



The Problem of Writing a Composition

THE STORYTELLING PROBLEM

Read the story shown in Figure 4-1. Now, put the book aside and write the story in your own words. Assume that you are writing to a person who has never heard the story. Your task is not to recall the story verbatim, but rather to tell the main events in the story to someone else.

Figure 4-2 shows the main points of the story. Did your version of the story contain all or most of these points? Did you clearly introduce the lady and the fairy (rather than just referring to them as "she")? Could someone else read your story and understand it? Do your story present the events in the proper order?

FIGURE 4-1 Can you retell this story?

Once upon a time, there was a lady who was called Niobe, and who had twelve sons and twelve daughters. She met a fairy who had only one son and no daughter. Then the lady laughed at the fairy because the fairy only had one boy. Then the fairy was very angry and fastened the lady to a rock. The lady cried for ten years. In the end she turned into a rock, and her tears made a stream which still runs today.

Source: From Piaget, J. (1955). *The language and thought of the child*. Cleveland: Meridian Books. Copyright 1955 Routledge.

FIGURE 4-2 The main points in the story

1. Once there was a lady (or Niobe, etc.).
2. She had children (provided they outnumber those of the other character).
3. She met a fairy (or a girl, etc.).
4. This fairy had few children (or none, provided their number is inferior to the first lot).
5. The lady laughed at the fairy.
6. Because the fairy had so few children.
7. The fairy was angry.
8. The fairy fastened the lady to a rock (or a tree, etc.).
9. The lady cried.
10. She turned into a rock.
11. Her tears made a stream.
12. Which flows to this day.

Source: From Piaget, J. (1955). *The language and thought of the child*. Cleveland: Meridian Books. Copyright 1955 Routledge.

FIGURE 4-3 How children told the story

This story is taken from an early study by Piaget (1926). In the study, a child between the ages of 6 and 8 was asked to listen to the story and was given instructions like these: Are you good at telling stories? Very well then, we'll send your little friend out of the room, and while he is gone, we'll tell you a story. You must listen carefully. When you have listened to it all, we'll make your friend come back, and then you will tell him the same story (pp. 96-97).

Some examples of the stories that children told are given in Figure 4-3. As you can see, the children make many mistakes in their retelling of the story. Some of their obvious problems are leaving out crucial pieces of information, such as the reason that the fairy attacked the lady; referring to characters by pronouns that lack clear referents; and ignoring the order of events. Piaget (1926) summarized the performance of his young storytellers as follows: "The words spoken are not thought of from the point of view of the person spoken to" (p. 16). In other words, the children seemed to have trouble taking the listener's point of view, so they behaved as if the listener already knew the story (i.e., young children assume that everyone else knows what they know). In contrast, adults are often able to adjust their stories for different audiences (i.e., adults can often take the listener's perspective into account).

In this chapter, we explore the nature of writing. What does Piaget's storytelling demonstration tell us about writing? His work suggests that one major aspect of speaking and writing is to influence an audience. In speaking, the audience is physically present, but in writing, the

Ri (age eight)

There was a lady once, she had twelve boys and twelve girls. She goes for a walk and she meets a fairy who had a boy and a girl and who didn't want to have twelve children. Twelve and twelve make twenty-four. She didn't want to have twenty-four children. She fastened N to a stone, she became a rock.

Gio (age eight)

Once upon a time there was a lady who had twelve boys and twelve girls, and then a fairy a boy and a girl. And then Niobe wanted to have some more sons. Then she was angry. She fastened her to a stone. He turned into a rock and then his tears made a stream which is still running today.

Met (age six)

The lady laughed at this fairy because she only had one boy. The lady had twelve sons and twelve daughters. One day she laughed at her. She was angry and she fastened her beside a stream. She cried for fifty months, and it made a great big stream.

Ce (age six)

There's a lady who was called Morel, and then she turned into a stream... then she had ten daughters and ten sons... and then after that the fairy fastened her to the bank of a stream and then she cried twenty months, and then after that she cried for twenty months and then her tears went into the stream, and then...

Source: From Piaget, J. (1955). *The language and thought of the child*. Cleveland: Meridian Books. Copyright 1955 Routledge.

audience is not physically present. Thus the requirement of keeping the audience in your mind as you write is particularly difficult; adult writing often shows some of the egocentric characteristics and disorganization of Piaget's young storytellers. This demonstration suggests that writing is a skill that depends partly on the writer's ability to understand the perspective of the audience (i.e., of the potential readers).

What does a good writer need to know? In answer to this question, Applebee (1982) identified three kinds of knowledge, each of which is exemplified in Piaget's storytelling study.

1. *Knowledge of language*, such as the grammatical rules of English.
2. *Knowledge of topic*, such as the specific information to be conveyed.
3. *Knowledge of audience*, such as the perspective of the potential readers.

The remainder of this chapter explores how writers use these bodies of knowledge in the writing process, and how the writing process can be improved through instruction.

THREE COGNITIVE PROCESSES IN WRITING

A Cognitive Model of Writing Suppose that you were asked to write a short biographical story, such as an essay on how a water faucet works or a business letter. What cognitive processes would occur as you wrote? To examine this issue, Flower and Hayes (1981; Hayes, 1996; Hayes & Flower, 1980) gave writing assignments to people and asked them to describe what they were thinking as they carried out the assignment. This procedure is called *thinking aloud*, and the final transcript of everything that the writer says is called a *thinking aloud protocol*.

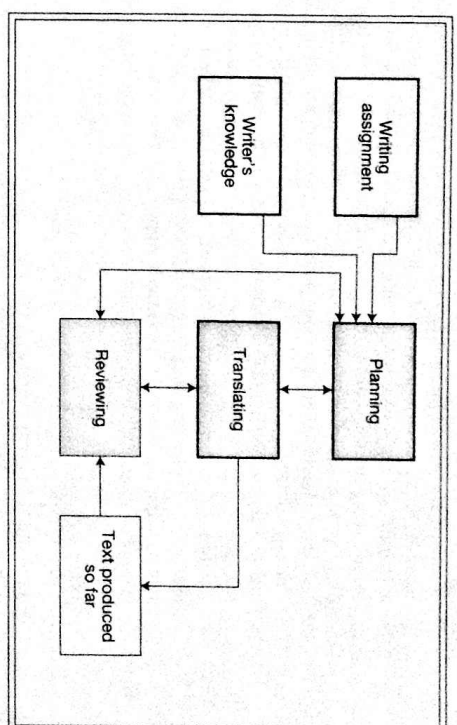
Based on their analysis of writers' thinking about protocols, Hayes and Flower (1980) identified three distinct processes in writing—planning, translating, and reviewing.

Planning involves searching for information from one's long-term memory, from the assignment, and from what has been written so far, and using this information to establish a plan for producing text. Three subprocesses in planning are generating, organizing, and goal setting. **Generating** involves retrieving information relevant to the writing task from your long-term memory; for example, in writing an essay on the writing process, you might remember that the three major processes are planning, translating, and reviewing. **Organizing** involves selecting the most useful information that you have retrieved and structuring it into a writing plan; for example, in writing an essay on the writing process, you might devote one section to each of the three major processes in the order given earlier. **Goal setting** involves establishing general criteria for guiding the execution of the writing plan; for example, you may decide that because your audience is unfamiliar with the material, your essay on the writing process should be kept simple and free of jargon. To be more consistent with newer taxonomies of planning (Kellogg, 1994, 2000), this chapter includes goal setting under the planning subprocess of *evaluating* (i.e., determining the degree to which planned writing corresponds to the writer's goals).

Translating involves producing text that is consistent with the plan—that is, the act of putting words on the page. For example, the produced text should consist of legible, grammatically correct English sentences that convey the intended information in an effective way.

Reviewing involves improving the written text using the subprocesses of *reading* and *editing*. In reading, the writer detects problems in the text; in editing, the writer

FIGURE 4-4 A model of the writing process



Adapted from Hayes and Flower (1980)

attempts to correct the problems. For example, if the first draft contains a sentence that is ungrammatical or that fails to convey the intended meaning, the sentence will be rewritten as part of the reviewing process.

Figure 4-4 provides a simplified version of the general model of writing proposed by Hayes and Flower (1980). The three shaded rectangles represent the three major processes in writing. The two unshaded rectangles on the left represent the input into the writing process: the writing assignment (including an understanding of the topic and audience) and the writer's knowledge (including knowledge of the topic, the audience, and written English). The unshaded rectangle on the right represents the output (i.e., the text that is produced). The arrows indicate that the three writing processes interact rather than occur in a fixed order.

In a recent review of research on writing, Graham (2006b) observed that Hayes and Flower's (1980) study is "arguably the most influential study of writing in the last 25 years" (p. 456) because it "fixed the vocabulary people use when talking about the composing process" and "served as a catalyst for much of the subsequent research" (p. 458). More recently, Hayes (1996) offered a revised model that still contains three basic cognitive processes in writing. However, in his model, planning is subsumed into a broader process called *reflection*, "an activity that operates on internal representations to produce other internal representations" (p. 13); translating is subsumed into a broader process called *text production*, "a function that takes internal representations . . . and produces written, spoken, or graphical output" (p. 13); and reviewing is replaced by *text interpretation*, a process that "creates internal representations from linguistic and graphic input" (p. 13). In addition, Hayes's revised model emphasizes the role of working memory in writing, includes visual and spatial representations in writing (such as graphs, tables, and pictures), and acknowledges the role of motivational and social factors in writing. Graham (2006b) notes that "it is too early to tell if it will have the same impact" (p. 461) as Hayes and Flower's (1980) earlier analysis.

Similar analyses of the writing process have been proposed by other researchers. For example, Nold (1981) suggests three major processes: planning, transcribing (corresponding to translating), and reviewing. Similarly, Bruce, Collins, Rubin, and Gerner (1982) include the following steps in their model of writing: production of ideas (corresponding to planning), production of text (corresponding to translating), and editing (corresponding to reviewing). Gould (1980) lists four processes: planning, accessing additional information (corresponding to a part of planning), generating (corresponding to translating), and reviewing. In a review, Kellogg (1994) concluded that "writing involves four cognitive operations that play a role in all thinking tasks: collecting information, planning ideas, translating ideas into text . . . , and reviewing ideas and text" (p. 16). The first two processes would be considered part of planning in the Hayes and Flower model, whereas the second two correspond to translating and reviewing, respectively. Apparently, there is some consensus that the major writing processes include planning, translating, and reviewing. Furthermore, all the analyses assume that a great deal of interaction occurs among the processes, rather than each process occurring separately.

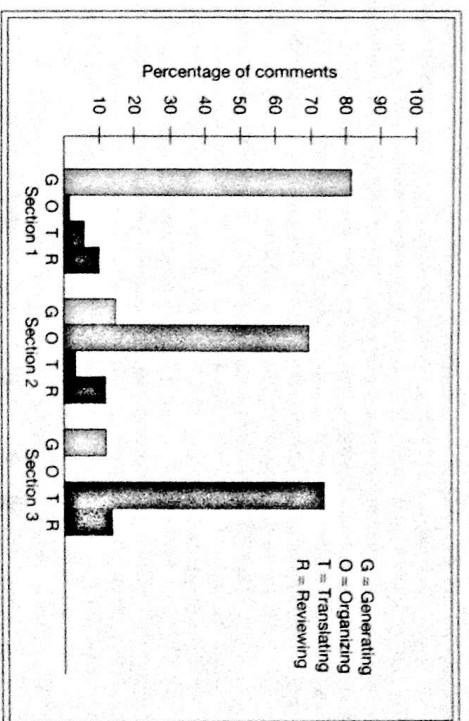
Looking at Student Protocols. As evidence to support their model of the writing process, Hayes and Flower (1980) presented an analysis of the thinking about protocol of a typical writer. The protocol contained 14 pages covering 458 simple statements or comments made by the writer. The protocol could be divided into three sections. In the first section, consisting of the first 116 comments, the writer seemed to focus on the planning subprocess of generating information, with occasional interruptions to focus on reviewing. Some typical comments made during this section of the protocol were "And what I'll do now is simply jot down random thoughts . . ." and "Other things to think about in this random search are . . ." In the second section, consisting of the next 154 comments, the writer concentrated on the planning subprocess of organizing the information, with occasional interruptions to focus on reviewing. Typical comments made during this section of the protocol included "Now I think it's time to go back and read over the material and elaborate on its organization." Finally, in the third section, containing the final 188 comments, the writer emphasized the process of translating, with occasional interruptions for generating and reviewing. Examples of typical comments were "Let's try and write something," or "Oh, no. We need more organizing" (p. 10).

Figure 4-5 shows the proportion of comments directed toward generating, organizing, translating, and reviewing for each section of the protocol. These data were derived using only major comments from two writers. As can be seen, the first section of the protocol is devoted mainly to generating ideas, the second mainly to organizing the ideas, and the third mainly to translating the writing plan into acceptable sentences. In addition, the reviewing process (consisting mainly of editing) seems to play a small part in each of the three sections of the protocol.

Instructional Themes. As you can see in the foregoing analysis, the study of writing is in its early stages of development. However, even in this early work on writing, several implications for writing instruction have emerged: product versus process, problem solving versus procedure application, communication versus composition, and knowledge transforming versus knowledge telling.

First, consider the distinction between *process* versus *product*. Much of the emphasis in writing instruction is typically on the final product, including spelling, punctuation, and grammar. An additional focus suggested by the cognitive analysis of writing is that writers

FIGURE 4-5
What writers do during the writing process



Adapted from Hayes and Flower (1980).

instruction should also concentrate on the process of writing. In particular, the foregoing analysis suggests that most of the time and effort in writing is devoted to planning rather than to actually producing acceptable text. Steinberg (1980) summarizes this idea as follows: "Teaching of writing focuses too much on product, on the written paper that the student submits, and not enough on process, on how to write" (p. 156).

Second, consider the distinction between *problem solving* versus *procedure application*. Much of the instruction in writing involves teaching procedures for producing sentences properly, such as "Never begin a sentence with 'because,'" or "Each paragraph should have a topic sentence, a summary sentence, and approximately three core sentences." In addition to using such procedures, a writer must also engage in an act of problem solving. For example, Kellogg (1994) shows that "in composing a written text, individuals . . . engage in a special form of thinking—the making of meaning—that may well define one of the most unique characteristics of our species" (p. 3). As in other types of problem solving, the writer must establish goals and work to achieve them. Thus instruction in writing may be viewed as instruction in problem solving. Flower and Hayes (1981) make this argument as follows: "Writing is problem solving, and can be analyzed from a psychological view of problem-solving processes" (p. 40).

Third, let's explore the distinction between *communication* versus *composition*. Much of the instruction in writing involves learning to produce a composition that meets stylistic and grammatical requirements. Nystrand (1982b) points out there is an emphasis on "proper talk" and "standardized composition" rather than on writing in a way that influences the audience. In addition to teaching students how to write compositions that conform to "school English," students must learn to be sensitive to the ideas that writing is an attempt to communicate with a reader. As Fraser (1982) points out, "effective writing is bringing one's own goals in line with the readers' constraints" (p. 130). Similarly, Nystrand (1982b) notes that writers need to develop a "notion of audience as person or persons whom . . . the writer hopes to influence" (p. 2).



Planning

WHAT IS PLANNING?

As noted in the previous section, planning is a major process in writing. Planning includes generating information from memory, which Hayes and Flower (1980) call *generating*, evaluating that information with respect to criteria for writing, which Hayes and Flower call *goal setting*, and organizing that information into a writing plan, which Hayes and Flower call *organizing*.

If planning is an important component in the writing process then we can make two predictions: students' planning should be related to the quality of their essays (correlation hypothesis), and training in how to plan should result in improvements in the quality of essays (training hypothesis). Concerning the correlation hypothesis, in a review of research on planning, Hayes and Nash (1996) noted strong positive correlations between writing quality and amount of planning—that is, “more successful writers do more planning than less successful writers” (pp. 54–55). Concerning the training hypothesis, in a review of research on writing, Graham (2006a) found that teaching writers strategies for planning had a strong impact on their writing, that is, students given training in planning wrote higher quality essays than those who did not receive training. The effect size of planning training averaged 1.5 immediately after training and averaged 1.3 on delayed writing tests.

RESEARCH ON PLANNING

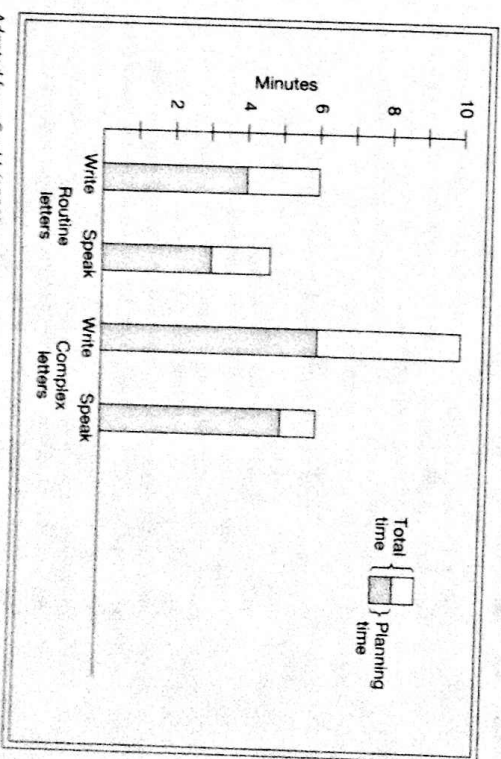
How Much Do Students Plan in Dictation? As an example of planning, let's suppose you were asked to dictate a one-page business letter. The dictation rate is potentially 200 words per minute (i.e., a person can speak comfortably at a rate of 200 words per minute). However, Gould (1980) reports that the normal dictation rate is approximately 23 words per minute. Similarly, suppose you were asked to write a one-page business letter. The

writing rate is potentially 40 words per minute, yet Gould reports that the normal writing rate for business letters is 13 words per minute.

These results indicate that people produce text much more slowly than the limit imposed by the output device (writing or dictating). Why do people dictate (or write or write time is devoted to planning. For example, by carefully recording pauses that made during speaking or writing, Gould (1978a, 1978b, 1980) was able to determine the pauses accounted for approximately two thirds of total composition time in both writing and speaking. These results are summarized in Figure 4-6.

When Do Students Plan in Writing? Interestingly, Gould's studies revealed that planning pauses occurred during the writing process (as *local planning*) rather than before it (as *global planning*), suggesting that writers rarely plan before they start writing. In more focused study, Matsushashi (1982, 1987) carefully observed the pauses made by high school students as they wrote essays. As in the Gould study, Matsushashi found that planning time accounted for approximately one half to two thirds of the total writing time. In addition, Matsushashi found that pauses occurred mainly at the borders between student in writing an essay, the numbers after each word indicate the length of the pauses (in seconds) that occurred before the writer moved on to the next word. As can be seen, the longest pauses are in line 4 (9.7 seconds before going on to a new clause), line 16 (6 seconds after the sentence), line 8 (13.3 seconds before the new paragraph), and line 11 (12.8 seconds after the sentence). During some of the longer pauses, the writer removed his pen from the paper and shifted position in his seat. Matsushashi suggests that the pauses allowed the writer to organize the information mentally and place it within the appropriate context.

FIGURE 4-6 How much planning time is used in writing or dictating a letter?



Adapted from Gould (1980).

1. Truly⁵ successful¹¹ person⁵ to⁸ person² communi-
2. cation³ is¹ difficult¹ because⁹ people⁶ in⁹ general¹¹ are⁹ poor
3. 10 others⁷ they¹⁰ would⁷ rather¹ listen³ to⁹ themselves¹⁹ speaking
4. 2 than⁴ someone⁷ else⁵ 4 7 it⁹ is⁷ my⁷ feeling¹⁹ that⁹ this⁸ occurs
5. 1 because¹ of¹ a⁸ basic² self-centeredness¹⁶ of people⁴ end¹² to
6. 1 the⁹ more³ interested⁷ in⁷ their⁹ own⁷ lives⁵ to¹² bother¹⁰ exposing
7. 1 themselves⁷ to³ show⁷ others⁹ live⁹
8. 13 Communication¹ is⁷ successful⁸ only⁹ when² there
9. 2 is² +³ give⁹ and⁸ take¹ between³ the⁷ parties¹ 1. 3 Each⁷ one
10. 1 should⁹ contribute¹ equally² 1 1 as⁸ well⁷ as² 0 accepting⁷ the
11. 2 contributions⁵ of⁹ the⁷ others¹² 8 The⁶ situation⁷ 1 1 0 have
12. 1 8 described⁶ above³ leads⁹ to⁶ poor⁸ communication¹ 7 1 0 since
13. 1 9 everyone⁸ wants⁹ to⁶ give¹ 1 2 and⁸ no¹ 0 one⁶ wants⁹ to
14. 1 2 take⁹

(Numbers after words indicate pause times, in seconds.)

Source: Reprinted from What writers know: The language, process and structure of written discourse. M. Nystrand (Ed.), *Explorations in real-time production of written discourse*, pp. 269-324, Copyright 1982, with permission from Elsevier.

How Far Ahead Do Students Plan? Additional evidence concerning the planning process is reported by Scardamalia, Bereiter, and Goelman (1982). For example, in one study elementary school children were asked to write an essay. At various points during the writing process, the teacher would interrupt a student, asking what he or she was going to write. Usually students had the next five or six words in mind and had thought ahead to the end of the clause. Young children (in the primary grades) tended to dictate to themselves, mouthing each word while writing. In contrast, older children (Grade 4 and above) rarely vocalized during writing but did vocalize during pauses. Apparently, young children rely on external memory (i.e., self-dictation) in order to keep the next few words in their short-term memory, whereas older children behave as if a memory load of several words does not require external memory.

Do Experienced and Inexperienced Writers Plan Differently? Experienced writers are more likely than inexperienced writers to generate, evaluate, and organize ideas before writing; that is, experienced writers engage in more global planning than do inexperienced writers. For example, Planko (1979) found that few students—even at the high school and college levels—engage in any planning prior to writing a school assignment. In contrast, professional writers overwhelmingly report creating some sort of written outline before beginning a draft (Stotsky, 1990). When told to write a short story within a time limit ranging from 2.5 to 20 minutes, 5th-grade and 10th-grade students generally began writing immediately, whereas adults were more likely to engage in prewriting planning activities such as writing an outline (Zbrodoff, 1985). When given longer time limits for the assignment, adults, in contrast to elementary and high school students, spent more time planning and produced more detailed outlines (Zbrodoff, 1985). These results suggest that global planning is a hallmark of experienced writers.

Bereiter and Scardamalia (1987) analyzed the ideas generated by students at various ages, and identified three stages of planning activity. First, young children such as those entering elementary school have difficulty generating any ideas at all. Writers at this level have problems with even the most basic planning subprocess—generating ideas. Second, elementary school children (up to approximately 12 years old) engage in knowledge telling—expressing ideas as they are generated without evaluating or organizing them. Writers at this stage seem to have mastered one planning subprocess—generating ideas—but have not mastered other planning subprocesses, such as evaluating and organizing ideas. Third, older writers can engage in knowledge transforming—generating, evaluating, and organizing ideas before expressing them in order to communicate with the reader. This analysis shows how the ability to generate ideas is not enough, because students also need to learn how to evaluate and organize the ideas they have generated.

IMPLICATIONS FOR INSTRUCTION: PLANNING

In summary, this section presented several important findings concerning the planning process: Planning is a time-consuming process accounting for most of writing time; local planning seems to occur mainly at sentence and clause boundaries; local planning generally allows the writer to work on one clause or sentence at a time, and inexperienced writers often do not engage in global planning.

Although the ability to generate, evaluate, and organize ideas is central to the writing process, writing instruction does not normally teach students how to plan. The foregoing analysis of planning suggests that students may need instruction and practice in how to generate ideas, how to organize information, and how to evaluate whether that information fits into the organization.

A major finding of the research on planning is that students often fail to engage in global planning; in other words, they fail to generate ideas, evaluate those ideas for relevance to the writing goals, and organize the relevant ideas before writing. If writers do not engage in these prewriting activities, they may have to try to generate, evaluate, and organize at the same time that they are engaged in translating. By trying to do two things at once—plan and translate—both processes might suffer, resulting in lower quality essays. It follows that an important instructional intervention is to encourage students to engage in a range of planning subprocesses, including generating, evaluating, and organizing, before they begin to write.

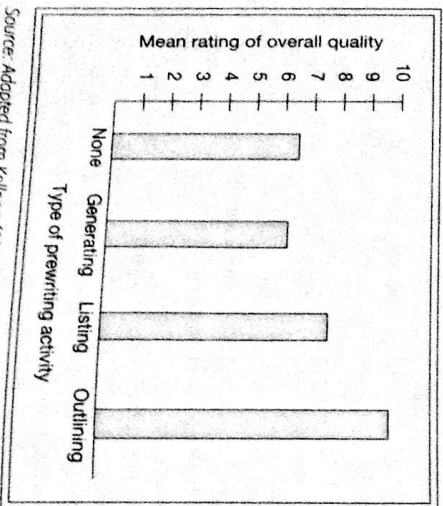
For example, Kelllogg (1994) investigated the hypothesis that asking students to plan before they write would result in better essays. College students were asked to write an essay on the pros and cons of professionals joining an "Anti-Greed" Club, based on the following instructions:

Imagine that you are a successful professional. An "Anti-Greed" Club has been formed in your neighborhood. All the members of this club are professionals like you (attorneys, physicians, business executives, etc.) who earn over \$50,000 per year. Each member pledges to give annual income over \$50,000 to poor families in the community. The recipients and amount each receives are decided by chance—that is, by a drawing. Several members of your social club are considering joining the "Anti-Greed" Club and have asked your help in making an objective, rational decision. Write a paper giving the pros and cons of such a move as you see it. Be careful to give fair treatment to both sides of the issue, regardless of how you feel about it personally (Kelllogg, 1987, p. 262).

One group of students was not asked to engage in any prewriting activity (no prewriting group) so that no planning processes were activated prior to writing. Another group was asked to write down as many ideas as possible without evaluating or organizing them (generating group), so that only the planning subprocess of generating was activated. Another group was asked to generate a list of relevant ideas (listing group), so that the planning subprocesses of generating and evaluating (or listing group) were activated. Finally, a group was asked to produce an outline (outlining group) so that the planning subprocesses of generating, evaluating (or goal setting), and organizing were activated.

How do prewriting activities affect what is written? Judges were asked to rate the quality of each essay on a 10-point scale. Figure 4-8 shows that the average quality ratings of the essays written by the no-prewriting group and the generating group were low, whereas the outlining group wrote the highest quality essays. According to Kellogg (1994), students in the no-prewriting group and the generating group must try to engage in planning and translating processes at the same time. Given the constraints on how much can be processed in working memory at one time, the quality of their writing was affected. In contrast, when students engaged in intensive planning before writing, as those in the outlining group had done, memory resources could be used mainly for the translating process during writing, thus allowing for better essays. Similarly, Kellogg (1988) found that students composed better business letters when they were forced to spend 10 minutes generating an outline before writing than when there was no prewriting activity. Kellogg's results are encouraging, because they show that it is possible to teach students to engage in productive planning processes before they begin to write.

As another example, suppose we asked some fourth and sixth graders to write a persuasive essay such as a letter to the Parent Teacher Association (PTA) about whether students should be allowed to watch violent movies and television programs. Do students need help with planning what to write? To examine this issue, Ferretti, MacArthur, and Dowdy (2000)



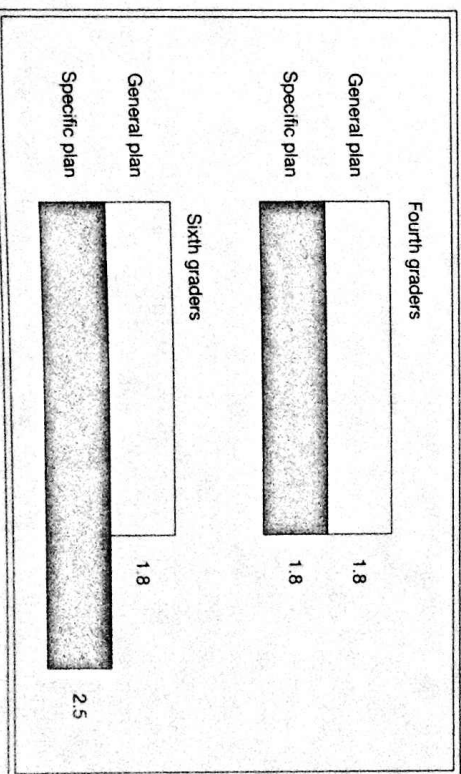
Source: Adapted from Kellogg (1994).

provided two kinds of planning aids to fourth and sixth graders. Some students (control group) received a statement of the general goal, which was to take a position and write a letter to persuade the audience to agree with them. Other students (treatment group) were given a statement with the same general goal along with specific subgoals such as to state your belief, give two or three reasons for your belief, give supporting evidence for each reason, give two or three reasons someone might disagree with you, and give evidence why each reason is wrong.

Figure 4-9 shows the mean quality rating of the students' writings on a scale of 0 (lowest) to 7 (highest) for fourth and sixth graders in the two groups. As you can see, the fourth graders did not benefit from receiving a statement of specific subgoals, but the sixth graders did (showing an effect size of 0.8). Apparently, the younger writers did not understand how to implement the writing plan, whereas older writers did. This study suggests that students need guidance and practice in planning the components and structure of their essays.

Fostering planning skills in students includes helping students learn how to generate, evaluate, and organize ideas. First, training students in how to retrieve information is an important aspect of planning. Students need practice in how to search for needed information, including how to take (and use) notes from sources. A key finding in many writing studies is that students' knowledge of the domain is a crucial determinant of the quality of the writing (Voss & Bisanz, 1985). For example, Caccamise (1987) found that students generated far more ideas when writing about a familiar topic than when writing about an unfamiliar one. In short, students need to write about topics that they already know about or have researched. Second, students need practice in establishing goals and evaluating whether the ideas they generate meet their goals, including being able to write for a specific audience and for a specific purpose. Third, learning to organize ideas into a coherent structure is another important aspect of planning, which often involves being able to create and monitor outlines.

FIGURE 4-9
Mean quality ratings for persuasive essays written by fourth and sixth graders given general and specific plans



Source: Adapted from Ferretti et al. (2000).



Translating

WHAT IS TRANSLATING?

The next component in the writing process is what Hayes and Flower (1980) call *translating*. This phase involves carrying out the writing plan by actually generating some written text. According to Hayes and Flower, translating is done interactively with planning. In other words, a writer generates a plan, translates a small part of it, then checks the next part of the plan, translates that part, and so on. Research described in the previous section suggests that people may translate one phrase (or simple sentence) at a time.

Constraints on Translating. Suppose that you write by checking your overall writing plan, sentence by sentence. In other words, you check your plan for the first main idea and then try to translate it into a sentence, and so on. As you move from your writing plan (i.e., your idea of what you want to say) to the production of prose (i.e., the sentence that you actually write), you are constrained by several factors. As listed by Nystrand (1982a), these constraining factors are

Graphic: The sentences that you generate must be legible for the reader, so you must use lettering, penmanship, layout, spacing, indentation, and spelling that are familiar to the reader.

Syntactic: The sentences that you generate must be based on the rules of written English, i.e., grammar, punctuation, and sentence organization must be appropriate for the reader.

Semantic: The sentences that you generate must convey the meaning to the reader that you intended; your assumptions about the information that a reader brings to the reading task must be appropriate.

Textual: The sentences that you generate must fit together into a cohesive paragraph and passage.

Contextual: The sentences that you generate must be written in the appropriate style (e.g., sarcasm or understatement).

Each of these types of constraints involves ensuring a correspondence between your written words and the reader's understanding of them. Examples of writers' failures to follow the constraints on writer-reader communication are given in Figure 4-10. Nystrand (1982a) refers to these examples as *misconstraints* (i.e., cases in which the reader is either misled or misinterprets the writer's information).

RESEARCH ON TRANSLATING

Removing Constraints on Translating. The translation process may require a great deal of attentional capacity on the part of young writers, because so much of the translation process is not yet automatic to them. One solution to this problem is to ignore the normal constraints on writing, as the following writing from a 6-year-old demonstrates.

WONS A LITOL. GROU WOS WONG IN HR GARDIN INTH SE GOT NOT BY A ROBR AND TIN SE SPREND AND TIN HE MON AND DAD KAM GUT AND HET HE OWT OV THE ROBR'S HANDS AND TIN TAV KOLD THE POLES AND TIN THE POLES FOX KAM OV THE ROBR AN POT HIM IN THE GAOI. (Read, 1981, pp. 106-107)

FIGURE 4-10
Examples of
five errors in
writer-reader
communication

Graphic Misconstraint
"now here" for "nowhere"

Syntactic Misconstraint
"You still going to get where your going with a seatbelt on."

Semantic Misconstraint
"The law against drinking is for your own safety." (Written to adults whereas the law against drinking applies only to minors.)

Textual Misconstraint
"I think that the snowmobilers will get used to these new laws, and people will see the laws the government put out are for our protection." (The previous sentences have discussed only automobile seatbelts so the reader has not been prepared to consider snowmobiles.)

Contextual Misconstraint
Asking high school students to read the state laws on drunk driving.

Source: Adapted from Nystrand (1982a)

As can be seen, this young writer was able to tell a story without paying great attention to some of the basic rules of spelling, punctuation, grammar, and the like. By freeing herself from the tedious constraints on writing, the young writer was able to produce a story. Read (1981) suggests that "teachers and parents can look upon early writing in roughly the same way that they regard children's art, as an expression which is created with pleasure and which is not expected to be adult-like" (p. 114). In addition, Read provides evidence that the use of nonstandard spelling during writing does not adversely affect reading; for example, the little girl who wrote this story was able to sight-read words such as "girl" even though she wrote "GROU."

In most school writing tasks, the graphic and syntactic constraints (as well as others) are enforced. If the rules of spelling, grammar, and even penmanship are not yet automatic, then the writer's full attentional capacity must be devoted to the correct production of text rather than to organizational planning. For example, Scardamalia and colleagues (1982) proposed that because the information-processing capacity of young writers is limited, and since the mechanical and syntactic aspects of writing are not automatic, an emphasis on correctly formed sentences results in poorer overall writing quality. The low-level aspects of writing (such as correct spelling, punctuation, and penmanship) interfere with higher level planning.

To test this idea, Bereiter and Scardamalia (1987) asked fourth- and sixth-grade children to write an essay, dictate an essay at a normal rate, or dictate an essay at a slow rate. The dictation modes were used because they presumably freed the young writer from some of the mechanical and syntactic demands of translating. As predicted, the dictation modes resulted in about twice as many words being produced and in small increases in judged quality, as compared to writing. Similarly, Reece and Cumming (1996) and De La Paz and Graham (1995) reported that struggling young writers produced higher quality essays when they dictated than when they wrote by hand. However, Gould (1980) notes that dictation does

not tend to increase the quality of prose in adults. Apparently, the mechanical processes of handwriting, proper spelling, and punctuation are not automatic in young writers, but, for simple assignments, do eventually become automatic in adults. Thus the act of translating ideas into words may actually disrupt the flow of thinking in young writers.

Polished Versus Unpolished First Drafts There is some potentially important evidence that the quality of adult writing is also hindered when attention must be focused on the mechanics of writing. For example, suppose that you were asked to write a formal business letter to persuade your teacher to use a future class period for either a film that is related to the course or for a library reading session. First, you will have 10 minutes to complete a preliminary draft. Then, after a 5-minute rest period, you will have 10 minutes to produce the final draft.

Suppose your goal is to produce a high-quality final draft, containing many persuasive arguments expressed in a coherent way. Would it be better to try to write a polished letter as your first draft—including proper sentence formation, punctuation, and spelling—or would it be better to try to concentrate only on generating arguments in the preliminary draft, with revisions for organization, sentence formation, and mechanics handled in the final draft? Glynn, Britton, Muth, and Dogan (1982) investigated this question in a controlled experiment in which students were given writing assignments as just described. Some students were told to write a polished first draft.

On this preliminary draft, you need to be concerned with content (i.e., the production of persuasive ideas), order (i.e., the logical sequence of these ideas), sentence formation (i.e., the incorporation of these ideas into sentences), and mechanics (i.e., compliance with punctuation and spelling rules). Communicate all the ideas that you think may be useful in persuading me to choose one alternative and not the other. More than one persuasive idea can be incorporated into each sentence (p. 558).

Other students were told to write an unpolished first draft.

On this preliminary draft you need to be concerned with content (i.e., the production of persuasive ideas). Communicate all the ideas that you think may be useful in persuading me to choose one alternative and not the other. Summarize each of these persuasive ideas using only three or four words, and write them in order. On this draft, do not attempt to work on order (i.e., the logical sequence of persuasive ideas), sentence formation (i.e., the incorporation of these ideas into sentences), or mechanics (i.e., compliance with punctuation and spelling rules). You will be permitted to work on order, sentence formation, and mechanics during the next draft (pp. 558–559).

For the final draft, all students were told to “produce the best letter you can,” including consideration of content, order, sentence formation, and mechanics.

Table 4–1 summarizes the differences between the final drafts produced by the two groups. Students who wrote unpolished first drafts tended to write final drafts containing more persuasive arguments, more arguments per sentence, and fewer mechanical errors, as compared to students who wrote a polished first draft. Subsequent experiments determined that this pattern was most strongly pronounced for students with average verbal ability as compared to students with low verbal ability. These results suggest that when good writers are forced to express early drafts in complete sentences, the quality of the final draft suffers. Apparently, the heavy load placed on attentional capacity limits the writers’ ability to retrieve and organize information. By forcing ideas to be translated prematurely into polished sentences, without allowing time for planning, the result may be a final draft that lacks integrated content.

TABLE 4–1
Differences in final drafts when preliminary drafts are polished versus unpolished

	Total Number of Arguments	Arguments per Sentence	Mechanical Errors per Sentence
Polished preliminary draft	2.9	0.38	0.43
Unpolished preliminary draft	8.0	0.85	0.23

Adapted from Glynn, Britton, Muth, and Dogan (1982).

Individual Differences in Translating Another approach to the study of the translation process involves comparing older and younger writers, or comparing more skilled and less skilled writers. For example, in one study (Scardamalia et al., 1982) fourth- and sixth-grade students were asked to write essays on topics such as “Is it better to be an only child or to have brothers and sisters?” “Should boys and girls play sports together?” or “Should children be allowed to choose what subjects they study in school?” When students finished their essays, they were given cues to keep working such as “You’re doing fine. Now I know it’s a bit tough, but you can write some more about this.”

The results indicated that the cues to keep writing encouraged both fourth and sixth graders to add about 50% more to their essays. However, the judged quality of the essays improved only for the fourth graders. Apparently, the younger writers stopped writing before they were really finished, whereas the sixth graders continued until they had written a good essay. One implication is that younger children may be using the conventions of oral speech (e.g., needing someone to tell them to go on), but older writers can tell themselves to continue producing text.

When young writers were asked to dictate their essays, the students produced longer essays than when they were asked to write them. However, cues to produce more text resulted in more words being produced but not in increased quality ratings for the essays. Apparently young writers stop too soon when they must physically write the sentences; however, when they are encouraged to continue or when they are allowed to dictate, they produce more complete, coherent essays.

There is clear evidence that as children grow, the quality and quantity of their writing increase. For example, an analysis of a national child development study revealed that older children write longer and more complex sentences than younger children (Richardson, Cahnan, Essen, & Lambert, 1975). In a typical research study, Bartlett and Scribner (1981) asked children in grades 3 to 6 to write a story based on the following: “A man leaves his house. His body is found the next morning.” As expected, sixth graders produced longer stories than third graders (an average of 227 words versus 103 words, respectively); in addition, sixth graders produced more complex referring expressions (e.g., pronouns) as compared to third graders. Scardamalia et al. (1982) reported on a study in which fourth and sixth graders were asked to write essays. The experimenters measured the length of the longest “coherent string,” that is, the longest string of words with no nonfunctional units (such as “you know”) and no incoherent orderings. For fourth graders the average was 4.1 words, and for sixth graders the average was 6.3, suggesting that older writers produce longer coherent strings.

Scardamalia (1981) compared different levels of sophistication in sentence production. For example, writers using a low level of sophistication state single facts without any integration, as in the following:

In the state of Michigan the climate is cool. In the state of Michigan the fruit crop is apples. In the state of California, the climate is warm. In the state of California the fruit crop is oranges.

In contrast, writers using a high level of sophistication integrate all of the information into a coherent sentence, such as:

In Michigan's cool climate they harvest apples, but with California's warm climate, oranges may be grown.

Scardamalia (1981) noted similar differences among levels of sophistication in the essays students wrote on the question "Should students be able to choose what subjects they study in school?" A low level of sophistication is exemplified in the following essay:

Yes, I think we should. Because some subjects are hard like math. And because the teachers give us a page a day I think the subjects that we should have is Reading. Because that is easiest one. I think we should have math, science and social studies. Because in social studies and science we have to write up notes and do experiments. I think math is the worst subject. And I hate spelling to. Because in spelling there are so many words to write and they are all hard. And they waste my time. I think school shouldn't be to 3-45. I think it should be to 2:00. I think school is too long.

As can be seen, the writer simply expressed each idea that came into her head in the order that the ideas occurred to her. This type of writing is called *associative writing* by Barrett (1980) and *writer-based prose* by Flower (1979).

In the following example from Scardamalia (1981), the writer used a high level of sophistication in the production of sentences (the spelling is original):

Chose is an important thing but a very tricky thing to fool with. I feel that those of school subjects should be something that is done carefully. A young child given a chose would pick the easiest subjects with no foresight into his future. But choose in his later years could be very important. To develop his leadership qualities. To follow and develop his interests and character to his fullest. So with these facts I come to the conclusion that those of subjects should not be given until about the age of fifteen. You can not condemn or praise what you know little about. Until the age of chose a full and general curriculum should be given. It is not up to the school board to decide your life and until you are old enough to decide it is not your disson either.

This writer is able to express conflicting points of view and weave them into a coherent solution. This type of writing requires holding many different ideas in one's mind at one time and seeing the relationships among them. If a writer's attention is absorbed by the mechanics of writing, it is not possible to hold all of these relations in mind.

One implication of this work is that high-quality writing requires that the writer not have to use much attention for the mechanical aspects of sentence production. Good writing requires that the mechanics of penmanship, spelling, punctuation, and grammar be automatic. Thus, to be a good writer requires much more than having good ideas; it also requires a great deal of well-learned knowledge about the English language.

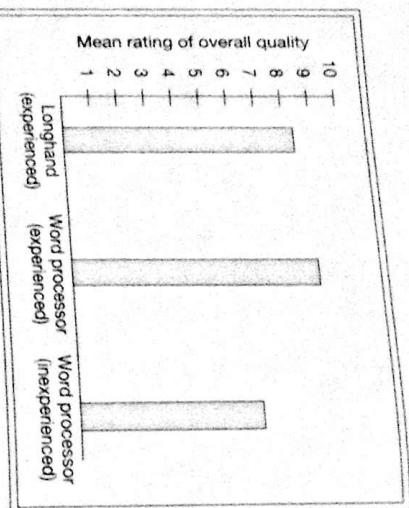
IMPLICATIONS FOR INSTRUCTION: TRANSLATING

The foregoing review of research on translation makes three points. First, the writer is constrained by many factors, including the mechanics of using proper grammar, spelling, and penmanship. Second, the mechanics of proper sentence writing may overload the writer's attentional capacity, thus interfering with high-level planning and organization. Third, there appears to be a developmental trend in which older writers, who presumably have automated much of the mechanics of writing, are able to write more complex sentences, to integrate the information, and to keep writing until finished.

Writing instruction that emphasizes correct spelling, punctuation, grammar, penmanship, and other mechanics may serve to reduce or eliminate the student's ability to plan. The result can be a mechanically correct composition that lacks coherence. Instead, students may benefit from writing situations in which the mechanical constraints are removed or relaxed (e.g., being free to write rough drafts that may not be mechanically perfect). The promising research on unpolished first drafts suggests that the quality of the final product may be higher if students are not forced to write polished first drafts. Even practice in oral expression—which certainly avoids constraints on spelling and penmanship—may provide needed practice in the translation process. These kinds of relaxations of mechanical constraints seem particularly important for young writers who have not yet automated many of the mechanical aspects of writing. Eventually, students need to develop automatic skills in the mechanics of writing such as penmanship (or typing), spelling, grammar, and punctuation. These automatic skills will free their attentional capacity to concentrate on the relations among ideas in the composition.

Writing with Word Processors A potentially important instructional intervention that may reduce the drudgery of the translation process is learning to use a word processor. The translation process involves putting words on paper. An obvious question concerns whether this process is influenced by whether the words are produced by typing them on a keyboard versus handwriting them. According to a cognitive theory of working memory, the amount of attentional resources is limited. If using one type of the output device—word processor versus pen—places a greater load on working memory than the other, the quality of the written product would suffer. For example, if students lack experience in using a word processor, they have to devote more attentional resource to the mechanics of typing and less to what they are writing. To test this hypothesis, Kellogg and Mueller (1993) compared the writing of students who were asked to compose by longhand, students who were asked to compose on a word processor but who lacked extensive word processing experience, and students who were asked to compose on a word processor and who possessed extensive word processing experience. Figure 4-1 shows that the rated quality of the essay (on a 10-point scale) was nearly equivalent for longhand writers and experienced word processor writers, but that inexperienced word-processor writers produced lower quality essays than did longhand writers.

By the same argument, if younger students have difficulty with the mechanics of handwriting, allowing them to use a word processor might enable them to devote more attention to what they are writing. This intervention will work, of course, only if students are well practiced in the use of word processors. In an extensive review of studies comparing writing by longhand and by word processor, Bangert-Drowns (1993) found no significant differences in the quality of writing products in most of the studies. However, overall the



Source: Adapted from Kellogg and Mueller (1993).

word processing groups had a small advantage. In a more recent review, Goldberg, Russell, and Cook (2003) reported that essays written on word processors were scored higher on average than essays written by hand. The mean effect size favoring using a word processor was 0.41, which is considered in the small-to-medium range. Consistent with the working memory hypothesis, the advantage of word processing over longhand writing was much greater for elementary school children than for college students, especially when the elementary school students were not highly skilled writers and when they had received extensive practice in using word processors.

These results are consistent with the idea that the translation process is equivalent when writing by pen or by word processor, as long as the writer is skilled in its use. In reviewing research comparing writers who generally possessed these skills, Kellogg (1994) concluded that "word processors and pens are equally effective output devices" (p. 147). However, when a writer lacks skill in using either, the need to focus on correctly using the device detracts from writing a high-quality product. In short, when the translation process requires paying attention to physically writing words, less attention can be paid to what to write.

Training on Handwriting. If handwriting is a constraint on the writing process, we can generate two predictions concerning the relation between being able to use a pencil to write the letters of the alphabet (handwriting test) and being able to write high-quality essays (essay writing test). First, we can predict that people who score low on handwriting should score low on essay writing and people who score high on handwriting should score high on essay writing. To test this prediction, Jones and Christensen (1999) tested second graders in Australia on handwriting and essay writing. For the handwriting test, the students had 1 minute to write the lowercase letters of alphabet in order starting with "a." Their score was the number of correct letters they produced. For the essay writing test, the students had 15 minutes to write a composition about their summer vacation. The essay was scored on a 20-point scale that included coherence of the ideas, spelling and grammar, sentence structure, and fluency. As predicted there was a strong positive correlation ($r = .82$) between handwriting score and essay writing score.

FIGURE 4-12a
Mean score on handwriting test before and after handwriting training for two groups

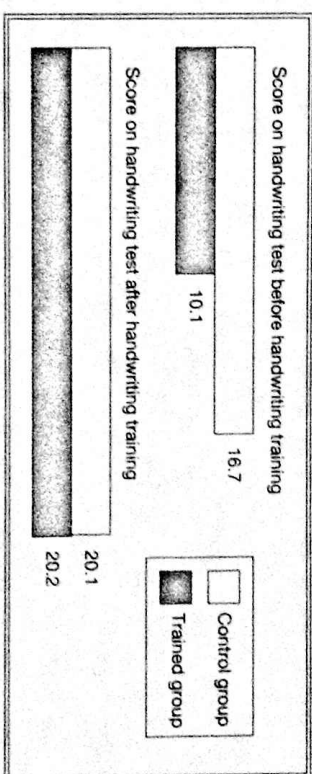
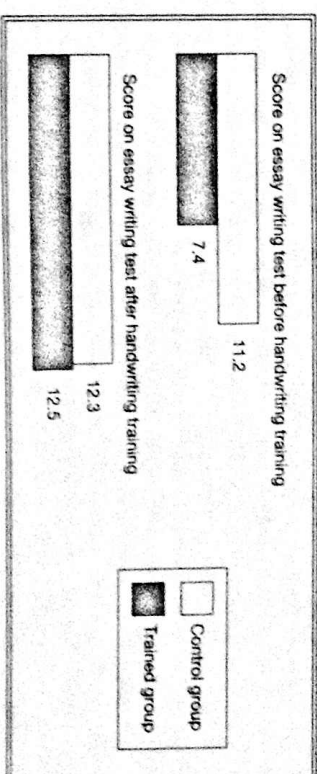


FIGURE 4-12b
Mean score on essay writing test before and after handwriting training for two groups



Source: Adapted from Jones and Christensen (1999).

Although the correlation shows that there is a strong relation between handwriting proficiency and essay writing ability, we cannot conclude that handwriting proficiency causes essay writing ability. Thus, our second prediction is that teaching students to improve their handwriting should also improve their essay writing. To test this prediction, Jones and Christensen (1999) selected second graders who scored relatively low on the handwriting test (treatment group), and provided them with direct instruction targeted to their specific handwriting errors. The training lasted for about 10 minutes per day for 8 weeks. Other students who already scored relatively high on handwriting (control group) received their regular handwriting instruction during this period.

Figure 4-12a shows that the trained group started off much lower than the control group on handwriting before the training, but reached about the same level as the control group after training. This shows that the intensive and focused instruction had a positive effect on students' ability to write letters accurately and rapidly. However, our main interest concerns what happened to the children's essay writing scores. As you can see in Figure 4-12b, the trained group started with lower essay-writing scores than the control group before training but ended up with equivalent scores after training. This finding shows that training in handwriting can have a positive effect on the quality of essay writing.

Why would a low-level skill like using a pencil to write letters on paper have an effect on a high-level skill like writing high-quality essays? One answer is that the students' working memory is limited. If cognitive capacity has to be used for thinking about how to form letters, then less capacity remains for thinking about what to write. When students can produce letters accurately and rapidly—with little or no conscious attention—the translation process can focus on expressing ideas clearly rather than on forming letters.

Graham, Berninger, Abbott, Abbott, and Whitaker (1997) also examined these predictions. First, they tested 600 children in grades 1 through 6 on a battery of tests including tests of handwriting (i.e., alphabet test and copying test) and tests of essay writing (i.e., narrative fluency, narrative quality, expository fluency, expository quality). For the alphabet test, students were asked to write the lowercase letters of the alphabet in order, after 15 seconds they were told to put a slash mark, and then finish the alphabet. Their score was the number of correct letters produced in 15 seconds. For the copying test, students were asked to copy a printed essay as fast and accurately as possible. Their score was the number of correct words produced in 1.5 minutes. For the essay writing tests, students were given 5 minutes to write a narrative composition based on the prompt, "One day [write a name] had the [best or worst] day at school" and 5 minutes to write an expository composition based on the prompt, "I like [person, place, or thing] because _____." Fluency was based on counting the number of words produced in 5 minutes, whereas quality was based on having two teachers rate the essays on a scale of 1 (considerably below grade expectations) to 5 (considerably above grade expectations).

Consistent with prediction 1, there were strong positive correlations between fluency measures and handwriting measures (ranging from 0.55 to 0.75) and moderate correlations between quality measures and handwriting measures (ranging from 0.23 to 0.69). Using a statistical technique called structural equation modeling, Graham et al. (1997) also determined that handwriting measures strongly predicted writing fluency and quality measures both for primary-grade children and intermediate-grade children.

What about the second prediction? In a related study, Berninger et al. (1997) provided twenty-four 10-minute sessions of handwriting training to first graders who scored low on tests of handwriting (treatment group). Compared to equivalent control students who received twenty-four 10-minute sessions of phonological awareness training (control group), the treatment group showed larger improvements in handwriting performance and in writing fluency (as measured by essay writing tasks).

Similarly, Graham, Harris, and Fink (2000) provided twenty-seven 15-minute sessions of handwriting training to first graders who were experiencing handwriting difficulties (treatment group). The treatment group showed large improvements in writing fluency that were still maintained 6 months later, but an equivalent group of students who received twenty-seven 15-minute sessions on phonological awareness (control group) did not show strong improvements on writing fluency.

Overall, these studies provide consistent support for the idea that writers are better able to use the translation process for constructing essays that express their ideas when they do not have to devote excessive attention to the mechanics of writing letters. Graham and Harris (2000) summarize the research base by noting that "writing development is dependent on the mastery of transcription skills" (p. 10); that is, essay writing depends on having automated handwriting skill.



Reviewing

WHAT IS REVIEWING?

The third major process in our model of writing is the reviewing process. As Bartlett (1982) points out, this process involves both detecting errors in the text and correcting them. Graham (2006b) observed that "novice writers . . . typically devote little attention to revising" and the "changes they make are mostly superficial." In a research review, Graham (2006a) reported that when school-age children are taught strategies for revising text, the quality of their writing greatly improves—on average the effect size is 0.74, which is a medium-to-large effect.

RESEARCH ON REVIEWING

How Many Changes Do Students Make? Gould (1980) presents evidence showing that revision is almost totally absent from adult writing or dictating of simple assignments, such as one-page business letters. Experienced dictators use less than 10% of dictation time on reviewing or revising what they have said. If reviewing is not used often in letter writing, then prohibiting writers from reviewing should not greatly affect their writing performance. To test this idea, Gould (1978a) asked adults to engage in "invisible writing." This invisible writing involved writing with a wooden stylus on a sheet of paper that had carbon paper and another sheet of paper under it so subjects could not see what they had written. Based on the writing of eight business letters, those using invisible writing required about the same amount of time as those using normal writing (10 minutes for invisible writing versus 11 minutes for normal writing), achieved about the same quality ratings from judges (3.0 for invisible writing versus 3.2 for normal writing, with 1 being unacceptable and 5 being excellent), and needed about the same amount of editing changes (almost none for both groups). Similarly, Planko (1979) reported that first-year college students spent less than 9% of writing time on reading or reviewing what they had written. Apparently, adults often do not review what they have written, especially when the assignment is a fairly short and simple one.

What Kinds of Changes Do Students Make? In a review of the research on revision in writing, Fitzgerald (1987) reported that students mainly make surface and mechanical revisions, suggesting that they generally equate revision with proofreading. In addition, Fitzgerald (1987) found that although teachers rarely ask students to revise what they have written, when they were asked to engage in in-depth revision, their final product was generally improved.

Bartlett (1982) conducted an extensive series of studies of how children in grades 3 through 8 revise text. For example, in one study, fourth and fifth graders were asked to revise their own text and text provided by the teacher. Both texts contained syntax errors (such as failure of subject-verb agreement or inconsistent use of verb tense), and referent errors (such as using a pronoun that has an unclear or ambiguous antecedent). Table 4-2 shows that students detected errors in someone else's text much more easily than errors in their own; in addition, students detected syntax errors more easily than referent errors, especially in their own text.

TABLE 4-2
Detecting
errors in text

	Referent Errors	Syntax Errors
In writer's own text	17%	53%
In other texts	73%	88%

Source: Adapted from Bartlett (1982)

Children have difficulty not only in detecting referent errors but also in making the appropriate correction. For example, Figure 4-13 shows original versions of text along with revised versions suggested by students. As can be seen, the correction strategies selected were not successful. Bartlett (1982) found that the most commonly used successful strategies for correcting referent errors are the use of pronouns (e.g., "One day a man went to the beach. The day was hot and he needed a cool swim") and use of repetition (e.g., "Shortly after Christmas, a young woman moved into the house. The young woman had few possessions and she settled in quickly"). However, in the examples in Figure 4-13 these strategies are not appropriate.

Individual Differences in Reviewing In another experiment reported by Bartlett (1982), children were given eight paragraphs to revise. Each paragraph included an unusual referent error that could not be corrected by the most common strategies of using pronouns or repetition. For example, one of the paragraphs involved what Bartlett called *ambiguous referencing*:

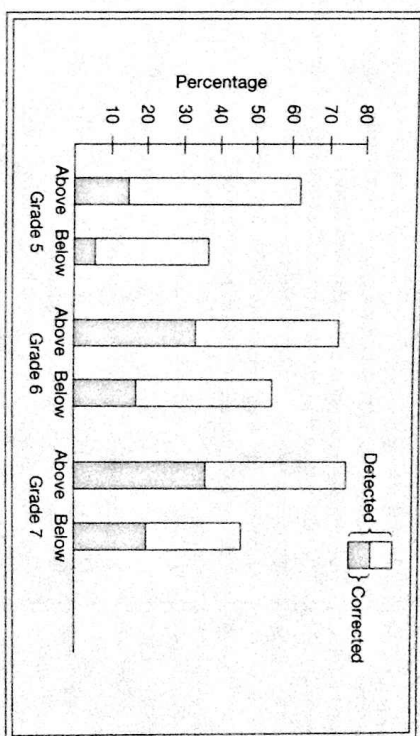
One day two girls set out for the park
She had a bike . . .

FIGURE 4-13
Unsuccessful
correction strategies

Original Text
One day a man left his house. Another man was standing outside. The man took out a letter and gave it to him. They talked for a while and then they got into a car. They were both policemen. They were going to catch a thief.
Attempts to Repeat an Antecedent (60% of Unsuccessful Corrections)
The man took out a letter and gave it to the other man.
Attempts to Differentiate Among Characters (25% of Unsuccessful Corrections)
The man that was outside took a letter and gave it to the other man outside.
Introduction of Nondisrupting New Information (15% of Unsuccessful Corrections)
Joe left his house. Another Joe was standing outside. Joe took out a letter and gave it to the other Joe.

Source: Adapted from Bartlett (1982)

FIGURE 4-14
Detection and
correction of
referent errors by
above- and below-
average writers



Adapted from Bartlett (1982)

Figure 4-14 summarizes the revision performance of above-average and below-average writers in Grades 5 through 7. As might be expected, above-average writers corrected about twice as many errors as below-average writers, and older writers corrected about twice as many errors as younger writers. However, even the oldest and most able writers successfully corrected only 36% of the referent errors.

Bartlett (1982) also found differences among the correction strategies used by above-average and below-average writers in Grades 5 through 7. Figure 4-15 lists five successful correction strategies, along with examples of each. Table 4-3 summarizes the proportion of solutions that involved each strategy for above-average and below-average writers. As can be seen, above-average writers tended to rely most heavily on adding descriptive information about both referents or on naming the characters; in contrast, the below-average writers relied on nondescript referencing or on adding descriptive information about only one referent. In a follow-up study, Bartlett (1982) found that the performance of adults closely paralleled that of above-average fifth-, sixth-, and seventh-grade writers. Apparently, good and poor writers differ with respect to both the quantity and quality of their corrections.

Bartlett's research focused on how children revise text containing referent errors, including comparisons of the general revising behavior of skilled and less skilled writers. Using a similar approach, Stallard (1974) compared the writing performance of skilled 12th graders versus a randomly selected control group of 12th graders. As expected, the skilled writers took more time than the control writers (41 minutes versus 23 minutes) and produced more words (343 words versus 309). However, Stallard also noted that the skilled group conducted three times as many revisions (184 versus 64). In fact, less than half of the control group ever looked back to see what they had written, whereas most of the skilled writers did. Similar differences between the writing processes of skilled and less skilled writers led Hayes and Flower (1986) to conclude that "the more expert the writer, the greater the proportion of writing time the writer will spend in revision" (p. 110).

Percentage of Errors That Were Detected

	Referent Errors	Syntax Errors
In writer's own text	17%	53%
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One day two girls set out for the park.
She had a bike. . . .

Original Text

One day a man left his house. Another man was standing outside. The man took out a letter and gave it to him. They talked for a while and then they got into a car. They were both policemen. They were going to catch a thief.

Attempts to Repeat an Antecedent (60% of Unsuccessful Corrections)

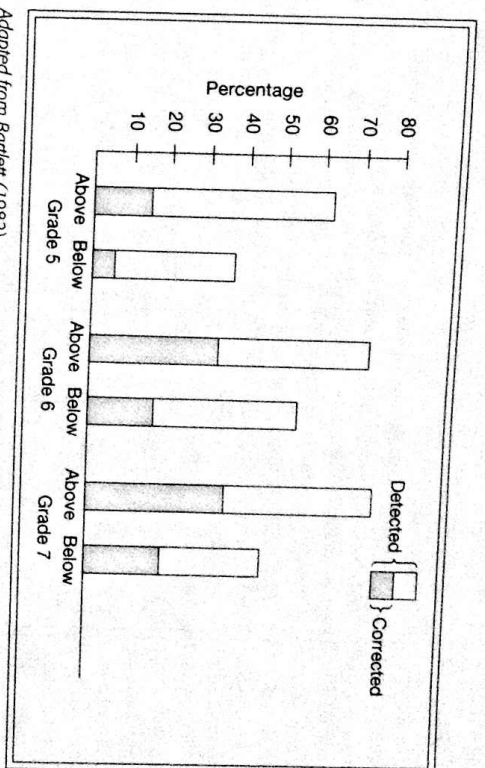
The man took out a letter and gave it to the other man. . . .

Attempts to Differentiate Among Characters (25% of Unsuccessful Corrections)

The man that was outside took a letter and gave it to the other man outside.
Introduction of Nondiscriminating New Information (15% of Unsuccessful Corrections)
Joe left his house. Another Joe was standing outside. Joe took out a letter and gave it to the other Joe. . . .

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FIGURE 4-15
Successful
correction of a
referent error

Original Text
One day two girls set out for the park. She had a bike. . . .
Adding Descriptive Information about Both Referents
One day two girls set out for the park. One was very athletic, and the other hated sports. The athletic one had a bike. . . .
Adding Descriptive Information about One Referent
One day two girls set out for the park. One of the girls was athletic, and she had a bike. . . .
Naming Characters
One day two girls named Sandy and Karen went to the park. Sandy had a bike. . . .
Indefinite Referencing Using Plural Noun
One day two girls went to the park. They had a bike. . . .
Indefinite Referencing Using Singular Noun
One day two girls went to the park. One had a bike. . . .

Adapted from Barlett (1982)

TABLE 4-3

Differences
in correction
strategies of
good and
poor writers

Strategy Used	Percentage of Total Solutions	
	Above-Average Writers	Below-Average Writers
Adding descriptive information about both referents	33%	9%
Adding descriptive information about one referent	10%	41%
Naming characters	29%	5%
Indefinite referencing using plural noun	23%	27%
Indefinite referencing using singular noun	6%	18%

Adapted from Barlett (1982)

What can be done to help students during the revision process? Consider the following task. You are an editor for a magazine that publishes accounts of famous people in history. An author has just given you two articles she has written on Christopher Columbus and Margaret Mead. Your job is to read and revise the two articles. She was in a hurry, so there are likely to be several problems that you will have to fix. These problems may range from

mechanical errors such as spelling and punctuation to problems with the way that the material is organized.

When this task was given to seventh graders and college students, they were far more successful in correcting errors in meaning when the text covered a familiar topic (e.g., Christopher Columbus) than an unfamiliar topic (e.g., Margaret Mead), but familiarity did not affect students' correcting of mechanical errors (McCutchen, Francis, & Kerr, 1997). These results, as well as related studies, show that detection and correction of meaning errors depends partly on the domain knowledge that writers possess (McCutchen, 2000).

In addition, some students were told that an assistant had already done some preliminary editing and had highlighted sentences that need corrections, such as partially shown in Table 4-4. For example, take a look at the first paragraph. The second sentence should go later in the story (i.e., it needs revision for meaning) and the final sentence has a misspelled word (i.e., it needs editing for spelling). Now, take a look at the last paragraph. As you can see, the second to last sentence has a misspelled word (i.e., it needs editing for spelling), whereas the last sentence should go earlier in the story (i.e., it needs revision for meaning). McCutchen et al. (1997) found that the highlighting caused seventh graders to focus on correcting mechanical errors but to ignore some meaning errors. Overall, cueing seems to "focus less sophisticated writers too narrowly and thereby impede meaning-based revision" (p. 667). The negative effects of cueing were confined to young readers. College students were able to make more corrections of both mechanical problems and meaning problems when problem sentences were highlighted. Thus, younger readers seem particularly vulnerable to focusing on mechanical errors at the expense of correcting meaning errors. This suggests that caution should be used in cueing younger writers about the location of errors, as this may limit their focus to searching for mechanical problems.

IMPLICATIONS FOR INSTRUCTION: REVIEWING

In summary, the foregoing review of research makes several points concerning the review process. First, writers often do not review what they have written. Second, when writers are encouraged to review, they fail to detect most of the errors (especially referent errors),

TABLE 4-4

Revise the
Margaret
Mead story

Margaret Mead had always been interested in the ways of life of peoples from other lands. **Margaret spent the rest of her life studying and writing about primitive ways of life that no longer exist today.** This is the study of how different people live. Margaret decided to make this her career. **She believed it was important to study primitive people before modern ways of living destroyed their culture.**

[Second and third paragraphs went here.]

Margaret learned many things from the Samoan people. She always took notes and kept careful records of what she heard. These notes were used to write her first book, which was called *Coming of Age in Samoa*. **It made her famous. When Margaret went to college, she took a class in anthropology.**

Source: From McCutchen et al. (1997, p. 675).

and even when they do detect errors they often fail to correct them properly. Third, older or more skilled writers appear to detect and correct far more errors and use more sophisticated review strategies than younger or less skilled writers. Older or more skilled writers also engage in more review than less skilled or younger writers.

These results suggest that students need to be encouraged to review what they have written. Some instruction may be needed in specific strategies for detecting and correcting errors. Checklists or questions can be used to guide a student's review, although the review process should eventually become internalized. The use of word processors may allow for easier review and revision because students are freed from the need to write each new draft by hand. The difference between a good writer and poor writer is often not in the quality of the first draft but in the number of drafts generated. Students need to see how revision can turn a poor paper into an excellent one. Some of these ideas are examined more fully below in our discussion of an instructional program aimed at improving the revision process—revision training.

Revision Training Can students be taught to be more effective reviewers? According to an exemplary study by Fitzgerald and Markman (1987), the answer is yes. In their study, some sixth-grade students received thirteen 45-minute lessons on the process of revision (revision training group), whereas other sixth graders spent an equivalent amount of time reading good literature (comparison group). The instruction consisted of four 3-lesson units on how to make additions, deletions, substitutions, and rearrangements. In the first day of each unit, the teacher defined the target process (e.g., addition), modeled the process, and led the class in revising an example story. On the second day, students worked in pairs on revising a portion of a text, guided by a step-by-step handout. On the third day, students worked individually on revising a story supplied by the teacher and one they had written themselves. After completing all four units, students received an integrative summary in the 13th lesson.

As a final test, students wrote a first draft of a story (stage 1), marked the original paper for changes (stage 2), made changes on the original paper (stage 3), and wrote a final draft on new piece of paper (stage 4). On average, the revision training group made 23 revisions per 100 words over the course of all four stages, whereas the comparison group made only 16 revisions per 100 words. The revision training group produced 61% more additions, 69% more deletions, 27% more substitutions, and 42% more rearrangements than the comparison group. Importantly, the rated quality of the stories improved from stage 1 to stage 4 for the revision training group but not for the comparison group. Fitzgerald and Markman (1987) concluded that "our findings support the utility of direct instruction in revision in writing in the classroom" (p. 18).

Another approach to improving the revision process is to help students develop specific strategies for constructing sentences. To achieve this goal, Saddler and Graham (2005) taught fourth graders strategies for combining sentences across thirty 25-minute lessons with three lessons per week for 10 weeks (treatment group). The lessons showed how good writers often play with their sentences to make them sound better, and the students began by receiving practice in combining two kernel sentences into a combined sentence. For example, if you have two sentences:

"They tried to put the worm in their bag."
"The worm did not fit in their bag."

you can use the word "but" to connect them into:

"They tried to put the worm in their bag, but the worm did not fit in their bag."

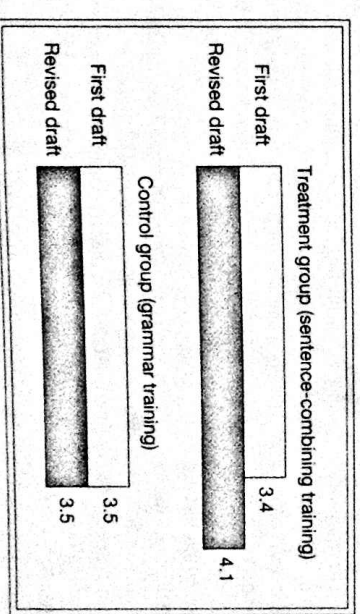
Subsequent lessons involved working on stories to improve their sentence construction by combining kernel sentences. As a control group, equivalent students received the same amount of training with grammar instruction. To test writing, in one session students were given 15 minutes to write a story based on a picture prompt (such as a child swinging on a vine through the jungle) and then were given 15 minutes to revise the story in the next session. The essays were scored on overall quality using an 8-point scale.

As you can see in Figure 4-16, revising the first draft improved the quality of the revised draft for the treatment group (from 3.4 to 4.1) but not for the control group (3.5 on both drafts). These results show that it is possible to teach specific revision strategies that improve writing quality.

What can be done to help students with learning disabilities who have trouble writing essays? De La Paz, Swanson, and Graham (1998) devised a treatment to help students focus on important steps in the revision process. First, students read their entire essay and revise it "to make it better." Next, they choose any one of the four white evaluation cards that applies to their essay: "Ignores the obvious point against my idea," "Too few ideas," "Part of the essay doesn't belong with the rest," and "Part of the essay is not in the right order." Then, to correct each problem they select a blue tactic card—"Rewrite," "Delete," "Add," or "Move"—and carry out the tactic. After detecting and correcting each problem, the students read the revised essay and highlight problem areas with a yellow marker. Then they select a yellow evaluation card that best characterizes the problem: "This one doesn't sound right," "This is not what I intended to say," "This is an incomplete idea," "This is a weak idea," "This part is not clear," or "The problem is _____." Then they revise the problem area. In contrast, in normal revising (control condition) the students simply read the essay and revise it "to make it better." Finally, they read over the revised essay to make any addition revisions.

Does the treatment improve the revision process? First, the treatment prompts students to make more revisions. Students make 10.1 nonsurface revisions per 100 words in the

FIGURE 4-16
Mean story quality on first draft and revised draft for treatment and control groups



Source: Adapted from Saddler and Graham (2005).

treatment condition and 4.2 nonsurface revisions per 100 words on the control condition. Second, the treatment prompts students to focus particularly on larger text units: For individual words, students make 1.6 revisions per 100 words in the treatment condition and 1.4 in the control condition; for clauses and sentences, students make 5.7 revisions per 100 words in the treatment condition and 0.8 in the control condition. Third, the treatment prompts students to focus on deletions, substitutions, and rearrangements rather than solely on additions: Students make 2.0 additions per 100 words in the treatment condition and 1.6 in the control condition; students make 8.1 deletions, substitutions, and rearrangements per 100 words in the treatment condition compared to 2.6 in the control treatment. Importantly, the revised essay is longer and rated as higher in quality in the treatment condition than in the control condition. Overall, these results show that students need revision training that focuses on revising larger units of text than single words (i.e., clauses and sentences) and on actions other than just addition (i.e., deletions, substitutions, and rearrangements).



Chapter Summary

The research on writing is just beginning to make sense of the writing process. However, even the preliminary research presented in this chapter invites implications for instruction. Preliminary research confirms that student writing is improved by exemplary writing programs that focus on teaching strategies for planning, translating, and revising such as *Cognitive Strategy Instruction in Writing* (Englert, Raphael, Anderson, Anthony, & Stevens, 1991) or *Self-Regulated Strategy Development* (Sawyer, Graham, & Harris, 1992). This chapter highlights some of the encouraging advances in scientific research on the cognitive processes of writing.

First, planning, which includes the development of an organization and the generation of content information, is a major component in writing. Students need explicit and specific training in techniques for organizing compositions, paragraphs, and sentences. Similarly, students need training and practice in how to generate and record information to be used in a composition.

Second, translation is a major writing component that involves converting ideas into words. The translation process relies on mechanical skills, such as handwriting, spelling, punctuation, grammatical sentence construction, and so on. Students need to be freed from the mechanical constraints on translation to concentrate their attentional capacity on planning a coherent composition. For older or more skilled students, the mechanical skills should become automatic; for younger or less skilled students, heavy emphasis on mechanics should not be required in the first draft.

Third, reviewing is a major writing component that involves the detection and correction of errors. The difference between a good composition and a poor composition may depend not on differences in the first draft, but on differences in how subsequent drafts are carried out. Students need explicit and detailed instruction in how to revise, with the ultimate goal of internalizing the revision procedures.

Writing programs are more likely to be successful to the extent that they help students develop the cognitive processes of writing—planning, translating, and revising.