of a DO/WHAT chart, which enables them to deconstruct a prompt and create a roadmap for composing.

To create a DO/WHAT chart, students use green and blue highlighters to mark all of the verbs in the prompt that instruct a student to DO something in green and underline the task words that tell the student WHAT to do in blue. For example, in English language arts, students often have to write (green) an essay (blue) and make (green) a claim (blue) about the main point, lesson, or message of the text. Students then transfer those words onto a T-chart below the prompt. This activity helps the students to clarify and visualize what is expected, plan and goal set, organize information, and evaluate the criteria for a successful response to the prompt. Figure 1.5 illustrates a prompt and a DO/WHAT chart for an assignment in environmental chemistry. (Note: DO words in this prompt are bracketed, and WHAT words are underlined.)

Writing Situation/Essential Question:

Wildfires are a form of chemical reaction and are more frequent or severe now than they were a hundred years ago. Why are wildfires in Tustin, California, worse now than they were 100 years ago?

Tustin 1918



Tustin 2018

**Writing Prompt:**

First, [identify] at least three differences between Tustin today and Tustin 100 years ago based on the pictures above or what you already know. Then, [describe] at least three causes of wildfires. [Consider] how the differences or primary factors you identified and the causes of wildfires are related. [Draw] a scientific model to show how the primary factors and causes of wildfires are related. [Use] your model to [explain] why wildfires are worse now in Tustin than they were 100 years ago.

DO	WHAT
Identify	at least three differences
Describe	at least three causes
Consider	how primary factors and causes are related
Draw	a scientific model
Use	your model
Explain	why wildfires are worse

FIGURE 1.5. Environmental chemistry prompt. Writing prompt reprinted by permission of Professor Hosun Kang. Copyright © 2023 John Wiley and Sons. Reprinted by permission.

Self-Assessment and Goal-Setting Checklist and Revision Planner

Involving students at the draft stage in assessing the quality of their own written words and making plans for revision can improve their writing (Chung et al., 2021). In any discipline, students can be given a Self-Assessment and Goal-Setting Checklist. After completing a DO/WHAT chart to ensure that they understood the writing task, students can read their initial draft and check off the appropriate box for each question about their written text. For example:

Does the writing present a clear claim?

- The writing presents a clear claim in the introduction that responds to the essential questions.
- The writing attempts a claim, but the claim is not in the introduction and/or the claim is not clear.
- The writing does not present a claim.

Students then use this checklist to fill out a Goal-Setting Revision Planner form in which they indicate the following: “What I did well on my initial writing draft; what I didn’t do well, was challenged by, or I didn’t do as well in my initial draft” (on the left) and “When I revise, I will do the following:” (on the right). After students revise, they can submit a Revised Writing Reflection to the teacher in which they discuss the revisions they made based on their self-assessment, what they are most proud of in their revised draft, and what strategies helped them the most when they revised their paper. Goal setting was found to have a positive statistically significant effect on writing outcomes in the meta-analysis of writing treatments for students in grades 6–12 (Graham et al., 2023); however, effects were not detected for self-feedback.

Writing to Review/Revise Ideas and Reflect

Research-based strategies that engage students in revising their understanding and reflecting on both the writing process and the product are another way to scaffold students’ writing development and promote critical thinking skills (Graham et al., 2023). Revising understanding and reflecting on learning are self-regulated strategies that experienced readers and writers use for meaning making (Harris & Graham, 2016). A 2023 meta-analysis of writing treatments at the secondary level (Graham et al., 2023) found that self-regulated strategies and the cognitive strategies approach that engages students in monitoring, evaluating, revising, and reflecting on their writing have statistically significant positive effects on secondary students’ writing outcomes.

When students are provided with an opportunity to revise and reflect on their writing, they develop critical thinking skills. Hence, the IES Practice Guide *Teaching Secondary Students to Write Effectively* (Graham et al., 2016) recommends using “a Model–Practice–Reflect instructional cycle to teach writing strategies” (p. 19). The guide states that “reflection activities enable students to carry out the evaluation component of the writing process, and deepen their understanding of their writing effectiveness and how well they accomplished their goals and executed their strategy” (p. 23). Through reflection, students also monitor their progress, discover ways to improve their writing, and evaluate

whether the strategies help (or do not help) them to complete the task. The following two strategies—color coding and the STAR revision strategy—effectively engage students in revision and reflection processes.

Color-Coding Strategy

Color coding is a revision strategy used for analytical or argumentative writing. The goal of color coding is to move students beyond retelling and summary to analysis, interpretation, and commentary. As Bereiter and Scardamalia (1987) point out, inexperienced writers use a simplified version of the idea-generation process that they call *knowledge telling*, which consists of retrieving information from long-term memory and converting the writing task into simply regurgitating what is known about a topic. More expert writers, on the other hand, engage in a complex composing process known as *knowledge transformation*, in which they analyze the writing task in accordance with rhetorical purposes. One way to help students move from knowledge telling to knowledge transformation is to help them make their thinking visible using color coding.

In English language arts in which students engage in analytical writing (i.e., literary analysis), teachers first designate three colors for the types of assertions that comprise a literary analysis. The first color is *yellow* for plot summary. Plot summary is yellow because it's like the sun and reiterates what is obvious and known in a text. It makes things as plain as day. We need some plot summary to orient our reader to the facts, but we don't need to retell the entire story. The second color is *blue* for commentary or reasoning. Commentary is like the ocean because the writer goes beneath the surface of things to look at the deeper meaning and to offer opinions, interpretations, insights, and "aha" moments. The third color is *green* for supporting detail or evidence. Supporting detail and evidence bring together the facts of the text (yellow) with your interpretation of it (blue). It is what glues together plot summary and commentary.

The color-coding technique can be flexibly adapted depending on the genre of writing in a specific content area. For example, in history classes that engage students in argumentative writing in which students synthesize multiple sources and include counterarguments to acknowledge an alternative point of view, the color-coding technique can be adapted to include the rhetorical moves that are involved in developing historical argumentation (see Figure 1.6).

When students apply the color-coding technique to evaluate their writing, the coded draft becomes a guide for revision because they can

Summary	Evidence	Reasoning	Counterargument
Yellow	Green	Blue	Pink
Background to event/issue; Retelling what happened	Examples; Details supporting claim; Quotes from sources and paraphrases	Deeper thinking/analysis; Interpretations/reasoning; Conclusions; The So What?; Insight and opinions	Acknowledgment of counterargument; Reasons addressing/refuting counterargument

FIGURE 1.6. Color-coding technique adapted for history.

see whether they have simply summarized or have gone further and woven other rhetorical moves such as evidence, commentary/reasoning, and counterclaims into their writing. The color coding is followed by a self-reflection and revision planner asking students to identify the strengths of their writing, the areas where they need to improve, and specific steps for revising. Such a planned revision process that engages students in self-assessment and reflection not only has a positive effect on students’ self-efficacy but also improves their overall writing quality (Chung et al., 2021).

STAR Revision Strategy

The STAR revision strategy (Gallagher, 2006) can help students guide their revision process and make meaningful changes that will enhance the quality of their drafts. The strategy can be used with any writing genre (e.g., narrative, informational, persuasive, argumentative) in any discipline. The four letters represent the four steps of the STAR strategy, which are as follows:

- S: Substitute overused words with precise words, weak verbs with strong verbs, weak adjectives with strong adjectives, and common or general nouns with proper or specific nouns.
- T: Take out unnecessary repetition, irrelevant information, or information that belongs elsewhere.
- A: Add details, description, new information, figurative language, clarification of meaning, or expanded ideas.
- R: Rearrange information for a more logical flow.

After students learn and use this strategy during the revision process of their writing, teachers can have students reflect on their use of the STAR strategy by asking them to think about and share how this strategy helped them (or failed to help them) in their revision process.

Since it is a strategy for the revision process of writing, the STAR strategy is used after students have written their drafts. It focuses on both global macro-level aspects of writing, such as organization and development of ideas, and micro-level linguistic features, such as word choice and sentence construction. Overall, students can follow the STAR strategy to revise and reorganize their papers for logical flow and expand their ideas. Teachers can use the STAR strategy frequently with any writing assignment students engage in.

How Can Teachers Integrate Writing-to-Learn Strategies into More Extended Process Writing?

Research indicates that writing-to-learn strategies like writing summaries, taking structured notes and concept mapping, and generating short answers after reading a segment of text can improve student learning; however, writing extended texts involving analysis and interpretation has an even more powerful impact (Graham & Hebert, 2010). Since engaging in expressive writing-to-learn strategies can help students make their thinking visible, these strategies can be carefully scaffolded into more extended process writing to enhance the end product. Let's look at one example of how a teacher might incorporate writing-to-learn strategies into an extended process writing task.

The Saturation Research Paper

The Saturation Research Paper integrates the disciplines of English language arts and history as students research and immerse themselves in a famous historical figure: First, they select a significant event in that historical figure's life, assuming their persona and speaking in their voice; then the student weaves together factual information and narrative techniques to dramatize the event, showing and not just telling why it was significant.

The teacher begins by guiding students through a mentor text (e.g., a sample Saturation Research Paper written about Harriet Tubman or Anne Frank), stopping to engage students in using their Cognitive Strategy Bookmarks to respond to the author's craft moves to consider how suspense is created, examine the way factual information is interwoven and documented; then the student visualizes the scene, analyzes the

central message, and reflects on and relates its relevance today. Using a DO/WHAT chart, students then deconstruct the prompt and create a roadmap for composing. After clustering a range of historical figures (e.g., Vincent van Gogh, Cesar Chavez, Albert Einstein, the Dalai Lama, Martin Luther King Jr.), students select the person, begin preliminary research to ensure that enough factual source material is available, and present a Saturation Research Paper proposal in which they identify the person they will research, explain the event they will dramatize and why it is significant, outline the writing strategies they will use to bring the event to life, and indicate at least three sources to consult during research. After participating in mini-lessons on documenting sources, writing dialogue, interior monologue, showing not telling, and flashback, students create a storyboard of the key scenes they will dramatize.

In addition to providing models of what is expected and extending multiple opportunities to practice, one of the key principles of instructional scaffolding is to break up tasks in order to concentrate the student's attention on "something manageable" (Bruner, 1978, p. 254). Students who are accustomed to writing impersonal expository reports may find historical fiction to be unfamiliar territory. To get into the persona of their chosen historical figure and to strategize about how to get started may be challenging and involve several preliminary attempts. Asking students to write and share an opening scene that sets the stage for their significant event can help ensure the paper is off to a good start and provide motivation to make revisions during the composition stage rather than waiting for a complete final draft. Figure 1.7 presents a sample of an opening scene written about Neil Armstrong.

In groups of four, students can use job cards to respond to each other's writing (see Figure 1.8). Reader #1 responds to the questions: *Does the writer have your attention? What hooked you, or what would draw you further into the scene?* Reader #2 addresses the questions: *Do you feel like you are there? Which of the author's craft moves helped you to visualize the scene or what would make the piece more vivid?* Reader #3 considers: *Has the writer chosen an interesting historical figure and a significant event to dramatize? What do you think the writer's paper is going to focus on?* Giving students feedback early in the writing process and a chance to make changes or additions they are pleased with can enable them to continue writing with a greater sense of confidence.

Once an initial draft is complete, students work in pairs to respond to each other's papers, give the paper a provisional score (not shared with the teacher) of their draft in progress, and fill out a Saturation Research Paper Sharing Sheet to provide suggestions for improvements. Students then use the STAR strategy to Substitute, Take things out, Add, or Rearrange elements of their paper to make it more compelling. Finally, the

papers are mounted on posterboard, illustrated, and displayed around the classroom. During a gallery walk, classmates read each other's final drafts and celebrate the work done by posting kind comments.

Scaffolding writing-to-learn strategies for extended process writing is part of many comprehensive writing programs, such as the Pathway to Academic Success Project. The effectiveness of this type of process writing approach was identified in a meta-analysis of secondary writing treatments (Graham et al., 2023) to have a positive impact on all writing measures but especially writing quality. Unfortunately, research suggests that the amount of extended process writing students engage in “remains distressingly low,” especially for “the kinds of writing where students might be expected to engage with the discipline-specific arguments and evidence called for by the Common Core Standards” (Applebee & Langer, 2011, p. 16).

July 16, 1969

“This is Apollo/Saturn Launch Control,” NASA commentator Jack King booms, “We are now less than 16 minutes away from planned liftoff for Apollo 11” (Barbree, 2014, p. 214). *This is it!* I think to myself, *the culmination of America's race with the Russians to put a man on the moon.* Adrenaline courses through my body but I steady my hands and give my crewmates Buzz Aldrin and Mike Collins a big thumbs up.

Methodically, we go through our checklist one more time: liftoff configuration, boost insertion, booster separations, launch emergency procedures. Then, after testing systems for power transfer from Saturn to Columbia and Eagle, we arm the destruct system, and the access to the walkway leading to Apollo swings back out of the way. Last but not least, I place my hand on the abort handle (Woods et al., 2019b). *We definitely won't be needing this today,* I assure myself.

“Houston, This is Apollo,” I report. “Our transfer is completed on internal power. All the second stage tanks are now pressurized. It's green all the way.”

“Roger that, Apollo. We've passed the six minute mark. Now 5 minutes 52 seconds and counting, and we're on time for our planned lift-off at 32 minutes past the hour.”

As I wait, the butterflies in my stomach quell as a deep calm washes over me. I think of my ten year step-by-step journey to this moment: from my selection to the Space Soonest Program, to joining the NASA Astronaut Corps, to serving as back-up for Gemini 5, then becoming the first American civilian in space in Gemini 8, and now commander of Apollo 11. Deke Slayton says he picked me because I'm the best man for the job and have earned this, hands down. *I won't let you down, Deke.*

Written by Carol Booth Olson.

FIGURE 1.7. Opening scene on Neil Armstrong.



FIGURE 1.8. Ninth-grade students at Cerritos High School use job cards to share their opening scenes with each other and their teacher Marianne Stewart.

What Action Steps Do Teachers Take to Integrate Writing into Their Content-Area Instruction?

One of the most important pedagogical decisions teachers have to make is to determine how much time they need to devote to delivering the content of their discipline, particularly in middle and high school settings. At the same time, one of the greatest returns on a teacher's investment in the classroom is teaching writing, especially when students are provided with opportunities to write within and across disciplines because writing is such a powerful tool for learning.

In previous sections of this chapter, we have provided a wide array of writing-to-learn strategies that can be used to cultivate disciplinary literacy. Strategies such as See/Think/Wonder and Note Taking/Note Making encourage students to visualize, make predictions, form interpretations, and solve problems in the act of constructing meaning. Strategies like the Cognitive Strategy Bookmarks and Say, Mean, Matter are used to help students transition from knowledge telling to knowledge transformation (Bereiter & Scardamalia, 1987) as they read and respond. The DO/WHAT chart, Self-Assessment and Goal-Setting Checklist, and Goal-Setting Revision Planner are particularly useful for planning and goal setting for composing texts. The color-coding technique and the STAR revision strategy encourage students to study the author's craft and revise meaning as they revise their initial drafts. Each particular strategy provides opportunities for students to apply their

critical thinking in determining next steps throughout the reading and writing process. The Saturation Research Paper serves as an example of an extended writing exercise that fosters critical thinking because artfully blending the elements of both narrative and informational writing takes skill and practice, especially as students select a historical figure, incorporate dialogue, and set the scene of a particular event. Across all of these strategies, students are developing their declarative, procedural, and conditional knowledge (Paris et al., 1991) of writing strategies and genres, enabling them to become confident and competent readers and writers across the disciplines.

ACTION STEPS ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■

In order to integrate these strategies—and others that you may have accumulated throughout your professional experiences—into your content-area instruction, consider the following action steps:

- Explain to your students *why* you are doing *what* you are doing. Emphasize the importance of writing in every discipline. Research shows that when you write about your reading, not only does your reading improve, but your command of the content increases as well.
- Start with small, ungraded writing-to-learn strategies that help students understand what they are learning better and become accustomed to using writing as a tool for learning in each discipline.
- Think about more extended writing assignments; work backward to scaffold writing-to-learn strategies that help make the task more manageable.
- Write to learn for yourself, and create your own models of writing to share with students in the context of your discipline.
- Share strategies that work with your colleagues in professional learning communities to foster collaboration across classes and disciplines.
- Have students share what they are writing in your class and in other content-area classes to capitalize on shared knowledge; this will help students build specific, disciplinary knowledge and cross-curricular writing ability.

As you implement these action steps and integrate writing into your instruction, keep in mind that “the benefits of writing across disciplines extend beyond the writing itself—writing can improve reading comprehension, critical thinking, and disciplinary content knowledge”

(Graham et al., 2016, p. 32), all of which help students to prepare for college and careers.

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