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Synthesis of Research on Teaching Writing

Twenty years of research in writing, including both the composing process and teaching methods, reveal that writing involves stop-review-start-again processes that teachers need to recognize in their assignments.

Research in the field of writing over the past two decades or so has focused on the process of composing as well as on the teaching of composition. My recent review of about 2,000 studies (Hillocks 1986a) indicates that the findings of research on the composing process strongly support the findings of research on classroom teaching. The results provide some answers to an important question: what types of knowledge do writers need for effective writing? Those answers provide a guide for developing more effective writing curriculums. This article examines research on the composing process, research in teaching composition, and the implications of their results for curriculum development.

The Composing Process

Research on the composing process indicates that writing is an enormously complex task, demanding the use of at least four types of knowledge: knowledge of the content to be written about; procedural knowledge that enables the manipulation of content; knowledge of discourse structures, including the schemata underlying various types of writing (e.g., story, argument), syntactic forms, and the conventions of punctuation and usage; and the procedural knowledge that enables the production of a piece of writing of a particular type (Hillocks 1986b). The research of Bereiter, Scardamalia, and their colleagues (Bereiter 1980, Bereiter and Scardamalia 1982, Scardamalia and Bereiter 1983, Scardamalia et al. 1982) and of Flower and Hayes (1980, 1981a, 1981b), and others strongly indicates that the processes and subprocesses of composing are hierarchically related and recursive. That is to say, the act of writing any set of words in a composition requires a review of what has already been written.

Purposes and constraints. Available research suggests the existence of the hierarchical levels in Figure 1, which is adapted from Bereiter (1980). To illustrate, let us assume that a director of curriculum has been called upon by a board of education to investigate the need for reform of the mathematics curriculum in the school system and to present a position paper concerning it by a particular date. The astute curriculum specialist will recognize, even at the outset, the presence of several purposes and constraints in this task and will begin work in light of those. These purposes have to do primarily with content. The astute director will also recognize that she will be writing for several audiences: the board of education, members of the administration, mathematics teachers, and perhaps some interested parents. Such problems are the purposes and constraints that appear to control the composing process and which, there-

fore, appear in the top trapezoid of the triangle. Because the process is recursive, however, the purposes and constraints may change as a result of thinking and writing at lower levels. This is, for example, the operation of what Bereiter calls the *content processor* may provide new insight into the purposes related to content and audience. These new purposes would influence the levels below.

Content knowledge and processes. The second trapezoid is divided into two closely linked parts that appear to influence each other: (1) content knowledge and processes and (2) discourse knowledge and processes. The first of these has to do with recalling and transforming content. Research by Scardamalia, Bereiter, and Goelman (1982) indicates that while children have no difficulty in recalling information when prompted by a conversational partner, the simple act of recalling data systematically for writing, when no such partner is present, is a process that must be learned. Researchers asked youngsters in grades four and six to write as much as they could on a topic. When they asked each youngster individually to write even more, without suggesting what to write, the children did write more. When contentless prompts seemed to have exhausted what children had to say, specific questioning revealed that the children had far more content than they had previously revealed. Bereiter and Scardamalia hypothesize that children write briefly, not for lack of knowledge, but for lack of adequate means for tapping the knowledge they do have. To use Bereiter and Scardamalia's terminology, children need to learn to conduct a memory search.

Anderson, Bereiter, and Smart (1980) conducted classroom experiments to help students learn to perform memory searches. Over a period of 12 writing sessions, they asked students to write a list of all single words that might be important to a topic before they began writing. This procedure provided children with the means for conducting a memory search, for they wrote longer compositions at the end of training even when they were not requested to write out the list of single words. Other techniques such as brainstorming, "clustering," and "mapping" (Buckley and Boyle 1983) may have similar effects. Such techniques may well have the effect its proponents claim for them.

Content processing also appears to include collecting and transforming new data. Our curriculum director would not simply collect and present mathematics achievement raw scores. She would transform those scores through various statistical procedures. Several studies (Fichtenau 1969; Hillocks 1979, 1982; Widvey 1971) provide instruction in transforming data: moving beyond the level of objects, actions, and their details to comparison (including metaphor), generalization, definition, hypothesis, and argument. Practice in these skills has a powerful impact on subsequent writing. We shall examine them again later under the heading of *inquiry*.

Discourse knowledge and processes. Research by Flower and Hayes (1981a) suggests that the processing of content may be closely intertwined with discourse knowledge and processes. It is clear that knowledge of form (schemata) enables young children to produce elementary stories (Stein and Trabasso 1982). Emig (1971) argues that form learned in school (e.g., the five-paragraph theme) enables high school students to produce compositions quickly and easily. At the same time, Flower and Hayes (1981a) report that writers who first focus on the final form of discourse and try to produce its parts short-circuit the normal generating processes and become mired in an unmanageable task that blocks writing. Current writing textbooks tend to focus on learning the characteristics of a given type of writing (e.g., description,

narrative, argument, or "the paragraph"). At the same time, however, they ignore the procedures for generating such writing. The result is that students may know that a "good" paragraph should have a topic sentence (though few actually do) and support or that arguments consist of propositions supported by reasons and relevant data. But those same students may not be able to generate a "good" paragraph or a developed argument. It is one thing to identify the characteristics of a piece of writing but quite another to produce an example of the type. Recent research at the University of Chicago indicates that sixth-graders rank ordered arguments of varying quality in the same way as adult experts. But they were unable to produce arguments of high quality. Knowledge of discourse, then, appears to have two dimensions: declarative knowledge, which enables identification of characteristics, and procedural knowledge, which enables production.

Gist units. Research by Hayes and Flower (1980) suggests that as a result of thinking about purposes, constraints, content, and form, writers produce abstract chunks of discourse, what Bereiter (1980) calls "gist" units. A gist unit is a generally circumscribed unit of content that has not been laid out in any detail but for which the writer probably has notions of form and purpose.

Semantic, verbatim, and graphemic units. Research by Matsuhashi (1981) and Bereiter, Fine, and Gartshore (1979) suggests that the composing of written sentences involves three fairly distinct stages. To begin with, writers appear to have a general notion of what is to be written (semantic units) and proceed to work out the specific lexical items to produce what Bereiter calls a verbatim unit, a sequence of words not yet recorded, but which the writer can state upon request. Writing these words produces graphemic units, which are often different from the verbatim units announced orally. The limits of working memory (seven words plus or minus three) severely restrain the number of words that can be planned in advance. Matsuhashi's research indicates that in developing a long sentence, writers work with semantic units, which become clauses or phrases. They work out the first phrases or clauses explicitly, having only a general idea of what will follow. After recording the first unit, they pause to plan the remainder. The semantic units appear to include keys to the kind of structure to be produced, though not the specific lexical items. That is, while the semantic unit may necessitate that a certain kind of relationship be established (e.g., temporal, cause/effect), it allows for choice among a variety of specific syntactic and lexical structures. At this level a writer may review alternative constructions and choose one in light of its appropriateness to purposes, content, and form.

Verbatim units are the lexical strings that writers hold in mind as they record what they wish to write. Graphemic units are the recorded versions of them. Verbatim units differ slightly from graphemic units. According to Bereiter, Fine, and Gartshore (1979), the differences between the two are in the direction of "correctness." Thus, writers do not simply record verbatim units but edit them during recording, sometimes omitting, adding, or changing a word, sometimes making "corrections" in usage.

Editing. Editing appears at the very tip of the triangle indicating a stage that follows the production of graphemic units: the correction of spelling or usage, the addition and deletion of words or phrases, the restructuring of syntax, and so forth.

The term revision has not been used in the triangle, even though the research indicates that major changes can and do take place even at the highest levels of planning. Flower and Hayes (1981a), for example, show a young man change his purpose, form, and content after reconsidering his audience. In addition, as already indicated, minor revision or editing takes place as verbatim units become graphemic units and after graphemic units have been recorded. Revision is used here to refer to the reexamination of a whole discourse or some fairly extensive part of it, *after the first version of that discourse has been*

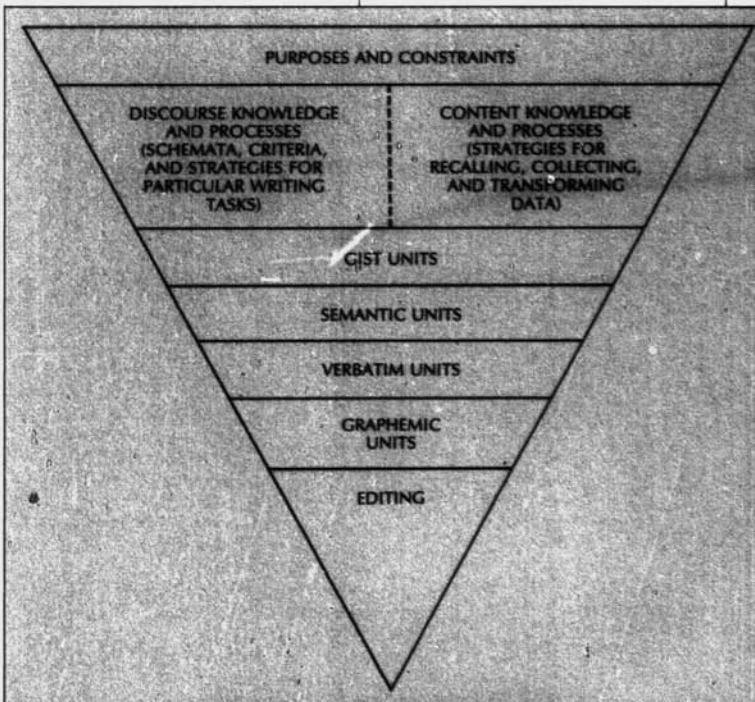

Fig. 1. Plans and Processes in Composing

completed. Revision in this sense involves the reexamination of the whole product in light of purposes, content, and form. Bridwell's (1980) high school seniors, for example, averaged 61 revisions per piece of writing. The vast majority of those revisions were cosmetic and mechanical. About 19.6 percent were revisions at the sentence or multisentence level. She found no revisions at the level of the whole composition. No students changed basic purposes, content, or form.

We should not be shocked by these findings. How many of us, after producing a first draft, scrap the entire manuscript? We may do it occasionally, but not often. What provokes larger scale revisions has not been studied in any detail, but we can surmise that major revisions come about because the writer recalls information forgotten during the initial writing, receives new information, or thinks of an alternative way to organize. The sources of such new information are most likely to be some experience related to the topic at hand (e.g., reading a related article or book) or to feedback from an audience.

Research indicates that the relationships among the parts of Figure 1 are not only hierarchical but recursive

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(Flower and Hayes 1980, 1981a). That is, writers do not set goals once and proceed to content and discourse knowledge. They do not think about content and form once and proceed to gist units. The evidence strongly suggests that writers continually reconstruct goals, plans, and content (Scardamalia et al. 1982, Flower and Hayes 1981a). They apparently must do so because the space available in working memory requires that larger plans be held in long-term memory while short-term memory focuses on the generation of relatively brief graphemic units. Each reconstruction of goals, plans, and gist units affords opportunities to assess and change what has been written. At the same time, the necessity for such continuous reconstruction suggests why writing is so difficult for so many people.

Classroom Instruction

The complexity and difficulty of the composition process also indicates the inadequacy of current school practices. Applebee (1981) found that the average preparation for writing amounts to about three minutes, that most writing assignments in schools ask students to supply short answers of one word to a sentence, and that the most students are likely to write is a paragraph—call it 150–200 words. Such conditions may account for the brevity of writing reported by researchers (Emig 1971). Under such conditions, students may not be able to develop their capacities to conduct memory searches, construct and re-

Highlights of Research on the Teaching of Writing

The effectiveness of six methods of teaching writing varies widely.

Grammar. **The study of traditional school grammar (i.e., the definition of parts of speech, the parsing of sentences, etc.) has no effect on raising the quality of student writing. Every other focus of instruction examined in this review is stronger. Moreover, a heavy emphasis on mechanics and usage (e.g., marking every error) results in significant losses in overall quality.**

Models. **The presentation of good pieces of writing as models is significantly more useful than the study of grammar. At the same time, treatments that use the study of models almost exclusively are considerably less effective than other available techniques.**

Sentence combining. **The practice of building complex sentences from simpler ones has been shown to be effective in a large number of experimental studies. This research shows sentence combining, on the average, to be more than twice as effective as free writing as a means of enhancing the quality of student writing.**

Scales. **Scales, criteria, and specific questions that students apply to their own or others' writing have a powerful effect on enhancing quality. Through using the criteria systematically, students appear to internalize them and bring them to bear in generating new material even when they do not have the criteria in front of them.**

Inquiry. **Inquiry focuses students' attention on strategies for transforming raw data. For example, students might find and state specific details that convey personal experience vividly, examine sets of data to develop and support explanatory generalizations, or analyze situations that present ethical problems and develop arguments about those situations. On the average, these treatments are three-and-a-half times more effective than free writing and over two-and-a-half times more effective than the traditional study of model pieces of writing.**

Free writing. **This focus asks students to write freely about whatever concerns them. As a major instructional technique, free writing is more effective than teaching grammar in raising the quality of student writing. However, it is less effective than other focuses of instruction examined.**

While the results for the various treatments differ greatly from each other, they all have some place in the writing curriculum. Indeed, sentence combining, scales, and inquiry all make occasional use of models, but they certainly do not emphasize the study of models exclusively. Structured free writing, in which writers jot down all of their ideas on a particular topic, can be successfully integrated with other techniques as a means of both memory search and invention.

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construct complex plans, transform data, process much more than they might produce in an extended conversational turn, or revise in more than a mechanical fashion.

In addition, researchers find that most student writing is produced only for teachers to report what information has been learned (Britton et al. 1975). While such writing tasks may be a necessary part of education, they cannot provide practice in developing goals and plans and in transforming content.

What kinds of instruction have the greatest impact in enhancing students' abilities to deal with a wide variety of composing problems? Part of my review mentioned at the beginning of this article included a meta-analysis of experimental treatments or interventions in classrooms. My colleagues and I screened several hundred studies against a set of criteria (see Hillocks 1986a, 108–110). This process resulted in the selection of 60 well-designed studies with 72 experimental treatments and their control treatments, each of which was coded for a variety of variables.

The meta-analysis was based on the techniques developed by Glass (1978) and particularly on important developments by Hedges (1981, 1982a, 1982b). These combined techniques enable us to compare the effectiveness of treatments across studies.

Instructional Focus

We identified six instructional focuses, each of which was examined in three or more treatments. These include grammar, sentence combining, model compositions, scales and guided revision, inquiry, and free writing. In each case the treatment was classified as having a particular focus if that focus appeared to consume a major portion of classroom time. The results of the analysis for focus of instruction appear in Figure 2. They are reported in effect sizes that answer the question, "What is the difference between the experimental groups' gains and the control groups' gains in studies having a particular focus in common among the experimental groups?" Effect sizes are reported in standard deviations.

Grammar. In treatments with a focus on grammar, students are taught parts of speech, parts of sentences, kinds of clauses, kinds of sentences, and so forth. The intent of such programs is to help students understand "how the English language works." Many teachers assume that such knowledge is essential to clear and effective writing, even though linguists have argued that such grammar does not adequately describe language.

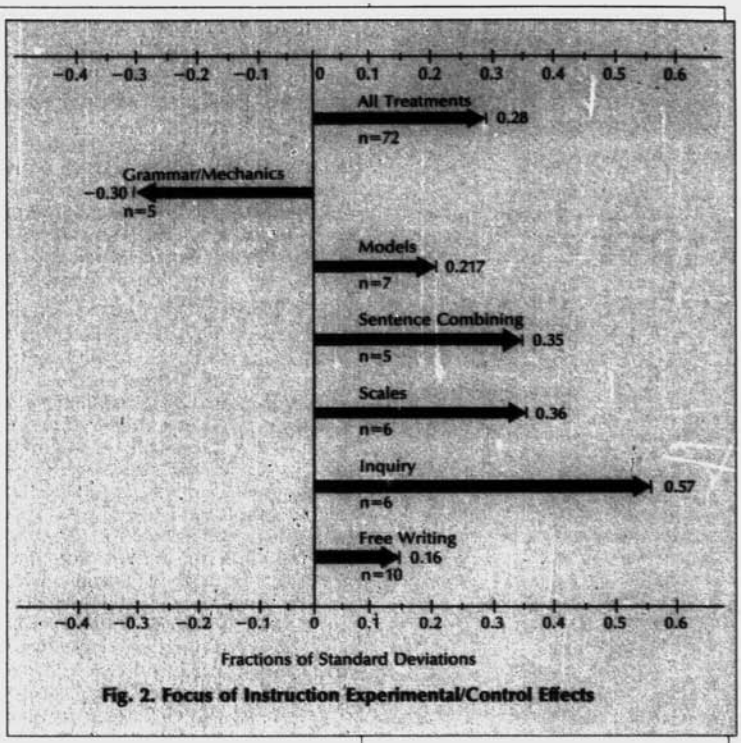


Fig. 2. Focus of Instruction Experimental/Control Effects

In 1963, Braddock, Lloyd-Jones, and Schoer, in light of the review of research to that time, concluded that the study of grammar had no effect on the quality of student writing. The studies I (Hillocks 1986a) examined force the same conclusions. Four studies with five treatments are represented in Figure 2. The findings indicate that results for the control groups are superior to those for groups studying grammar.

In New Zealand, Elley and his colleagues (1976) conducted a very thorough, carefully designed study that compared both traditional and generative grammar treatments to a no-grammar treatment. These were taught to randomly assigned students over a three-year period with extensive testing at the end of every year of instruction and at the end of a fourth year during which treatments were suspended. Elley and colleagues found no statistically significant differences in writing quality and none in subscores for writing mechanics among the three groups of students at any time over the four years. Many other studies reviewed but not included in the meta-analysis support the same conclusion: the study of grammar does not contribute to growth in the quality of student writing.

Given the findings of research on process, we cannot expect grammar study to contribute much to the quality of writing. In Figure 1, the earliest point in the process at which knowledge of grammar might enter is at the verbatim/graphemic level. Not surprisingly, no researchers report that writers make use of even a peremptory grammatical analysis of what they are doing. Certainly, no one consciously lays out the grammatical scheme for a sentence: "Let's see, subject with modifiers, verb, object, plus restrictive clause. Now, how will I fill that in?" Of course, writers use knowledge of grammar, but it is intuitive knowledge

that puts itself in the service of the content to be rendered.

If formal grammatical knowledge is used at all, it is probably used at the level of editing or proofreading, levels that can exercise little or no control over purpose, plans, content, and style. In short, we should not expect knowledge of grammar to influence the quality of writing.

Models. A second traditional and extensively used method of instruction in composition is the presentation of model compositions thought to exemplify principles or characteristics of good writing. This method dates from the classical academies of Greece and Rome whose pupils were required to recite orations from memory. The idea was that students would incorporate the rhetorical principles involved into their own thinking and would have specific examples to guide their own composing of orations. This belief in antiquity is not far removed from what modern-day cognitive psychologists have shown about discourse processing—for example, that our processing and production of stories are guided by bare-bones outlines or schemata of the essential elements of stories (Stein and Trabasso 1982).

The effect size for such treatments is small, .217 standard deviations. This is a somewhat surprising result simply because most writing in day-to-day situations makes use of identifiable patterns or forms. Further, the selection and development of plans appears high in the hierarchy of the writing process sketched in Figure 1. From that alone one might expect that teaching about discourse patterns would have greater impact on the quality of writing.

"We can no longer accept the teaching of grammar as being . . . conducive to improving the quality of writing."

"The limits of working memory (seven words plus or minus three) severely restrain the number of words that can be planned in advance."

However, treatments focusing on models tend to emphasize identifying, naming, and perhaps evaluating the parts or features of models. The resulting knowledge is comparable to what cognitive psychologists call declarative knowledge. Then the treatments call upon students to imitate the models; that is, to produce compositions that make use of the features studied. However, these treatments do not teach the procedures for producing a piece exhibiting the characteristics studied. It is one thing to identify a good piece of writing and quite another to produce it, just as it is one thing to identify a virtuoso trumpet performance and impossible for most of us to replicate it.

The remaining focuses of instruction are all primarily concerned with procedural knowledge. All feature activities that involve students in procedures that seem important for producing discourse. In three cases they provide the intervening steps between declarative knowledge and final performance—a step that breaks down the performance task into steps or parts and provides active practice on the parts or subroutines to make performance attainable by students.

Sentence combining. Hunt (1965) and others have demonstrated that syntactic fluency increases with age. That is, as children move from elementary school through high school their use of more complex syntactic structures increases dramatically. A number of researchers have found that direct instruction in producing more complex syntactic structures results not only in greater syntactic complexity, but in increased quality (O'Hare 1973, Faigley 1979, Morenberg et al. 1978). These procedures have been called *sentence combining* because they present students with sets of two or more sentences, requiring them to combine the sentences using some structure stipulated in the materials. (Some materials do not stipulate structures to be used.)

It is important to note that from O'Hare (1973) onward, sentence combining treatments have excluded direct instruction in grammar and grammatical terminology.

While the research clearly indicates that such work over the course of several weeks results in higher-quality writing, the increased quality may not be due simply to increased complexity. Rather, as Scardamalia and Bereiter (1983) suggest, it may provide students with control over an organized repertoire of syntactic structures, control that allows them to pick and choose among a variety of alternative syntactic structures at the verbatim level. Such work may also have a positive effect in revision, enabling students to search more systematically for more appropriate structures. Whatever the case, the research in Figure 2 indicates that sentence combining can have a powerful effect on the quality of writing.

Scales. Equally powerful are the instructional methods that make direct or indirect use of scales in instruction. These methods present students with sets of criteria for judging and revising compositions. In two studies, the scales consist of sets of four compositions that illustrate four quality ratings (0–3) along a particular dimension such as elaboration, word choice, or organization (Sager 1973, Coleman 1982). In these studies, the teacher leads students in an evaluation of compositions until students understand the discriminations illustrated by the scale. Then students receive additional compositions to rate on their own. Probably more important, when the pieces of writing are not top-rated (3), students receive a set of prompts to help them generate ideas for revising the piece.

"The focus of instruction with the greatest power is . . . inquiry. . . . [It] involves using sets of data in a structure . . . to help students learn strategies for using the data in their writing."

The use of scales and criteria-guided revision appears to help students develop better control over and understanding of discourse knowledge. As indicated in Figure 1, instruction of this type is likely to affect most aspects of composing, influencing the selection of content, the development of plans, the development and arrangement of gist units, and the content and structure of verbatim units.

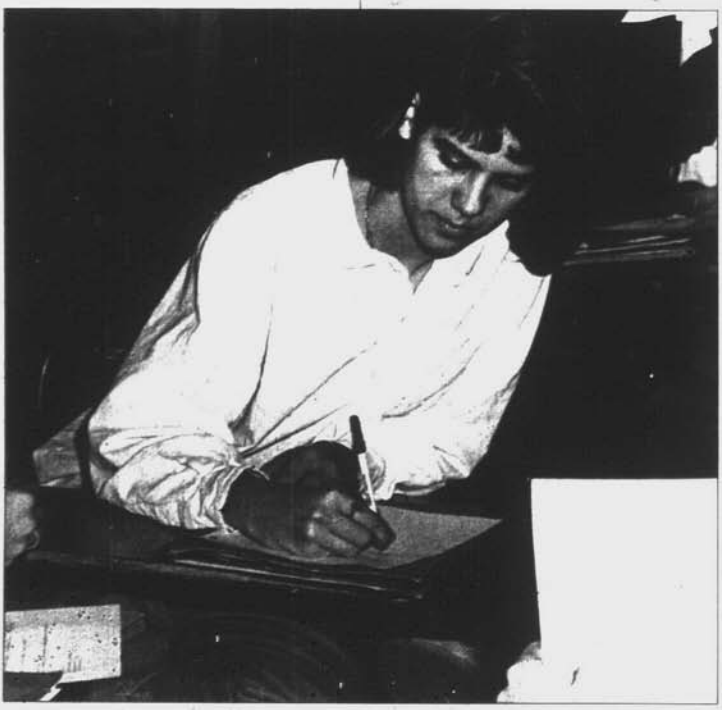
Inquiry. The focus of instruction with the greatest power is what I have called inquiry. This approach should not be construed as discovery teaching in which students are presented with problems or tasks and set free to pursue them. On the contrary, the method involves using sets of data in a structured fashion to help students learn strategies for using the data in

their writing. These strategies range from recording and describing to generalizing, presenting evidence, discriminating through the use of criteria, hypothesizing, and so forth.

Teachers using this focus of instruction typically present students with data (a set of objects, a drawing, a set of scenarios, information about a problem), designate a task to be performed using the data, and provide guidance in performing that task. This procedure is repeated using similar tasks but different data until students become proficient in using the strategies required by the task. The results of these studies indicate that the process of observing and writing is far more effective in increasing the quality of student writing than the traditional study of model paragraphs that illustrate the use of strategies (Hillocks 1979, 1982).

A second example of this focus is the approach to teaching argument developed and tested by Troyka (1974). The strategies to be learned in this treatment include the development and support of generalizations on one side of an argument and the recognition and refutation of opposing viewpoints. Students receive sets of information relevant to some problem (community pollution, prison rebellion, purchasing a fleet of taxicabs, etc.) and play the role of one of the participants in solving the problem. The necessity of presenting a position to groups known to hold different positions requires students to develop and support their own generalizations and, more important, to recognize and confront the positions opposing theirs. The discussion or debate among those positions leads to writing more formal arguments. Study results indicate that students in the experimental program made very large gains (over one standard deviation) in contrast to control group students who used the traditional approach of studying and imitating model pieces of writing.

The focus on inquiry, then, appears to help writers learn strategies for transforming available data for use in writing. Analysis of data undoubtedly affects a writer's plans and is very likely to affect even the highest level of Figure 1, purposes and constraints. The studies in this group strongly suggest that learning to write involves far more than learning about rhetoric and discourse. Writers must learn strategies for transforming raw data.



Free writing. The final focus of instruction examined was free writing, an approach to teaching writing that asks students to write about whatever is of interest to them in an uninhibited way. Nearly all treatments examined combine free writing with sharing ideas, peer feedback in small groups, redrafting, and, at some point, teacher feedback. At the same time these treatments eschew the use of grammar, model compositions, criteria for judging writing, and so on, as inhibiting and restrictive (Parker 1979, Ganong 1975, Gauntlett 1978). They sometimes include prewriting activities such as brainstorming and clustering, which appear to act as aids in searching memory for information. Such activities are often grouped together and referred to as "the process approach to writing."

Figure 2 indicates that the experimental/control effect for these treatments is weak (.16). Nonetheless, such treatments represent a clear advance over traditional instruction in writing reported by Applebee (1981), instruction that usually provides no prewriting activity, no opportunity for revising, and no feedback until after the writing is a *fait accompli*. This traditional instruction (which simply provides an assignment) results in student writers who believe that only one draft is necessary and that Whiteout is the writer's best friend, permitting the immediate elimination of perceived errors. The resulting writing may be cosmetically more appealing, but it is usually superficial and poorly organized and developed.

Clearly, young writers must learn that effective writing involves a complex process that includes prewriting, drafting, feedback from audiences, and revising. At the same time, as Figure 2 suggests, free writing and the attendant process orientation are inadequate strategies.

Curriculum in Writing

The available research cannot indicate the optimal curriculum for writing.

Further research and theories of discourse and discourse learning are needed. However, it does indicate what approaches to teaching writing ought to be stressed. And it indicates parts of the rationale for devising more effective curriculums. First of all, we know that while declarative knowledge is useful, the curriculum needs to stress procedural knowledge for maximum effectiveness.

We can no longer accept the teaching of grammar as being in any way conducive to improving the quality of writing. Perhaps some will wish to include the study of grammar in the curriculum for humanistic reasons. Perhaps some grammar must be taught as a means of improving mechanics and proofreading. However, large doses of traditional school grammar do no more good than attention to mechanical problems when they arise (see Elley et al. 1976, for example). But attention to problems as they arise does appear to have some effect, especially in contrast to curriculums that offer little or no attention to mechanics (Bennett 1976).

The procedural knowledge related to grammar appears to come out of sentence combining and construction. Such instruction does not rely on parsing and labeling. Rather it stresses the procedures for developing varieties of syntactic structures. The most important value of sentence combining appears to be in helping students develop a repertoire of structures that they can call upon systematically, both in generating sentences and revising them.

Writers need knowledge of discourse structures traditionally provided by the study of model pieces of writing. As in the case of traditional grammar, such study is, in itself, not enough. But experimental treatments that include the study of types of writing along with procedures for generating them have been much more successful.

Curriculums in the past (e.g., almost any composition textbook) have ignored the strategies that writers use to transform raw data for use in writing. The assumptions have been that students (1) have the knowledge required by the writing tasks suggested, (2) can gain access to it, and (3) can transform it for use in the type of writing required. For example, many curriculums prepare students for writing a comparison/contrast composition by presenting and commenting on model compositions of that type. The underlying assumption is that knowing how others have structured comparison/contrasts in writing enables one to develop an original comparison/contrast. However, results from research indicate that writers need to learn strategies for recalling and transforming information. They need to practice various techniques for searching memory and for manipulating what they recall for use in writing. Techniques such as free writing, brainstorming, and clustering appear to be useful for helping students recall information and to have some impact on the quality of writing. Significantly more powerful, however, have been the kinds of instruction emphasizing what I have called the strategies of inquiry—strategies for collecting and transforming data in various ways.

Our initial question was, What types of knowledge do writers need for effective writing? The traditional study of grammar and model compositions provides little of the necessary knowledge. The most important knowledge is procedural: general procedures of the composing process and specific strategies for the production of discourse and the transformation of data for use in writing. The research indicates that when curriculums begin to focus on such procedural knowledge, they will begin to produce more effective writers.□

"Research on the composing process indicates that writing is an enormously complex task . . . [in which] processes and subprocesses . . . are hierarchically related and recursive."

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