8 Learning from Writing: Study Three

For the third study in the series investigating the effects of writing on learning, we examined the relationship between what students did during the study task and what they remembered later. We were concerned with both the particular information focused on during the study task and the type of focus, as determined by the demands of various writing tasks. Also, we shifted our attention from the essay used as a criterion measure in the previous study to a measure of students' recall of particular content from the passages they had read. This allowed us to trace students' overt attention to particular items of content from the reading passages, first as they appeared in the material produced as part of the treatment condition, and later in measures of immediate and longer term recall.

We reduced the number of passages and students in order to examine each protocol in more detail and also reduced the time between the study task and the post-test in order to detect task differences that might not be evident a month after a single intervention. We assumed that such differences might be of practical importance under ordinary classroom conditions, in which writing tasks are often longer lasting, better motivated, and more cumulative than those contrived for the experimental situation. The tasks examined included a read-and-study condition (with no writing), two review-writing tasks (comprehension questions and summary writing), and one task requiring reformulation and extension of information in the passage (an analytic essay). The summary-writing task was added at this point in our studies because of its emerging importance in the parallel strand of classroom studies, discussed in chapters 3 through 6.

Thus this third study of writing and learning compared the kinds of behaviors and learning that result when students engage in four different kinds of tasks:

1. Read and study, but no writing
2. Comprehension questions (twenty short-answer questions)
3. Summary writing
4. Analytic writing

We were interested in seeing how the students approached each task in terms of the kinds and amount of material they manipulated (thought or wrote about) and what they recalled in both the short and the long term, that is, after one day and after five days.

Participants

The 112 students who participated in this study were ninth-grade and eleventh-grade students drawn from four of the six classes we studied in the project's second year. Mean student achievement levels were average on a variety of regularly administered, nationally normed achievement batteries.

Passages and Tasks

In developing the study tasks, we selected two passages from those used in the previous study: "postwar Russia" and "economic expansion." (Synopses of the passages and their characteristics appear in Appendix 2.) For each passage, we designed four different study tasks, each of which we expected would lead to a different kind of effort and engagement during the study period: read and study, comprehension questions, summary writing, and analytic writing.

Read and study. For the read-and-study condition, students were asked simply, "Study the reading passage. Do *not* do any writing." This instruction successfully inhibited the spontaneous note-taking that had occurred in the previous study.

Comprehension questions. The comprehension-question condition was identical to that in the second study. The twenty questions that were devised for each of the passages were divided equally among textually explicit and textually implicit questions.

Summary writing. The summary-writing task was designed to prompt review of the new material in an extended, cohesive text. Students received the following assignment: "In your own words, write a 200–250 word summary of the passage you just read."

Analytic writing. The analytic-writing assignments were designed to require the students to reformulate and extend the material from the reading passages as they developed evidence to support a particular interpretation or point of view. Topics were identical to those used in the second study.

Measures

Two outcome tasks were used, each yielding two or more measures; the tasks and scoring procedures are described below.

Topic Knowledge

Langer's (1980, 1981, 1984b, 1984c) measure of passage-specific knowledge was again used to measure the ways that the students' knowledge of the topic changed as a result of having engaged in the particular study activity. Three key concept words or phrases from the top half of the content hierarchy (see Meyer, 1975) were selected for each of the two passages. The six words were intermixed and administered as a single set of concepts. Students were asked to provide written free associations to each of the six concepts. Scoring of the measure reflected both the amount (breadth) and organization (depth) of passage-relevant information reflected in the free associations, following the procedures outlined in the previous chapter. Two scores were derived for each student, one for the target passage and one for the other passage in the study, which served as a control condition.

Recall Tasks

For the recall tasks, students were asked, "Please write down everything you can remember about the passage that you read." The recall protocols were scored for number of words, mean number of words per T-unit (Hunt, 1965), and preservation of the original gist of the passage. Ratings for gist were a holistic score reflecting the extent to which each recall showed an understanding of the overall gist or meaning of the original passage. Raters used a four-point scale, ranging from 1 (no reflection of the original gist) to 4 (very good preservation of original gist). Interrater agreement in an independent rating of a subset of thirty recalls was .87. (Though cast somewhat differently, the measure of gist is an overall measure of quality, parallel in its emphasis on coherent understanding to the holistic essay score in the previous study.)

In order to relate the information included in the recall tasks to the original passages, we first analyzed each passage for hierarchical content structure, using our adaptation of Meyer's (1975, 1981) prose analysis system (see Langer, 1986b). For this analysis, each passage was divided into sequentially numbered T-units, which were then analyzed in terms of their rhetorical relationships to other information in the passage. For example, content units appearing at level 2 of the

content hierarchy are very central to the major theme of the passage, while those at levels 4 and 5 are explanations and elaborations of the higher level ideas. Two project team members analyzed each passage; differences were resolved by a third analyst. (The tree diagrams for each passage appear in Appendix 2.) The first passage, "postwar Russia," contained eighty-one content units; the second passage, "economic expansion," contained fifty content units.

The tree diagrams were used to examine students' responses during the study and recall tasks, content unit by content unit. A particular content unit was counted as "included" if any of the central ideas from the original T-unit appeared at any place during the study or recall task. Interrater agreement for the inclusion of individual T-units was .95 for two raters who separately scored a subsample of twenty recalls.

From these analyses, we defined *content units manipulated* as content units from the passage that also appeared at any point in the written material from the three study tasks that required writing: comprehension questions, summary writing, and analytic writing. *Content units recalled* were defined as any content units from the original passage included in the student's written recall. These were further subdivided to reflect level of the content unit in the original passage hierarchy and to reflect whether the content unit had been manipulated during the study task.

Procedures

During the class period when they regularly met with the project's participating teachers, the students were asked to complete the measure of passage-specific knowledge and then to read one of the two social studies passages, which were assigned randomly within each class. After reading the passages, the students engaged in one of the study conditions: rereading and studying, answering comprehension questions, summarizing, or writing a paper that asked them to defend a particular interpretation based on the text. The passages, which were prepared with instructions for the study conditions placed after the reading, were randomly distributed through the class. Students had the passages available while they completed the assigned study tasks. Eight additional students (four high and four low ability) engaged in think-aloud procedures to enable us to examine the reasoning and recall strategies that the students typically used in completing the different types of tasks. The passage-specific knowledge measure was repeated during class the following day (day two of the study).

Five days after the initial study task (on day six of the study), students completed the passage-specific knowledge measure for a third time, followed by the recall task. Passages and materials from the earlier study sessions were not available during either of the post-test sessions.

Background Characteristics

Before examining the effects of the various study conditions on subsequent performance, we need to consider students' initial knowledge of the content of the two passages and their behavior during the study tasks. The results for the pretest measure of passage-specific knowledge, summarized in table 15, indicate that students had similar amounts of background information about the two topics, but also that students showed some variation among study conditions in the extent of their knowledge ($p < .07$). Because of this, the analyses of learning outcomes that follow use pretest passage knowledge as a covariate to adjust statistically for any initial differences among the students in the four groups.

To understand the effects of the various tasks on student learning, we also need to examine the types of effort and engagement engendered by the tasks themselves. Three of the tasks (comprehension questions, summary writing, and analytic writing) asked for written responses. The general characteristics of these responses are also summarized in table 15.

In terms of number of words written during each of the treatment conditions, the students did the most writing when asked to summarize the passage and the least when asked to write analytically about what they had read. Because the comprehension questions used as a study condition could often be answered somewhat telegraphically, relying upon words in the question stem rather than repeating them, the word count may be somewhat misleading as a measure of the extent of engagement with particular content. If we examine instead the proportion of content units that were mentioned in the course of the study task, the picture looks somewhat different. Responses to the comprehension questions touched on a higher proportion of content units (26 percent) than did responses to either of the extended writing tasks. As in total number of words, analysis writing involved the smallest proportion of content from the original passage (15 percent).

From these data we might conclude that the comprehension questions led the students through the most thorough review of the material

Table 15

Background Measures: Pretest Passage Knowledge and Characteristics of Performance during Study Tasks on Day One

		Means			
	(Pooled *SD*)	Read and Study (n = 29)	Comprehension Questions (n = 29)	Summary Writing (n = 29)	Analytic Writing (n = 25)
Pretest passage knowledge					
Passage 1 concepts	(3.8)	2.1	4.4	2.6	4.1
Passage 2 concepts	(3.1)	3.0	3.7	2.7	4.4
Performance during study task					
Words	(56.5)	—	132.8	150.6	120.5
Words/T-unit	(2.8)	—	7.4	12.6	13.6
Content units included (%)	(8.6)	—	26.0	19.2	15.3

Analysis of Variance

		Effects							
		Task (Linear)		Task (Deviations)		Passage		Interaction	
Variable	*df* Error	*F*	*p*	*F*	*p*	*F*	*p*	*F*	*p*
Passage knowledge									
Passage 1	104	1.41	n.s.	2.70	.072	0.34	n.s.	0.42	n.s.
Passage 2	104	1.11	n.s.	1.65	.197	0.90	n.s.	1.21	n.s.
Performance during study task									
Words	63	0.53	n.s.	2.64	.109	7.09	.010	1.13	n.s.
Words/T-unit	63	54.95	.001	8.17	.006	1.02	n.s.	0.63	n.s.
Content units	61	14.46	.001	0.37	n.s.	4.40	.041	3.39	.041

they were studying and that the analytic-writing condition, in contrast, led them to focus most narrowly on a subset of that information in the process of reformulating and extending it. The analytic-writing task also led to more complex syntax, as reflected in the measure of words per T-unit. This finding is consistent with the hypothesis that analytic writing leads to more complex interrelating of ideas in the course of reformulating the material in order to develop and defend a thesis or argument.

The students' think-aloud protocols also reflected differences among the study tasks. To complete the comprehension questions, Mark's think-aloud began like this:

> What were the major manufacturing industries in the U.S. at the turn of the century? Shoot. That's the biggest question. Okay, I thought they said it was meat-packing, and iron, and steel, textiles, and clothing. . . . Let me think. They said something else. Where is it? Umm, this, er, economic growth. Okay, *meat packing*. . . . [copies directly from text].

In general, the think-alouds indicated that the comprehension questions led the students to focus on the specific information in the passages they were reading. They searched the passage for the correct response, copied it once it was found, and never rethought that response or returned to change an answer. Although the questions forced them to think about specific items of content, they made little attempt to rework the material and no attempt to draw relationships across different questions.

In comparison, the students who participated in the summary task relied on the text for temporal order instead of the "right" answer. They ordered their summaries to reflect the paragraph-by-paragraph development of the original passage. In doing so, they also tended to review the relationships among the ideas that were presented in the original passage, recasting those ideas somewhat more in their own language. The summary students reviewed less content than did the comprehension-question group (since they were not prompted to search for responses to the twenty questions), but they did tend to search for more relationships among the ideas they dealt with.

The following excerpt from Doug's think-aloud for the summary task reflects the focus on temporal ordering and interrelating of ideas at least from adjacent passage segments:

> Okay, some of the main things they were making were. . . . Hm. . . "24 billion dollars, rapid growth. . . ." Okay, *the things which were in most demand after the Civil War were what was produced. Things like shoes, meat, textiles,* um, *etc.* Um, let's see what the other things were. Something relates back to that. 79 percent increase, coal, oil. *Industry had increased in the U.S. by 79 percent.* . . . That's all of that. Umm, railroads, workers, stocks going up. *The railroad was a big factor in.* . . .

The students who engaged in the analytic-writing task were guided by their own reformulation of the material. When they looked back to the passage, they did so to corroborate rather than find the ideas they wanted to write about and to select details to support and

elaborate upon their points. The ideas remained the students' own. Unlike the other two writing groups, the analytic-writing group rarely relied on ideas or language drawn directly from the text. While these students dealt directly with a smaller proportion of the content in the original passage, they worked more extensively with the information they did use.

The beginning of Jill's think-aloud during an analytic-writing task illustrates the general approach to these tasks:

> Hmm . . . I'm rereading. Important reasons for occurring. . . . One of the reasons was the supply and demand, well, the law of demand. Right. Hmmm. . . . All right, so one example I can use is that demands grew greater, so supplies needed. . . . That's too confusing. I'm not going to do this one. Okay, the United States possessed many natural resources.

The fourth task asked students simply to "read and study" the passage. This can also be interpreted as a review condition, but one that lacks the focus provided by the writing tasks in the other two review conditions (comprehension questions and summary writing). This lack of focus led the students to wander somewhat in their approach, jumping from general summary to personal experience to tangentially related issues, pursuing none in great depth. Martha's think-aloud as she began to study shows her summarizing one of the factors in industrial growth:

> This passage mainly referred to the industrial growth of the country. And they give some general and specific factors of the growth. Like, ummm, immigration was an important factor for it. Since almost the beginning of the century, people have been coming to this country for better conditions of life. And they've been helping a lot in this growth.

Influence of Study Tasks on Recall

The study included three sets of measures of what students remembered about their reading: recall of content units, preservation of gist, and topic-specific knowledge.

Content Units Recalled

The patterns of recall of content units on the day following initial reading of the passage and five days later are summarized in table 16. If the tasks are ordered according to the degree to which they require focused, extended written responses (read and study < comprehension

Table 16

Overall Recall of Passage Content on Days Two and Six

		Adjusted Means, Percent Recalled			
	(Pooled *SD*)	Read and Study (n = 14)	Comprehension Questions (n = 17)	Summary Writing (n = 15)	Analytic Writing (n = 11)
Day two	(5.5)	11.3	11.6	16.2	16.5
Day six	(5.1)	10.0	12.1	14.6	15.8

Analysis of Variance

	df	*F*	*p*
Between			
Task (linear)	1	5.93	.019
Task (deviations)	2	0.23	n.s.
Passage	1	6.01	.018
Task × passage	3	0.13	n.s.
Covariate	1	5.27	.026
Error	48		
Within			
Time	1	7.59	.008
Task (linear) × time	1	0.01	n.s.
Task (deviations) × time	2	0.72	n.s.
Passage × time	1	0.10	n.s.
Task × passage × time	3	3.60	.020
Error	49		

questions < summary writing < analytic writing), there is a significant linear effect for task ($p < .02$). Overall, the tasks involving writing led to better recall than did the read and study condition, and the extended writing tasks (summary and analysis) led to better recall than the more restricted writing task (comprehension questions). However, the proportion of content recalled for all four tasks was relatively low even at day two, ranging from a high of 17 percent for students in the analytic-writing condition to a low of 11 percent for those in the read-and-study condition.

On day six, overall recall dropped slightly (from 13.9 percent at day two to 13.1 percent, $p < .008$), with the two extended writing conditions continuing to do better than comprehension questions or read and study. (There was also a significant task × passage × time

interaction reflecting a shift in relative ordering of the comprehension-question and the read-and-study conditions between the two passages at day six: on passage 1, students in the comprehension-question condition scored 1.1 percentage points lower than those in the read-and-study condition, while on passage 2, they scored 4.3 percentage points higher.)

Effect on Recall of Level in Content Hierarchy

Many previous studies have found that recall is influenced by the importance of the information in the overall structure of the passage. To examine the extent to which the importance of information might interact with recall in the four study conditions, we looked separately at recall in the top third, middle third, and bottom third of the content hierarchy in the original passage (table 17). As in previous studies, the overall tendency was that content higher in the passage structure was more likely to be recalled ($p < .002$), but the pattern was not particularly strong even at day two (12.4 percent for content from the top third compared with 8.2 percent for content from the bottom third). At all three levels, the effects of the writing tasks were roughly parallel to the effects on overall recall, though the scores for individual levels are less stable than the score for overall recall. The effects of most interest to the present study — the task by level interactions — were not significant.

Effect on Recall of Manipulating Content during Study Tasks

Of much more importance than level in the content hierarchy was whether a particular content unit had appeared in the writing completed as part of the original study task. Study two indicated that the number of words written while studying was significantly related to performance on post-test measures. In the present study, we were able to look directly at the relationships between content that was written about during the study task on day one and content that was recalled on days two and six. In table 18, the relevant results are summarized separately for content units that appeared in each student's study materials and for those that did not.

Overall, the students were much more likely to recall content units that they had directly included in their writing while studying the passages ($p < .001$). At day two, they recalled 38 percent of the content units they had directly manipulated, compared with only 5 percent of the content units not directly manipulated ($p < .001$). Further, the type of manipulation, as reflected in the nature of the study task, also had

Table 17

Recall by Level of Passage Structure on Days Two and Six

		Mean Percent Recalled				
	(Pooled *SD*)	All ($N = 57$)	Read and Study ($n = 17$)	Comprehension Questions ($n = 15$)	Summary Writing ($n = 11$)	Analytic Writing ($n = 14$)
Day two						
Top	(9.5)	12.4	8.0	13.8	13.4	14.4
Middle	(10.1)	11.3	12.6	9.6	12.1	14.3
Bottom	(6.4)	8.2	7.0	6.6	10.9	8.1
Day six						
Top	(7.4)	9.9	7.8	10.9	9.7	12.2
Middle	(8.2)	9.7	9.6	10.1	11.6	9.5
Bottom	(5.3)	7.0	4.7	5.3	8.0	11.0

Analysis of Variance

	df	*F*	*p*
Between			
Task (linear)	1	4.07	.044
Task (deviations)	2	0.41	n.s.
Passage	1	6.33	.015
Task × passage	3	0.15	n.s.
Covariate	1	5.38	.025
Error	48		
Within			
Time	1	7.97	.007
Time × task (linear)	1	0.00	n.s.
Time × task (deviations)	2	0.27	n.s.
Time × passage	1	0.01	n.s.
Time × task × passage	3	2.24	.094
Error (time)	49		
Level	2	6.91	.002
Level × task (linear)	1	1.39	n.s.
Level × task (deviations)	2	2.09	.129
Level × passage	2	6.41	.002
Level × task × passage	6	0.54	n.s.
Error (level)	98		
Time × level	2	0.50	n.s.
Time × level × task	6	1.50	.186
Time × level × passage	2	0.15	n.s.
Time × level × task × passage	6	0.42	n.s.
Error (time × level)	98		

Table 18

Recall by Manipulation of Passage Content on Days Two and Six

		Mean Percent Recalled			
	(Pooled *SD*)	All ($N = 43$)	Comprehension Questions ($n = 17$)	Summary Writing ($n = 15$)	Analytic Writing ($n = 11$)
Manipulated					
Day two	(17.2)	37.9	29.4	39.0	52.1
Day six	(18.4)	31.2	24.1	32.1	43.4
Not manipulated					
Day two	(3.8)	4.9	3.7	4.8	6.4
Day six	(3.8)	4.5	4.2	4.3	5.9

Analysis of Variance

	df	*F*	*p*
Between			
Task (linear)	1	17.48	.001
Task (deviations)	1	0.01	n.s.
Passage	1	1.60	n.s.
Task × passage	2	3.69	.035
Covariate	1	1.29	n.s.
Error	36		
Within			
Time	1	6.79	.013
Time × task (linear)	1	0.42	n.s.
Time × task (deviations)	1	0.33	n.s.
Time × passage	1	0.48	n.s.
Time × task × passage	2	1.21	n.s.
Error (time)	37		
Manipulation	1	223.99	.001
Manipulation × task (linear)	1	12.64	.001
Manipulation × task (deviations)	1	0.07	n.s.
Manipulation × passage	1	0.48	n.s.
Manipulation × task × passage	2	4.30	.021
Error (manipulation)	37		
Time × manipulation	1	5.33	.027
Time × manipulation × task	2	0.05	n.s.
Time × manipulation × passage	1	0.20	n.s.
Time × manipulation × task × passage	2	0.97	n.s.
Error (time × manipulation)	37		

a significant effect ($p < .001$), again in the predicted direction. At day two, students who completed comprehension questions recalled 29 percent of the content units that they included in their study task; students who summarized the passage recalled 39 percent; and students who completed an analytic-writing task recalled fully 50 percent. Recall of material not manipulated as part of the study task showed a similar trend, though even in the analytic-writing condition it averaged only 6 percent of the material.

These patterns of recall were remarkably stable even at the five-day retention test. The strongest effects continued to be associated with whether or not particular content units had been included in the study task: recall of manipulated content remained at 31 percent, compared with 5 percent for content that had not been manipulated. Similarly, the types of manipulation involved in analytic writing led to the best retention (43 percent), summary writing next (32 percent), and comprehension questions least (24 percent). Recall of content units not included in responses to the study tasks showed a similar ordering, though the amount recalled remained very small.

Capturing the Gist

It is possible to remember a goodly number of isolated facts from a passage without necessarily being able to relate those facts to one another in a systematic way. To assess this aspect of learning, we also rated each recall on a four-point scale reflecting the extent to which the gist or overall sense of the original text was captured. In table 19, mean scores are reported for recall of gist, as well as the percentage of recalls rated as "good" or "very good" at capturing the gist (3 or 4 on the scale).

As with the other measures discussed so far, ratings for gist showed a significant linear effect for task ($p < .04$), with students in the analytic-writing group doing best and those in the read-and-study and comprehension-question conditions doing least well. Students from the analytic-writing condition received considerably more "good" ratings for gist (73 percent) than did those who had completed comprehension questions (29 percent) or summary writing (31 percent). By day six the effects were weaker, though the two extended writing tasks continued to receive better ratings than either of the other two conditions.

Topic Knowledge

The third measure of the effects of the three study tasks was based on Langer's (1984b, 1984c) measure of topic-specific knowledge. This

Table 19

Ratings for Preserving Gist of Passage on Days Two and Six

	(Pooled *SD*)	Read and Study (n = 14)	Comprehension Questions (n = 17)	Summary Writing (n = 16)	Analytic Writing (n = 11)
Adjusted mean ratings (Pooled SD)					
Day two	(.8)	2.1	2.1	2.3	2.6
Day six	(.7)	2.1	2.1	2.3	2.5
Percent rated "good"					
Day two	23.1	29.4	31.3	72.7	
Day six	23.1	23.5	37.5	54.5	

Analysis of Variance

	df	*F*	*p*
Between			
Task (linear)	1	4.61	.037
Task (deviations)	2	0.25	n.s.
Passage	1	0.01	n.s.
Task × passage	3	0.01	n.s.
Covariate	1	2.53	.118
Error	48		
Within			
Time	1	0.01	n.s.
Task × time	3	0.24	n.s.
Passage × time	1	4.45	.040
Task × passage × time	3	2.19	.101
Error	49		

measure, which can be used whether or not the students have read a particular passage, was completed by all students three times (before reading, at day two, and at day six). At each administration, each student completed the measure for the assigned passage, as well as for the alternate (unread) passage. When the data were analyzed, the two passages were treated as separate replications. In each case, the students who had read the other passage were analyzed as an additional control condition of unrelated reading. That is, students who read "postwar Russia" also completed the "economic expansion" knowledge measure, and their responses to this measure over time were analyzed

Table 20

Topic-Specific Knowledge Scores on Days Two and Six

		Adjusted Means				
	(Pooled *SD*)	Unrelated Reading	Read and Study	Comprehension Questions	Summary Writing	Analytic Writing
Passage 1 concepts						
Day two	(4.7)	4.3	7.5	8.2	8.4	7.3
Day six	(3.1)	4.7	7.6	7.8	6.4	7.4
		(n = 46)	(n = 14)	(n = 14)	(n = 12)	(n = 7)
Passage 2 concepts						
Day two	(4.4)	4.9	3.7	9.4	7.3	12.1
Day six	(4.5)	4.7	3.7	9.2	6.3	11.8
		(n = 47)	(n = 11)	(n = 11)	(n = 14)	(n = 10)

Analysis of Variance

		Passage 1		Passage 2	
	df	*F*	*p*	*F*	*p*
Between					
Task (linear)	1	7.02	.010	15.10	.001
Task (deviations)	3	1.30	n.s.	2.11	.105
Covariate	1	52.72	.001	5.42	.022
Error	87				
Within					
Time	1	1.41	n.s.	1.70	.196
Task (linear) × time	1	4.83	.031	0.78	n.s.
Task (deviations) × time	3	1.66	.181	0.33	n.s.
Error	88				

as an "unrelated reading condition" in analyzing results for "postwar Russia." Conversely, in the analysis of "economic expansion," responses of students assigned to "postwar Russia" formed the unrelated reading group.

Results for this measure, summarized in table 20, reflect an interaction between passage and task. For passage 2, "economic expansion," simply reading the passage had no effect on students' passage-specific knowledge (mean scores of 4 at day two compared with mean scores of 5 in the unrelated reading condition). On the other hand, for passage 1, "postwar Russia," the read-and-study condition led to sharp gains in passage-specific knowledge (mean scores of 8 for the read-and-

study condition versus 4 for the unrelated reading group). At day six, students in the analytic-writing condition performed considerably better than those in the other groups on passage 2 (with a mean of 12), but on passage 1 the parallel analytic-writing group did less well than the read-and-study or comprehension-question groups.

The results for gist may help us make sense of this pattern. At day two, gist scores for passage 1 were significantly higher than for passage 2. Students seem to have had a relatively easy time making sense of the account of recent Soviet history, and in turn quickly developed a cluster of passage-relevant information. The passage on economic factors in the post-Civil War era, on the other hand, was more difficult to understand. The focused attention provided by the three tasks that involved writing seems to have been more necessary in helping the students interrelate the information in the way reflected in the scores for gist, as well as in the passage-specific knowledge measure.

Results for day six, also summarized in table 20, reflect small decreases in passage-specific knowledge since day two. These decreases are relatively constant across tasks, except for the results for summary writing. For both passages, students in the summary-writing condition showed a somewhat sharper decrease in knowledge scores than did those in the other conditions.

Discussion

If we look across the series of studies presented in chapters 6 through 8, we can draw some general conclusions about the question with which we began: What is the role of writing in learning?

First, the more that content is manipulated, the more likely it is to be remembered and understood. In general, any kind of written response leads to better performance than does reading without writing. Within groups of students who complete the same tasks, students who write at greater length tend to perform better than students who write less, even after allowing for a general tendency for better students to do better at everything.

Second, the effects of writing tasks are greatest for the particular information focused upon during the writing. Our results suggest that the effects of writing on learning are highly specific and limited to information and ideas that are expressed again in the process of writing about them. We might have hoped that the process of writing about text material would lead to a more careful review of the whole text, forcing the students to review and reconceptualize all of its parts in

the process of selecting what to write about. However, our results suggest that such effects are minimal at best. Rather than a generalized effect of writing on learning, there is a limited — and in some cases perhaps a limiting — one. Put another way, these results suggest that the particular writing task chosen may matter a great deal, depending upon a teacher's objectives.

Third, writing tasks differ in the breadth of information drawn upon and in the depth of processing of that information that they invoke. Thus note-taking, comprehension questions, and summarizing tasks, which focus attention across a text as a whole, have relatively generalized effects, though they lead to relatively superficial manipulation of the material being reviewed. They may be the tasks of choice when the purpose is to review a general body of information. Analytic-writing tasks, on the other hand, focus the writer more narrowly on a specific body of information. The results from the protocol analyses suggest that this attention is also more directly focused on the relationships that give structure and coherence to that information. In the context of learning from text, such tasks seem to lead to better retention of a smaller body of information. They will be the tasks of choice when the emphasis is on concepts and relationships in contexts where these relationships are more important than memory for a larger body of facts.

Finally, if content is familiar and relationships are well understood, writing may have no major effect at all. In these cases, simply reading the passage without any other attendant activity may be all that is needed to ensure comprehension and to remind readers of what they already know.

In these studies, we have made no attempt to separate the effects of writing from those of cognitive engagement. We suspect the two are inseparable and that the effects we have found for writing are a result of the kinds of engagement invoked by the different tasks. However, as educators we do not find the distinction particularly helpful. Writing seems to be at least one very useful way that teachers can orchestrate the kinds of cognitive engagement that leads to academic learning. While similar kinds of engagement can be invoked using other instructional techniques such as group or class discussion, writing activities are easier to plan and execute than many of the alternatives, and they have the advantage of maximizing the likelihood that all students, not only the most vocal, will be involved.

The results of our study of learning from writing, like those from the studies of individual classrooms, do not yield any simple prescriptions. Different types of written tasks promote different kinds of

learning, and choosing among them will depend upon the teacher's goals for a particular lesson or a particular course. Although they do not yield simple prescriptions for teaching, the results of our studies are generally encouraging: they suggest that the choices we make as teachers can be reasoned choices, reflecting the kinds of engagement with the subject matter that we value most for particular groups of students at particular points in time. Writing across the curriculum is perhaps too simplistic a concept, but our results provide good support for the underlying premise that writing tasks have a significant role to play in all areas of academic study.

The argument so far has had two parts. In the studies of teaching, we examined how writing activities function in a variety of subject areas and concluded that such activities are often limited and perhaps trivialized by their assimilation to old routines of teaching. In the studies of student learning, we have argued that the different types of writing activities have different effects on learning — that writing is not writing is not writing. Given these twin findings, do we have any alternative that might allow writing activities a broader role in fostering students' engagement in more complex and sophisticated reasoning? Sketching that alternative will be our task in the next chapter.