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City University of New York, 1993

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SELF-REGULATED STRATEGIES OF ORGANIZING AND INFORMATION SEEKING WHEN WRITING EXPOSITORY TEXT FROM SOURCES

by

RAFAEL RISEMBERG

A dissertation submitted to the Graduate Faculty in Educational Psychology in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York.

1993

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Abstract

SELF-REGULATED STRATEGIES OF ORGANIZING AND INFORMATION SEEKING WHEN WRITING EXPOSITORY TEXT FROM SOURCES

by

Rafael Risemberg

Adviser: Professor Barry J. Zimmerman

Two studies investigated components from Bandura's (1977) triadic model for self-regulation and Flower and Hayes' (1981) cognitive model of the writing process. Specifically, the studies examined student use of two self-regulated learning strategies during a writing task.

In Study One, a descriptive study, 71 college undergraduates read two source texts and then wrote a comparison/ contrast essay based on these texts. Use of one self-regulated learning strategy, organizing/ transforming, was assessed by scoring subjects' pre-writing notes on their level of organization. Use of the second strategy, information seeking, was assessed by timing how long students accessed model comparison/ contrast essays, which were available to subjects but were not required reading. Another process variable, self-efficacy for writing, and a background variable, reading ability, were also assessed.

Results showed that essay writing quality, as measured by primary trait scoring, was significantly correlated with each of the four variables. However, a multiple regression revealed that only two variables, reading ability and information seeking, contributed uniquely to writing quality.

The purposes of Study Two were to examine how information seeking impacts on the learning of a pre-writing strategy known as graphic organizers, and to gauge the effectiveness of graphic organizers in composition writing. In this study, 71 college undergraduates (different from those in Study One, but similar in background), were randomly assigned to two conditions: graphic organizer training and a control condition. After training, both groups were assigned the same essay writing task as in Study One.

This time, all the variables except information seeking were significantly correlated with writing quality. In addition, in comparison with the control group, the experimental group had significantly higher scores in self-efficacy, organizing, and writing quality, and lower scores in information seeking. A multiple regression showed that four variables contributed uniquely to writing quality: reading, training, organizing, and training x organizing interaction. A hypothesis that the interaction of training x information seeking would predict writing quality was not substantiated. Finally, a path analysis demonstrated four significant paths that led to writing quality:

reading, organizing, reading through organizing, and training through organizing.

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CHAPTER I

LITERATURE REVIEW

Introduction

Over the last fifteen years, the focus of writing research has shifted from writing product to writing process (Hayes & Flower, 1986). Where investigators used to attend only to changes in written compositions following an intervention, the spotlight now is on the behaviors and cognitive and affective states of the writer while writing. Studying these new variables, though more difficult to capture empirically, has nevertheless led to a richer picture of what writing is about.

As a process, writing is a complex task that requires the writer to deal simultaneously with a myriad of components (Flower & Hayes, 1980), among them handwriting, spelling, punctuation, grammar, organization, paragraph structure, meaning, style, and purpose. Although some of these components, such as spelling and handwriting, become automatic as most writers mature, school writing tasks become increasingly challenging, and students while writing often feel they are continously juggling constraints. The quintessential academic task, writing expository text from sources (e.g., doing a report based on library research), is particularly complex.

In order to succeed in the balancing act that writing often is, and to reduce the cognitive load, successful writers use a variety of strategies, among them goal setting, planning, organizing, monitoring, and revising (Humes, 1983). That is, they set goals and subgoals for the particular writing task, plan how they will go about achieving these goals, organize their thoughts mentally or in writing, self-evaluate their written product based on self-imposed standards, and then alter their writing accordingly.

These are some of the very same processes that exist under the rubric of self-regulated learning, described as student self-generated behaviors oriented toward the attainment of learning goals (Schunk, 1989). Although self-regulation is a process not specific to learning, educators have recently begun to apply its theories and principles to academic subject areas. Writing, because of its complexity, is a particularly appropriate area for the study of self-regulated learning. Indeed, as will be demonstrated, models for self-regulation and models for the writing process show some striking overlap.

Self-Regulated Learning

A Social Cognitive Model of Self-Regulated Learning

A comprehensive definition of self-regulated learning is provided by Zimmerman (1990), who describes self-regulated

learning according to three features. The first is that students who self-regulate are "metacognitively, motivationally, and behaviorally active participants in their own learning" (p. 4). Metacognitive processes include goal setting, organizing, self-monitoring, and self-evaluating during learning. Motivationally, these students self-initiate activities and display effort and persistence until the learning task is completed. With regard to behavior, these students restructure their environment for optimal learning, seek out information and advice, and self-reinforce during performance.

The second feature of self-regulated learning, proposed first by Carver & Scheier (1981), is the existence of a self-oriented feedback loop. By this mechanism, students compare their performance on academic tasks with their predetermined goals. They then react to this feedback in a number of ways. If there is a discrepancy between the standards they have set and their performance, they may alter their strategies, increase their effort, re-evaluate or alter their goals, or perform any number of procedures that will align their goals with their performance.

The third feature of self-regulated learning concerns how and why students choose certain strategies or behaviors (Zimmerman, 1990). The outcomes of these strategies must appear compelling enough for students to decide to utilize them. According to Bandura (1986), students choose particular strategies based on their prior experiences with using them. To students, it

matters not so much that the strategy is supposed to be successful as that it worked for them in the past.

A social cognitive view of self-regulated learning has its basis in Bandura's (1977, 1986) triadic model (see Figure 1). This model consists of three reciprocally interacting components: person, behavior, and environment. Three types of self-regulated activities are explained by this model. The first, covert self-regulation, consists of a metacognitive (and thus person-centered) feedback loop in which behaviors are usually not overt. An example of covert self-regulation is student use of a mnemonic strategy to learn foreign words. In this case the student sets goals for learning a certain number of words, carries out the mnemonic strategy, self-evaluates the success of the strategy, and then alters the strategy accordingly. The other two types of self-regulated activities are more overt. In behavioral self-regulation, the student monitors his or her behavior and adjusts the strategy accordingly. An instance of this would be a student carrying out long division and then checking the answer by multiplication. Finally, in environmental self-regulation, the student interacts with his or her environment so as to promote learning, e.g., by turning off the radio while trying to study. The effect of this behavior, in this case a quieter room, is then monitored by the person for its intended effectiveness.

In order to flesh out this model, Zimmerman (1989) compiled a set of important subprocesses in self-regulated learning.

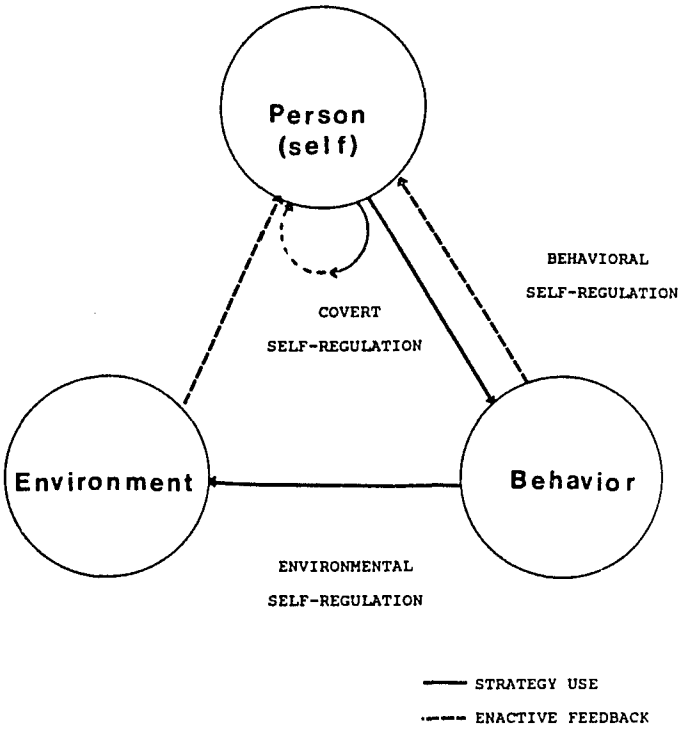


Figure 1. Bandura's (1986) triadic model of self-regulated learning.

Personal subprocesses include students' knowledge, metacognitive processes, goals, and affect. Behavioral subprocesses are those of self-observation (monitoring one's performance), self-judgment (comparing the performance with pre-set goals), and self-reactions (changes in behaviors resulting from self-judgments). Environmental processes include modeling, verbal persuasion, and the structure of the learning context, such as task or setting.

Research on Self-Regulated Learning

In order to investigate specific self-regulatory learning strategies in a school context, Zimmerman and Martinez-Pons (1986) created the Self-Regulated Learning Interview (SRLI), consisting of six hypothetical learning situations involving in-classroom and at-home tasks, including one situation about writing a paper. For each situation, high- and low-achieving tenth grade students were asked to name all the methods they would use to help them fulfill the task requirement. Students' responses to these open-ended questions were transcribed verbatim and then classified according to fourteen self-regulated learning strategies, as follows: goal setting and planning; organizing and transforming (rearranging and restructuring instructional materials); rehearsing and memorizing; self-evaluating; self-consequating (arranging for rewards or punishment for success or failure); keeping records and monitoring; seeking information (from non-social sources, such as a reference book); environmental structuring (re-arranging the

physical setting to make learning easier); seeking assistance from peers, teachers, and adults; and reviewing tests, notes, and texts.

The investigators found significant differences between the two achievement groups in the frequency with which students used these strategies. Indeed, reports of self-regulated learning could predict with 93% accuracy which achievement group each student belonged. Three specific strategies best differentiated the two achievement groups. One, organizing and transforming, was defined as "student-initiated overt and covert rearrangement of instructional meterials to improve learning;" the second, keeping records and monitoring, was described as "student-initiated efforts to record events or results;" finally, seeking information was defined as "student-initiated efforts to secure further task information from non-social sources when undertaking an assignment" (p. 618). The SRLI was subsequently validated with teacher reports of student self-regulated learning behaviors (Zimmerman and Martinez-Ponz, 1988).

In a later study, Zimmerman and Martinez-Ponz (1990) administered the same SRLI, this time expanded to eight interview situations, to gifted and regular students from the fifth, eighth, and eleventh grades. Results showed that gifted subjects reported using a greater number of self-regulated learning strategies than did regular subjects. When they examined the use of each strategy, they found that four of the fourteen strategies

differentiated the gifted students: organizing and transforming, self-consequating, seeking peer assistance, and reviewing notes. There were no strategies that regular students used significantly more often than gifted students.

Studies on specific self-regulatory strategies have generally found them to be beneficial for learning. Areas studied include goal setting (e.g., Bandura & Schunk, 1981; Schunk, 1985), self-instructions (e.g., Schunk, 1986), and environmental structuring (e.g., Marcus, 1988). Several reviews on self-regulated learning, mostly in the metacognitive domain, have demonstrated the benefits of these strategies (Pressley, Borkowski, & Schneider, 1987; Weinstein & Mayer, 1986; Simons & Beukhof, 1987).

Self-Efficacy

Underlying self-regulatory processes is a key construct known as self-efficacy, or a person's confidence that he or she can perform a particular task in a given set of circumstances (Rosenthal and Bandura, 1978; Zimmerman, 1989). Bandura (1986) hypothesized that self-efficacy affects student persistence, effort expended, and task choice. Thus, self-efficacy is viewed as a predictor of student motivation. In accord with this belief, students with higher self-efficacy will choose more challenging tasks and then persist on these tasks longer than will students with lower self-efficacy. This construct is usually measured with

a 10-point Likert scale (10, 20,...., 100) in response to a brief statement of a confidence level for a task (e.g., "I can solve long division problems that have remainders"). Rather than being a general measure of academic confidence or ability, self-efficacy is notably task-specific.

Empirically, student self-efficacy perceptions have been found to be related to use of self-regulatory learning strategies. For example, in Zimmerman and Martinez-Pons' (1990) study, students were administered verbal and mathematics self-efficacy scales to measure their perceived ability to define ten words and solve ten mathematical problems of varying difficulty. Gifted students in all grades perceived significantly greater verbal as well as mathematical self-efficacy than their regular education counterparts, and this difference was particularly large for the verbal measure. In addition, verbal self-efficacy was significantly associated with the use of three strategies: organizing and transforming, seeking peer assistance, and reviewing notes. Mathematical self-efficacy was significantly related to the students' reviewing notes.

Studies relating self-efficacy to self-monitoring training corroborate these findings. Schunk (1983a) taught fourth and fifth grade students to record and self-judge success in division performance. These students, compared to an untrained control group, achieved over a 50% increase in division achievement. Moreover, the trained subjects reported a 21% higher self-efficacy

for solving division problems. In another study by Schunk (1983b), elementary school students were taught to record the number of math workbook pages they completed. Compared with a control group that did no such recording, the self-monitoring group showed twice as high an achievement level, were significantly more persistent on task, and attained double the self-efficacy scores.

Student reading and writing achievement has also been found to be mediated by self-efficacy. Shell, Murphy, and Bruning (1989), using college undergraduates as subjects, showed that self-efficacy for reading, along with outcome expectancy (beliefs that successful task performance will lead to a particular outcome), accounted for significant variance in reading achievement; furthermore, self-efficacy for writing, but not outcome expectancy, accounted for significant variance in expository writing achievement. The authors note that self-efficacy beliefs generally have been found to be more strongly related to achievement than have outcome expectancies. They speculate that the weaker relationship between beliefs and writing achievement (as compared with the relationship between beliefs and reading achievement) could be due to the fact that writing skill lags developmentally behind reading skill. Confirming their results with younger students, Bruning (1987) demonstrated that self-efficacy for reading was significantly associated with reading achievement, and self-efficacy for writing was

significantly associated with writing achievement for students in the fourth, seventh, and tenth grades.

Finally, McCarthy, Meier, and Rinderer (1985) assessed the writing ability and writing self-efficacy of 137 college freshmen in beginning writing courses. Students wrote in-class expository essays at the beginning and end of the semester. On the days they wrote their essays, they also filled out a questionnaire asking them to rate their confidence in being able to demonstrate nineteen writing skills. For each essay, teachers in the English department made analytical ratings of the performance of each of the nineteen writing skills, then added them together to arrive at an overall score for writing skill. They found that self-efficacy for writing was significantly associated with this measure of writing skill. This was true both before the course began and after the course ended.

Summary

Zimmerman provided a definition of self-regulation with the following features: students are metacognitively, motivationally, and behaviorially active participants in their learning process; using a self-oriented feedback loop, students compare their performance with their goals; and students choose particular strategies that are compelling or have proved effective for them in the past.

Bandura's triadic model is the basis for the social cognitive view of self-regulation. This model consists of three components: person, behavior, and environment, all of which interact reciprocally. Covert self-regulation is a metacognitive feedback loop whereby the learner carries out a cognitive strategy and then evaluates its effectiveness. In behavioral self-regulation, the learner monitors the effectiveness of the strategy based on the consequences of his behavior. Important sub-processes involved are self-observation, self-judgment, and self-reaction. Finally, with environmental self-regulation, the learner interacts with his environment to enhance learning.

Zimmerman and Martinez-Pons named fourteen categories of self-regulated learning strategies, among them planning and goal setting, organizing and transforming, monitoring and record-keeping, and seeking information. Through student interviews and teacher reports, higher achieving and gifted students were shown to use these strategies more often than their lower achieving counterparts.

Self-efficacy, or a person's confidence in being able to do a specific task under a given set of circumstances, is an important underlying variable that influences a person's motivation, manifested by increased effort and task persistence. A number of studies have shown student self-efficacy to be positively associated both with the use of a number of self-

regulated learning strategies, and with student achievement on academic tasks.

Writing and Self-Regulation

It is impossible to speak adequately of self-regulation apart from the context in which it is utilized (Zimmerman, 1989). Thus, we turn our attention to the field of writing, in which the study of self-regulated learning processes in the current study will take place.

A Model of the Writing Process

Early models of writing were relatively static, describing fixed stages of writing. One such model is Rohman's (1965) three-stage "Pre-write, Write, Re-write" paradigm, which was widely used in educational institutions in the 1960's and 1970's. According to this model, a product unfolds in stages sequentially so that, for example, the writer begins to write only after completing the pre-writing stage. However, as investigators began to focus on the behaviors that writers exhibit while actually writing, they began to discredit stage models such as this. Possibly because these static models were based on writing product and not process, they failed to account for the more fluid processes that actually go on during writing (Flower & Hayes, 1980).

The new model, constructed by Flower and Hayes (1981, see Figure 2), emerged through protocol analysis, whereby a subject verbalizes all of his or her thoughts before, during, and after writing. Central to this model are three writing processes labelled planning, translating, and reviewing. These are analogous to Rohman's three stages, with the important difference that the Hayes and Flower (1980) model includes a "monitor" that enables the writer to go from one process to another and back in a fluid fashion. In addition, the new model incorporates the writer's long-term memory and the task environment, something the the previous models omitted.

Subsumed under planning are three processes: goal setting, generating, and organizing. Goal setting refers to the writer's decisions concerning the objectives for the eventual written product. It is hypothesized that writers create not just one goal but a hierarchical set of goals and subgoals for each written product, depending on its complexity. Furthermore, these goals may change during the course of writing, being generated, organized, and revised by the same processes that act on other writing processes. Generating means coming up with ideas to write about, often from the writer's long-term memory. In this subcomponent the ideas are not necessarily organized in any particular order or scheme. It is during organizing, the last of the three subcomponents of planning, that ideas already generated

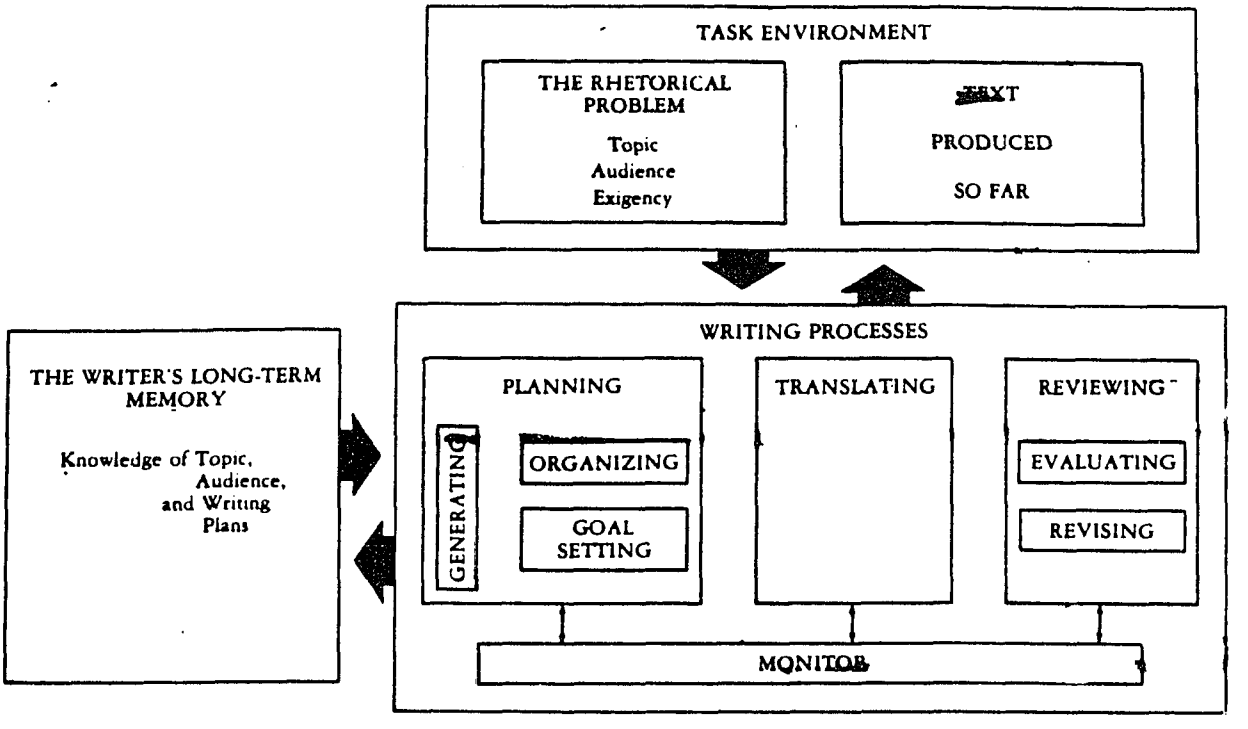


Figure 2. Flower and Hayes' (1981) cognitive model of the writing process.

are arranged hierarchically, and that the order of ideas is mapped out in some form.

Translating is defined as physically putting words onto paper. It is here that the writer must juggle all of the constraints of written language, such as spelling, punctuation, and grammar.

The process labelled reviewing is divided into two subprocesses: evaluating and revising. In the process of evaluating, the writer compares the text produced thus far with the goals that the writer pre-set. If there is a discrepancy, the writer then revises either the text or the goals. The revision could be on a superficial level (e.g., correct a misspelled word) or on a higher-order, meaning-based level (e.g., insert a topic sentence).

The monitor, one of the unique features of this model, allows the writer to go back and forth among planning, translating, and reviewing. Thus, the writer does not do all of the planning before translating, and does not finish translating before reviewing. The writer may plan a little, then write a few sentences, go back to planning, review the plan and/or written product, translate some more, revise, go back to planning, and so on until the text is completed.

Besides shifting among the three writing processes, the writer utilizes the task environment. That is, the writer has a topic, an audience, and exigency, which is defined as the specific

task demands. Furthermore, once the text begins to be written, it becomes part of the task environment.

In order to demonstrate their model's validity, Hayes and Flower (1980) carried out protocol analysis, whereby experienced writers spoke aloud all of their thoughts as they wrote an essay, and investigators recorded and then coded these statements. This procedure revealed that writers' thoughts could be grouped into three phases. In the first phase, generation of ideas predominated. An example of generation is, "And now what I'll do is simply jot down random thoughts". During the second phase, organizing those ideas generally took place. For instance, in this phase, the writer might say, "I'll use that topic last." Finally, translating took up most of the third phase. These are statements reflecting a search for a sentence to be written next, e.g., "How do I want to put this?", as well as the written sentences themselves. Evenly spread throughout the three phases, however, were a number of editing comments, such as, "Will this argument be convincing?" and "That's not the right word". Thus, editing, which is one feature of self-monitoring, was not relegated to the end of the writing task. It first occurred even before the writer began writing, and then permeated the entire process. This analysis gave support to Flower and Hayes' (1981) model, which posited an existence of a monitoring component that enabled the writer to travel back and forth fluidly between planning, translating, and reviewing.

As this model of writing stands, it bears some resemblance to features of self-regulated learning. Like Bandura's (1977, 1986) triadic model, Flower and Hayes' model incorporates elements of person (e.g., long-term memory, planning), behavior (e.g., translating, revising), and environment (task environment), all acting upon one another reciprocally. In addition, the writing model, with its goal setting, monitoring, and reviewing components, performs a feedback loop similar to the one outlined by Carver and Scheier (1981). Furthermore, this model of writing process contains several of the same categories of self-regulated learning strategies as described by Zimmerman and Martinez-Pons (1986), those being goal setting and planning, organizing, and self-monitoring.

In other aspects the two models differ, in part because the writing model is more specific to the particular academic task, and in part because it is incomplete relative to the self-regulation model. The Flower and Hayes model omits some classifications of self-regulated learning strategies. Some of these strategies are not relevant to writing (e.g., rehearsing and memorizing, reviewing tests), though some other strategies might improve the writing model if they were to be incorporated (e.g., self-consequating and environmental structuring). Of these, the last was investigated by Marcus (1988). She found evidence to support the hypothesis that better writers structure their environment, such as through turning the volume of a radio down,

in order to enhance learning. The writing model also fails to include a motivational component. It lacks reference to underlying cognitive factors, such as self-efficacy. Nevertheless, even with its shortcomings, this writing model is a good starting point for the study of self-regulatory processes when writing.

Self-Regulation Training for Writing

Recognizing the relevance of self-regulated learning for the task of writing, researchers have trained subjects in the combined use of several self-regulated learning strategies in an attempt to improve their writing performance. For the most part, this training has proved to be successful.

Day (1986) assigned junior college students to one of four conditions: summarization training alone, self-management training alone (involving such activities as paying attention and checking), and two summarization plus self-management training conditions. After training, subjects summarized eight expository texts. On an immediate post-test, subjects who had the combined treatment summarized better than did subjects who had only summarization training, though this difference was not statistically significant. On the delayed post-test, however, subjects in the combined summarization/ self-management group did summarize significantly better than did subjects who received training in summarization alone.

Another series of studies has been conducted using self-instructional strategy training, based on Meichenbaum's (1977) cognitive behavior modification approach. This instructional procedure is a combination of strategy training and self-regulation training, whereby the teacher models a strategy and then gradually fades the instruction until the student self-verbalizes it. Besides teaching content-specific strategies, the teacher models planning, self-evaluation, and self-reinforcement, all self-regulatory activities. This technique has been successful in improving sixth graders' writing ability with regard to story writing (Harris & Graham, 1985), revising essays (Graham & MacArthur, 1988), and writing argumentative essays (Graham & Harris, 1989b). As examples of the benefits of this procedure, students in the Graham and Harris (1989) study increased the total number of essay elements, spent longer on pre-writing, and improved the holistic quality of their essays.

Two studies attempted to make the self-regulatory component more explicit. In the first, Graham and Harris (1989a) assigned learning disabled subjects (those with an IQ between 85 and 115, and achievement at least two years below grade level in one or more academic areas) to one of two groups to train them in story writing. Subjects in the first group, self-instructional strategy training, learned a mnemonic device for inclusion of story grammar elements (who-what-when-where-how) and then, through teacher modeling, self-verbalizations, and finally covert self-

instructions, learned to utilize the strategy on their own. Subjects in the second condition followed the same procedures but were also taught explicit self-regulation strategies of setting goals for the number of story grammar elements they would include, then monitoring their performance by recording on a graph the number of story grammar elements they in fact included. After training, subjects wrote a story based on a picture. Dependent measures were number of story grammar elements included (e.g., main character, locale, starter event) and holistic rating on a 7-point scale (a general measure). In addition to these subjects, a no-treatment group of "normally achieving" subjects (identified by classroom teachers as being capable writers) wrote a story based on the same picture. Results showed that, while both experimental groups achieved parity with the normally achieving control group, the two experimental groups did not differ on either post-test measure. However, though it was not labelled as such, the self-instructional strategy training alone condition did include some implicit self-regulatory instruction (e.g., verbally self-evaluating, though not recording progress), and this may have been a factor in the students' subsequent success.

Later, as Harris (1990) reports, Sawyer, Graham, and Harris (1989) assigned subjects either to composition strategy training alone, self-instructional strategy training, or self-instructional strategy training plus explicit self-regulation training. Similar to the previous experiment, there was no difference between the

two self-instructional strategy training groups on writing measures (both groups outperformed the group that had composition strategy training alone). Nevertheless, only the group that included explicit self-regulatory training showed non-significant differences when their writing was compared with that of normally achieving peers.

Each of these studies included several self-regulatory components combined. We now examine subject utilization of two specific self-regulatory strategies that are of relevance to the current study: organizing/transforming and information seeking.

Organizing when Writing

Organizing and transforming, one of Zimmerman and Martinez-Pons' (1986) fourteen self-regulated learning strategies, also plays a key role in Flower and Hayes' (1981) cognitive model of writing. Organizing is often a covert activity, one that can be measured via protocol analysis. Recall that Hayes and Flower (1980) undertook such a procedure with professional writers and reported that comments regarding organizing, interspersed with editing comments, were the majority of comments made by these writers during the second of the three identified phases of writing. Examples of organizing statments include, "Under topic #1, I should discuss A, B, and C", and "This is the organization of a subpart."

Interviewing students about their knowledge of organizing is another method of examining this process. Englert, Raphael, Fear, and Anderson (1988) presented writing scenarios to three groups of fourth and fifth graders. One group, learning disabled, had IQ scores in the normal range but significant discrepancies between intellectual potential and academic functioning. The second group, low achievers, consisted of students who performed below the 33rd percentile on a standardized reading achievement test. Finally, the third group, high achievers, performed at a level above the 50th percentile on the same standardized test. The investigators presented a number of vignettes about students who were having trouble writing, including one in which a student was attempting to organize her writing, and they asked subjects open-ended questions about how to help these fictional students. Subject responses to these open-ended questions were scored for knowledge of writing processes (e.g., organizing), using a 3-point scale for each writing process. In addition to the interview, subjects wrote two expository essays. These essays were rated for quality according to a 12-point primary trait score, which was based on the degree to which it used the appropriate text structure (in one case, an explanatory text, in the other a comparison/ contrast text).

Subjects' responses to their open ended questions revealed that high achieving fourth and fifth graders, compared to low achieving and LD fourth and fifth graders, had significantly

greater knowledge of how to organize planned ideas. One of these areas was knowledge of using categories. When asked what kind of information should be included in an animal report, for example, high achievers tended to mention categories of information (e.g., habitat, food, color), whereas low achievers and LD students mentioned specific details, but rarely categories. Subjects were also assessed for their knowledge of subordinating ideas by asking them which of the ideas they had suggested would go together. For this task, high achievers surpassed the other students, though this difference was of borderline significance. Furthermore, knowledge of the organizational processes of using categories and subordinating ideas were each significantly correlated with writing quality of the subjects' expository essays.

Outlining and Other Pre-Writing Strategies

A more overt, albeit crude, method of examining organizing is to look at pre-writing time, or the amount of time taken, after students receive a topic, before they begin writing. Presumably much of this time is spent generating ideas and then organizing them. Perl (1979) found that community college students whose writing samples showed them to be "unskilled writers" (no more specific criteria given) spent only four minutes on pre-writing, meaning the time taken between receiving a writing topic and beginning to write words on paper. Pianko (1979) observed that her college subjects, some of whom were remedial and the rest

regular, spent only an average of 1.26 minutes pre-writing. As short as this was, she found that the regular students spent significantly longer pre-writing (1.64 min.) than did the remedial students (1.00 min.). Supporting these results, Kennedy (1985) found that, after reading sources from which to write an essay, higher ability college students planned more than did lower ability students. The problem with these studies is that pausing after receiving a topic and beginning to write is not necessarily indicative of organizing. The pause could plausibly be due to factors other than organizing, among them anxiety, writer's block, or even lethargy.

A more appropriate and informative method of tapping into organizational processes is to examine the organizational structure of students' pre-writing. Bloom (1988) analyzed the pre-writing samples of 7031 ninth graders who wrote for a statewide high school proficiency test. Students were assigned an essay topic and then told to pre-write anything they wished on a blank sheet of paper for five minutes before they wrote their thirty-minute essay on a separate sheet. The investigator found that 65% did pre-write, and she classified their pre-writing into fifteen categories. Of the students who pre-wrote, the majority (53%) re-wrote the topic and then jotted down one or more ideas. Only 9% of the students who pre-wrote used some kind of formal outline. Another 15% made lists, 4% used diagrams, and the remainder used a number of miscellaneous procedures, such as

freewriting and doodling. Of greater importance were the correlations she found between pre-writing strategy and writing performance: two of the most organized pre-writing strategies -- outlining and list making -- resulted in the highest scoring essays, on average. The less organized, though more frequently used strategy of re-writing the topic and jotting down ideas led to essays of the poorest quality.

In spite of the apparent benefits of outlines for writing essays, students rarely use them spontaneously. Emig (1971), in an extensive investigation of twelfth graders, found that students rearely pre-wrote unless they were told to do so. Even with English honors students, she observed that, though they sometimes used outlines, they rarely used formal, comprehensive ones. And judges who examined the final drafts of the students essays could not determine which ones used outlines. Pope and Prater (1990), after training eleventh graders in eight different pre-writing strategies, asked students which ones they preferred. Outlining was rated near the bottom of the list (even by high ability students), surpassed by such strategies as freewriting and brainstroming.

Given the universal acclaim of outlining by teachers at the secondary and university levels, it is surprising how few studies have attempted to validate its effectiveness for writing compositions. One study by Kellogg (1988) trained college students enrolled in a general psychology class to prepare a

written outline for a business letter, in which they were to argue in favor of a particular busing system for the handicapped. These writing samples, along with similar samples written by a no-treatment control group, were rated for five measures of writing quality (each on a 7-point scale): usage, coherence, development, effectiveness, and mechanics. Compared with the control group, the experimental group had better writing quality overall, and specifically in three of the five areas: idea development, effectiveness, and language usage. Interestingly, students who outlined spent less time on planning and reviewing and more time on translating than did their control counterparts, presumably because having an outline reduced cognitive overload. In his second experiment, he added a third condition: training in constructing mental outlines; that is, creating an outline in one's head and never putting the outline on paper. The investigator found that for essay quality, both outline conditions were better than no outline, and that students in the two outline conditions did not differ on any of the writing quality measures. This may explain the observations of other researchers that even high ability students do not pre-write; their mental organization might be sufficient for the task at hand.

While it is not possible to tap into covert organizational processes directly, but only inferentially, analyses of writing product seem to indicate that more highly organized essays are judged to be of higher quality. Spivey and King (1989) utilized

60 subjects, 20 each from the sixth, eighth, and tenth grades. Subjects were asked to write an informational report based on three encyclopedic articles (sources) about rodeos. The investigators measured organization in their subjects' informational essays by analyzing the extent to which the pieces of information in an essay were linked with each other. For instance, a subject who wrote about women's rodeo events and linked this content with a statement about association-sponsored rodeos would receive a higher organization score than a subject who included these two pieces of information sequentially, without providing a link. The researchers reported that essay organization was highly correlated with writing quality of the essay, as measured on a 6-point holistic scale.

Graphic Organizers

A different class of pre-writing organizing tools, known as graphic organizers, has recently emerged. Originated as a variation of Ausubel's advance organizers (Barron, 1980), graphic organizers are a graphic display of information that "provide a visual and verbal organizational structure that coheres information into a meaningful whole" (Horton & Lovitt, 1989, p. 627). Like outlines, they are highly organized, but unlike outlines, they contain a graphic element in the form of a chart in addition to the verbal element. It is hoped that students who

balk at the opportunity to produce outlines will more likely engage in the use of graphic organizers.

Though graphic organizers are useful for writing, they were originally intended as an aid for reading comprehension. A number of studies have demonstrated the effectiveness of graphic organizers for student comprehension (e.g., Darch, Carnine, & Kameenui, 1986; Horton, Lovitt, & Bergerud, 1990). Moore and Readance's (1984) meta-analysis of such studies found a small average effect size of 0.22. However, studies using university students as subjects showed a much larger average effect size of 0.66. Furthermore, the effect size was larger when students received or wrote the graphic organizer after they read the text as compared to receiving one prior to reading.

Most research involving graphic organizer training for the purpose of writing expository essays supports the notion that graphic organizers enhance writing achievement. For example, Jones and Hall (1979) trained 22 seventh graders to use matrix outlining, a graphic organizer specific to comparison/contrast essays. A control group of 22 seventh graders participated in unrelated imagery training. No writing pretest was administered. Instead, subjects in the two groups were matched for reading achievement test scores, reflecting the association between reading and writing. After training, subjects in both groups were given a topic on which to write a comparison/ contrast essay (no reading was necessary). With regard to these essays, the

experimental group produced more paragraphs with topic sentences, wrote higher quality topic sentences, and included more information supporting the topic sentences. Furthermore, low ability subjects (below the median in reading scores) from the experimental group were all equal or superior in writing achievement compared with high ability subjects (above the median in reading) in the control group.

Alvermann (1982) echoed these results. In her study, 30 average to above average tenth graders (scoring in the fifth, sixth, and seventh stanines on a standardized reading test) were assigned either to graphic organizer training or a control condition. Training was accomplished by having subjects read a passage and then fill in a graphic organizer that was mostly completed but had several blank boxes. In contrast, the control group engaged in the usual classroom prereading and postreading activities, using the same passages as did the experimental group. After training, both groups read an expository text knowing they would have to write a summary of it a week later. Results showed that the experimental group included more details in their essays and, in particular, more main ideas than did the control group.

The few studies on graphic organizers for writing at the college level have shown mixed results. Hitchcock (1987) conducted one such study using two groups of remedial college freshmen. Prior to intervention, all subjects read two persuasive papers and, based on these, wrote an argumentative essay. Then

the investigator taught one group a graphic organizer specific to persuasive/ argumentative essays. He introduced the graphic organizer, then modelled the construction of a graphic organizer based on reading passages, then had subjects construct their own graphic organizers based on reading passages. Subjects in the control group read the same passages and were led in general discussions of those readings, but they were never exposed to graphic organizers. After training was completed, all subjects read two new persuasive papers and from these composed an argumentative essay. Prior to training, groups did not differ on an analytic measure of writing quality that scored for four aspects of writing performance, each on a 6-point scale: originality, detail, organization, and mechanics. After training, the experimental and control group still did not differ significantly in writing quality; however, the experimental group showed more improvement over their pre-test essays, and they included more gist transfers (transformation of text found in the readings into their own words), than did the control group. Furthermore, the experimental group showed a high correlation between graphic organizer use and writing quality. Thus, of the students trained to use graphic organizers, the ones who actually used them improved their writing.

Balajthy and Weisberg (1990) trained 30 college freshmen enrolled in a developmental reading/ study skills course to use graphic organizers for comparison/ contrast essays. A control

group of 30 subjects from the same population carried out reading activities not involving text structure. In the posttest, subjects read a comparison/ contrast passage and wrote summaries of this passage. The summaries were scored by counting the number of idea units in the summaries and comparing them to the number of idea units found in the passage itself. Compared to the control group, the trained group did not include more idea units in their summaries. Nevertheless, of the poor readers in the sample (those scoring below average in comprehension on a standardized reading test), subjects in the experimental wrote better summaries than subjects in the control group. This indicates that graphic organizers might be of more use for remedial college students, because good readers may not need them.

Transforming Text

Transforming, or in other words changing material from the old to the new, is an important writing process, particularly when writing expository text from sources. Kintsch and van Dijk (1978) presented a ground-breaking model for transforming processes during composition of text. Their paradigm is based on a person's knowledge of text schema (organizational patterns found in various types of text) and on macro-operators, mental processes that actively reduce text to its gist. Three important rules guide the macro-operators. The first is deletion, meaning the removal both of unimportant information and of redundant information. The

second rule is generalization, otherwise known as superordination, that is, placing information into superordinate and subordinate categories. The final rule is construction, whereby the writer creates a topic sentence that is not explicitly present in the text read (the source). Using these processes, a writer can either transform his or her own ideas into readable text, or summarize an existing text, or synthesize a new composition from existing sources.

A developmental study by Brown and Day (1983), utilizing this model, came up with some important findings. The authors told groups of students in grades five, seven, ten, and first year of college to summarize separately two expository texts, which were written at a fifth grade reading level. Two independent raters read the subjects' essays and scored each essay for the use or non-use of each of five transformation rules: deletion of unimportant information, deletion of redundant information, superordination, selection of topic sentence, and construction of topic sentence. Results showed that all groups used the two deletion rules (unimportant information and redundant information) equally well, at a high level. However, when it came to superordination, college students and tenth graders outperformed fifth and seventh graders. With regards to selection and/or invention of a topic sentence, college students were superior to tenth graders, who were in turn superior to the fifth and seventh graders. In part two of the study, the investigators repeated the

procedure, this time using college freshmen in a community college. They found that this population transformed text more like seventh graders than like regular college freshmen.

Johns (1985) examined the transformations of underprepared college freshmen, who had obtained low scores on college entrance exams; regular college freshmen, who received freshman-level scores on the same exams; and adult fluent writers, who were seniors or graduate students enrolled in an upper level linguistics class. Subjects summarized in writing a selection from a history textbook. The investigator broke down each essay into its idea units, which consist of a noun phrase plus a verb phrase including, when present, a direct object. She determined that underprepared students, compared with the more advanced subjects, included the least number of important idea units in their summaries. In addition, the underprepared group did more direct copying from the textbook, combined propositions less frequently, and created fewer macro-propositions, or general ideas constructed from the text. Thus, lower ability college students appear to transform less often, and to rely more on reproducing the exact wording of the text.

In a previously cited study, Day (1986) trained junior college students to summarize by using transformation rules, with or without self-management training. In support of Brown and Day's (1983) findings, these students were able to use the deletion rules from the beginning, needing no training. With

regard to selection/ invention of a topic sentence, posttests showed an ability x treatment interaction, with the higher ability writers responding better to training. Nevertheless, lower ability students did improve at carrying out the various transformation rules, particularly when trained in self-management, demonstrating that transforming is a skill that can be taught.

Transforming is distinct from organizing in that transforming consists of altering original material, whereas organizing consists of rearranging the content hierarchically. Nevertheless, the two processes often go hand in hand in the course of writing. Indeed, Zimmerman and Martinez-Pons (1986) combined the two when classifying self-regulated learning strategies.

Information Seeking

Information seeking, another of Zimmerman and Martinez-Pons' (1986) self-regulatory strategies, is defined as a student's proactive, self-directed search for information from non-social sources. Examples of this construct include deciding to look up information in an encyclopedia, visiting a library to take out books, and seeking written or otherwise visual models for the task at hand. Excluded from consideration are information seeking activities that are teacher-directed, since these have little to

do with self-directed behaviors. As such, information seeking has received very little attention in educational research.

In one of the earlier studies of its kind, Kuhn and Ho (1980) utilized eighty-five fourth- and fifth-graders, all of whom had shown no evidence of formal operational thought. Subjects were randomly assigned to three conditions: experimental, yoked, and control. Experimental subjects were shown how different liquids could be mixed to form various colors, then they were allowed to seek other color combinations on their own and derive what information they could. Yoked subjects were shown the same liquids and were told to combine them in exactly the same combinations that the experimental subjects had used. Control subjects were not exposed to the liquids. Posttests measuring formal operations revealed that the experimental group, which had the opportunity to freely seek information, scored higher than the yoked group, which in turn scored higher than the control group. Thus, the process of seeking one's own information was found to benefit subjects cognitively.

Nichols-Hoppe and Beach (1990) presented subjects with an information search task in which they could look up pieces of information about various apartments, in whatever order and quantity they wanted, before choosing the best apartment. The task was varied so as to be of low, medium, and high complexity. Furthermore, the ninety-six undergraduates who participated were chosen for having either high or low test anxiety. A record of

their information search showed that the amount of information requested was greatest when the task was of high complexity. In addition, highly test anxious subjects looked up more information, and were more redundant in their information search, than were low test anxious subjects. Unfortunately, this study did not evaluate the final choices that subjects made, so there was no determination of the effects of information search on the end result.

Cavenagh (1989) investigated student information search in the context of computer-assisted instruction. Two groups of college students were taught a three-part lesson by computer. One group had the opportunity to augment the computer lessons with a computer search of one's own. These subjects were told they could access the additional information if they chose to, but they were not required to do so. The computer recorded the amount of time each subject spent reading the augmented text. The control group, in contrast, had access only to the non-augmented computer lessons. Results showed that the experimental group scored significantly higher than the control group on the posttest, which measured mastery of the lesson. Furthermore, there was a strong correlation between time spent on augmenting materials and posttest scores.

Only two studies, both conducted by Nelson and Hayes (1988), have examined self-motivated information search during the course of writing an essay. In the first, eight college freshmen and

eight advanced (upperclass and graduate) students were given a social studies essay topic and were then followed to ascertain the way they searched for information in a library. Using descriptive data analysis, the authors found that the subjects could be categorized as being either content-driven (with the goal being efficiency) or issue-driven (with the goal being to make a case or find a provocative approach). Students who were content driven, most of whom were freshmen, were more likely to use pre-digested sources, such as encyclopedias. This enabled them to get to the "facts" right away and so spend the least time possible working on the essay. In contrast, issue-driven students, most of them advanced, searched for more original sources, and chose sources of higher quality. For them, the facts were secondary to the rhetorical relevance.

In their second study, Nelson and Hayes (1988) followed eight students (five freshmen, two juniors, and one senior) as they collected information for research papers actually assigned to them in their classes. Once again using descriptive data, the authors labelled subjects as having either low investment responses or high investment responses. Students having low investment responses aimed for efficiency. These subjects generally made one library visit total. There they found sources (books) in their topic first and used the information in them to determine the paper content. Thus, they were sometimes able to write a paper from start to finish in one day. In contrast,

students having high investment responses thought their topic through before searching for sources. Thus, their plans determined which sources they would use, rather than the other way around. These subjects made many library visits and read sources in order to understand them, not just to transcribe and summarize. As interesting as these two studies were in elucidating the process of information seeking, they shared a serious shortcoming. In neither study did the authors actually examine the finished essays. Though we can expect that the issue-driven, high investment students would produce superior essays, in part due to their superior method of search, no such conclusion could be made without analyzing the writing itself.

Summary

Flower and Hayes' cognitive model for writing posits the existence of three central processes: planning (including generating, goal setting, and organizing), translating, and reviewing (including evaluating and editing), all of which are acted upon by a monitor that allows the writer to move back and forth between one process and another. The writer's long-term memory and the task environment also interact with these processes. Because of its inclusion of such features as goal setting, organizing, and interaction with the environment, this model for writing resembles the more general self-regulated learning model.

A number of researchers trained students using a combination of self-regulated learning strategies, including planning, self-evaluation, and self-reinforcement, in order to improve their writing skills. The training generally served to enhance student writing of both expository and narrative text.

The utilization of more specific self-regulatory strategies in the area of writing was examined. With regard to organizational processes, such factors as constructing lists and outlines and knowledge of organizing have been associated with higher writing achievement. Kellogg demonstrated that training students to make outlines improved essay writing quality and reduced cognitive load, whether the outline was constructed mentally or in writing. Nevertheless, students rarely write formal outlines unless directed to do so. Perhaps graphic organizers, schematic pre-writing exercises that include both verbal and visual elements, will prove to be better suited than outlines for students. Studies show that student-constructed graphic organizers enhance both reading comprehension and writing.

Transforming processes, according to Kintsch and van Dijk's model, occur through deletions, superordination, and invention of topic sentences. Studies have shown that even young students follow deletion rules, but that older and higher ability students are more adept at superordination and invention. Lower ability students also tend to copy text rather than transform it.

Self-directed information seeking from non-social sources has been investigated in a number of studies. College students were shown to seek more information as the task complexity increases, and as their level of anxiety increases. In another study, students who had access to augmented computer information learned more than students who did not have or did not utilize the augmented information. Finally, Nelson and Hayes studied information seeking in college students writing research reports. Students categorized as content-driven and low-investment utilized superficial information seeking processes as compared with students who were labelled issue-driven and high-investment.

Writing Expository Text from Sources

The specific writing task investigated in the current study is writing expository text from sources: that is, incorporating information from at least two written sources into one paper. As such, it is a reasonably complex task, requiring a host of self-regulatory strategies in order to produce a high quality product. Writing expository text from sources is the most common written assignment on the college level (Bridgeman & Carlson, 1985), and it is certainly common in the secondary level. Nevertheless, empirical investigation of this topic has only recently been attempted.

Spivey (1990) provides the most comprehensive conceptual framework for the process of writing expository text from sources, otherwise known as discourse synthesis. Taking a constructivist perspective, Spivey posits that people engaged in discourse synthesis construct meaning from texts through reading and for texts through writing. The key processes involved are organizing, selecting, and connecting. In the course of organizing, the reader refers to the text for cues as to how meaning may be organized. This occurs through prior knowledge of text structure. Subsequently, when composing text, writers must create their own text structure. They rearrange content units garnered from text and create new categories with which to chunk these units. Selecting, another key process, is important because the writer cannot include in the composition all the information found in the sources. In this process, the reader first determines the relative importance of content units found in various texts and then includes the more important ones in the composition. The criteria used in determining relative importance of content units are a function of a variety of factors, including prior knowledge, the frequency of occurrence of content units in the various sources, and even the individual's cultural background. Finally, the process of connecting takes place. Here, the writer integrates content found in the sources with content he or she already knows. In the course of reading, individuals make inferences that are not explicitly in the text and then include

this material in their writing. This adding of material is made even more explicit in the composition process, during which writers express their opinions, add content units not found in the sources, and otherwise generate original material.

Empirical work in this area has fleshed out this framework. Spivey and King (1989), cited previously, conducted one such study. Their subjects, 20 each from the sixth, eighth, and tenth grades, were chosen because they were either in the top three or bottom three stanines in reading ability (10 subjects each from each grade). Subjects read three encyclopedic sources on the topic of rodeos, and from these they wrote an informational report. The researchers examined a number of writing processes, as well as final writing product. They found that good readers and older subjects chose to include a higher proportion of important content units in their compositions. Organization of the essay was analyzed according to a breadth/depth ratio of number of thematic chunks to number of content units included. As was mentioned previously, essay organization was highly correlated with writing quality of the essay, as measured on a 6-point holistic scale. Other factors that were significantly related to essay quality were degree of connectivity and amount of written planning prior to writing the essay. Number of revisions that subjects made was not found to be related to essay quality. Thus, in support of Spivey's (1990) framework, it is evident that the processes she posited (organizing, selecting, and connecting)

serve to enhance composition. Specifically, she showed that good readers demonstrated better selecting of important content units than did poor readers, and that organization and connectivity of the written text was found to be related to essay quality.

Kennedy (1985) focussed her research on processes that could be studied during the act of writing itself, as it unfolded. She studied college students as they read three articles on a topic and then wrote an expository essay based on the material in the articles. As subjects went about the completion of their task, they engaged in a protocol, or think aloud, procedure that enabled detailed scrutiny into all of their activities. Her sample consisted of high-ability students (scoring above the ninetieth percentile on a standardized reading comprehension test) and low-ability students (scoring below the thirtieth percentile). In confirmation of Flower and Hayes' (1980) fluid model of composing, Kennedy found that subjects went back and forth frequently among many reading and writing activities. She also found that high-ability subjects engaged in more higher-order reading strategy use as compared with low-ability subjects. Furthermore, while all subjects reread the sources, the high-ability students reread the sources during pre-writing more than did low-ability students, while the low-ability students reread the sources more during transcription, though this was usually only to directly quote the sources. These behaviors were one indication of planning, and in

general the high-ability subjects did more planning than did the low ability subjects.

We have already examined Nelson and Hayes' (1988) findings on information seeking in their naturalistic study of college students writing a research paper from sources. Recall that they categorized subjects as either low-investment and high-investment, with the high investment subjects making more extensive, quality-driven visits to the library for information for their essays. In their second study, the authors also examined the composing processes of the two groups of subjects after subjects had gathered all the information they felt they required. The investigators found that low-investment subjects, in keeping with their stated goals for maximum efficiency, simply assembled blocks of notes from sources and then paraphrased them when writing the essay. Revision, when any occured, was at the local level (e.g., spelling checks). Indeed, some subjects did not take any notes or write a first draft; they typed the finished version of their paper in one sitting while reading sources. In contrast, high-investment subjects tended to take extensive notes, both before and after reading sources, and they wrote one or more exploratory drafts. These subjects revised extensively, and they did so on a more conceptual and textual level.

McGinley (1992) also utilized the think aloud procedure to tap on-line processes. He met with a total of seven subjects for two hours each. After training them in think aloud, he had

subjects read two magazine articles on the topic of mandatory drug testing and then had them write a persuasive essay. The author coded their think aloud statements as pertaining to various reading and writing activities (e.g., reading texts, writing notes), and as pertaining to various reasoning operations (e.g., making hypotheses, restating content). Again in support of Flower and Hayes (1980), subjects generally went back and forth among many reading and writing activities. Nevertheless, when activities were analyzed separately across four time periods, McGinley found that subjects spent most of period one reading the sources and the remaining three periods writing drafts; furthermore, a greater percentage of time was spent reading their drafts as time periods progressed. With regard to reasoning operations, subjects engaged in the following operations, in order of decreasing frequency: using schema, metacommenting, questioning, paraphrasing, restating content, and hypothesizing. Over time, subjects decreased the proportions of paraphrasing, questioning, and hypothesizing and increased the proportions of metacommenting and restating. In support of Spivey's (1990) framework, using schema (organizing) was the most common operation observed. Other operations, including metacommenting and paraphrasing, are indicative to some extent of selecting. Finally, the operation known as questioning and hypothesizing share some features with connecting, in that they involve the original perspective and contribution of the writer.

CHAPTER II

PURPOSE OF THE STUDY

This research was split into two separate studies. Study 1 was purely descriptive, while Study 2 included a training component.

Zimmerman and Martinez-Pons (1986) have identified fourteen self-regulated learning strategies. Through subject interviews, they have determined that use of a few of these strategies, including organizing/ transforming and information seeking, distinguish high achieving from low achieving students. Nevertheless, these processes have rarely been observed directly in subjects in an academic setting.

Thus, the primary purpose of Study 1 was to observe directly two self-regulated learning strategies, organizing/ transforming and information seeking, during a relatively complex writing task in which subjects read two sources and then wrote a comparison/ contrast essay based on the sources.

Prior studies examining organizing during writing have been limited. Some have measured the writing product and from that inferred the process of organizing, though this is an indirect gauge. Others have relied on pre-writing samples, but these were for writing tasks that were less complex than writing from sources, and so may not have necessitated as much organization.

additional information would learn the strategy better than subjects who did less information seeking. We also wished to add to the growing body of evidence of the utility of graphic organizers.

Finally, in both studies we sought to add to the existing research on self-efficacy as a key variable in self-regulation. We examined the associations between self-efficacy and the variables of organizing/ transforming, information seeking, graphic organizer training, and writing achievement.

This study sought to circumvent these problems and tap into a direct measure of organizing and transforming by presenting subjects with texts with which they were unfamiliar and had them write whatever notes they needed from the sources, prior to writing their essays. The level of oranization and transformation of their notes was a reflection of their actual organizing and transforming processes. Because the task of writing from sources is relatively complex, the effects of organizing on writing quality would be made evident.

Research into self-directed information seeking has been likewise limited. Though information seeking is an important skill in any academic setting, only a handful of studies have directly examined this process, and only two have been academically relevant. Furthermore, in this study a new aspect of information seeking was being tapped: seeking models and guidelines for writing. Subjects had available for reference the two sources from which to compose their essays, and in addition two model comparison/ contrast essays and the guidleines for writing such an essay. The measure of information seeking was the total amount of time that subjects referred to these documents.

The primary purpose of Study 2 was to examine the extent to which information seeking impacts on the learning of a content-based strategy. Half the subjects were trained to use graphic organizers as a way of improving the quality of their comparison/ contrast essays. We attempted to determine if subjects who sought

Hypotheses

Study 1:

H1: There will be significant positive correlations between scores of self-efficacy, organizing/ transforming, information seeking, and writing quality.

H2: Each of the following variables will contribute uniquely to writing quality scores: self-efficacy, organizing/ transforming, and information seeking.

Study 2:

H3: There will be significant positive correlations between scores of self-efficacy, organizing/ transforming, information seeking, and writing quality.

H4: Subjects trained in the use of graphic organizers will show, in comparison with untrained subjects, higher scores of self-efficacy, organizing/ transforming, and writing quality.

H5: Each of the following variables will contribute uniquely to writing quality scores: self-efficacy, organizing/ transforming, and information seeking.

H6: Information seeking and graphic organizer training will interact to improve writing quality.

CHAPTER III

METHOD: STUDY 1

Subjects

Subjects were 71 college undergraduates taking an introductory psychology course at Lehman College, a four-year urban college, part of the City University of New York. Subjects in this course were required to participate in two experiments during the semester. Therefore, they were not paid for participating in this study. All subjects filled out consent forms as per the guidelines of the Lehman College Institutional Review Board and the C.U.N.Y. Graduate Center Human Subjects Committee.

Demographic breakdown was as follows. Subjects who participated included 53 females and 18 males. There were 25 Caucasians, 23 Latinos, 20 African Americans, and 3 Asians. When asked for their native language, 25 subjects reported a language other than English; the breakdown was as follows: 20 Spanish, 1 French, 1 Hebrew, 1 Swahili, 1 Thai, and 1 Vietnamese. Regardless of their native language, subjects were required to have spent all four years of high school in an English speaking country. Those who reported otherwise were precluded from participating. All subjects were required to have taken their college's reading placement exam. Sixty-three subjects attained a passing grade on

this exam; the remaining eight received a failing score. In other background factors, 17 subjects previously attended community college for at least one semester, 27 reported having taken at least one remedial writing course in college, and 38 had at some point been taught to write comparison/ contrast essays.

Design

Study 1, the descriptive component, utilized a correlational design. Students composed a comparison/ contrast essay from sources, without any explicit instruction. Measured variables were self-efficacy for writing, organizing/ transforming, information seeking, and writing quality.

Measures

Self-Efficacy for Writing

The Self-Efficacy for Writing Questionnaire (see Appendix A) was adapted from a scale developed by Zimmerman (1993) and consists of 20 statements gauging the subject's confidence about being able to write an essay. Each statement refers to a different aspect about writing. Statements are worded in the form "I can....", e.g., "I can write a good introduction for the essay". For each statement, students are asked to choose a number from a 7-point Likert scale, with 1 being "Not well at all" to 7

being "Very Well", how accurate this statement describes how they feel. Subject responses are summed up for one self-efficacy score. Alpha Cronbach reliability for the original scale is 0.91.

Organizing/ Transforming

The Organizing/ Transforming Scale (See Appendix A) was adapted by the author from a similar scale developed by Leland (1986) for use in measuring planning for expository essays. The scale was applied to the subjects' pre-writing notes. This scale has six levels and measures organizing and transforming together. Organizing is measured according to the degree to which students order content into superordinate and subordinate categories or create ordered visual displays. Transforming is measured according to the degree to which subjects make gist statements out of the original text. Scores range from the lowest level of "copying text; no particular order" (score of 1) to the highest level of "well organized outline or chart" (score of 6).

Two raters scored subjects' pre-writing notes. The first was the experimenter. The second rater was a native English-speaking college senior, an English major with excellent writing skills. The experimenter trained the second rater to score pre-writing notes by providing her with samples of scored pre-writing notes obtained in a previous pilot study. Inter-rater reliability (Pearson's r) was calculated to be 0.88.

Information seeking

When subjects wrote their notes and their essays in longhand, all of them had access to three pieces of text on computer, besides the sources from which to write: two model comparison/ contrast essays, and a set of guidelines for writing a comparison/ contrast essay (see Appendix B). For any text to remain on the computer screen, subjects had to keep their finger depressed on the particular key that accessed the text.

Whenever subjects accessed any of these texts, the computer recorded this event, and it recorded the length of time that the text remained on the screen. Information seeking was operationally defined as the total length of time that subjects accessed all model essays and guidelines when pre-writing and writing one essay. The length of time that subjects accessed sources was not included in this measure.

Writing Quality

The Writing Quality Primary Trait Scoring Scale (see Appendix A) was developed by the author, who followed the guidelines specified by Lloyd-Jones (1977). Primary trait scoring is designed to determine whether a composition has certain characteristics that are crucial for a specific writing task. The two primary traits for this assessment were comparison/ contrast text structure and comparison/ contrast topic sentence with supporting detail. A high score for text structure indicated that

the composition had a well developed introduction, at least two separate comparison/ contrast sections, and a conclusion that synthesized all the information. A high score for topic sentence with supporting detail indicated that each comparison and contrast began with a topic sentence and was supported with explicit detail.

Each of the primary traits was scored from 0-4, according to the criteria listed in Appendix A. The two subscores were added together to form an individual score in the range of 0-8. The essays were scored by two raters, the same two who scored the pre-writing notes for organizing/ transforming score. The experimenter trained the second rater to score essays by providing her with samples of scored essays obtained in a previous pilot study. Inter-rater reliability (Pearson's *r*) was calculated to be 0.86.

Reading Ability

The Reading Comprehension Test of the Descriptive Tests of Language Skills (Educational Testing Service, 1985) was administered to all subjects upon admission to college. This test consists of forty-five multiple choice test items based on the comprehension of brief reading passages. The score is the total number of correct answers. Blank answers and incorrect answers each count as zero. Thus, the possible range of scores for this test is 0-45. A score of 25 or above is considered a passing

grade by the college at which the test was administered. Reliability for this test, as calculated by the Kuder-Richardson formula, was 0.89.

Materials

Text Sources

Two sources of text (see Appendix B) were utilized by subjects on computer as the basis for their comparison/ contrast essay. One, an informational essay on Martin Luther King, was 271 words in length. The second, an informational essay on Malcolm X, was 272 words in length. Each essay took up one screen on a standard computer terminal. Both essays were at the tenth-eleventh grade reading level, as measured by Fry's (1972) Readability Scale.

Model Comparison/ Contrast Essays

Subjects had access to two model comparison/ contrast essays (see Appendix B) on computer. One, an essay comparing and contrasting the games of football and rugby, was 273 words in length. The other, an essay comparing and contrasting the social organization of ants and humans, was 271 words in length. Each essay took up one screen on a standard computer terminal. Both essays were at the tenth-eleventh grade reading level, as measured by Fry's (1972) Readability Scale.

Guidelines for Writing Comparison/ Contrast Essays

Subjects had access to a set of general guidelines for writing a good comparison/ contrast essay (See Appendix B). This set of guidelines was 171 words in length and took up one screen on a standard computer terminal.

Computer Program

A computer program was custom made for this study. It was designed so that subjects sitting at an IBM computer could access each of the five above-mentioned texts, using a different key for each text. The five texts were as follows: the two source texts, one on Martin Luther King and the other on Malcolm X; the two model comparison/ contrast essays, one on rugby/ football and the other one on ant and human societies; and the guidelines for writing a comparison/ contrast essay. In order to read the screen's contents, subjects had to keep their finger on the key. As soon as the finger was released, the screen would go blank. A timer built into the program secretly recorded the number of seconds that each text stayed on the screen at any one time. A programmed print-out listed the order in which each subject accessed each text, and for how long. This program fit onto one, 5 1/4 inch floppy disk.

Computers

Subjects used IBM personal computers, Model 5150. This model utilized 5 1/4 inch floppy disks.

Demographic Questionnaire

The Demographic Questionnaire, Form 1 (see Appendix D) consisted of six questions about subjects' backgrounds that were deemed relevant to the study. The questions asked subjects about their gender, native language, country of high school attendance, community college attendance, remedial writing course history, and experience with writing comparison/ contrast essays.

Procedure

Subjects met in a computer classroom, in groups of 6-10, for a total of one hour each. Under the supervision of the experimenter, subjects first filled out two forms, in the following order: the Demographic Questionnaire, and the Self-Efficacy for Writing Questionnaire.

Each subject was seated in front of his or her own personal computer. The computers contained the various texts to which they could eventually refer. The experimenter then gave subjects a standard set of brief directions (see Appendix E), explaining the task at hand.

When the directions were over, the experimenter demonstrated how to access the five pieces of text that were available on computer, which were as follows: the two source texts on Martin Luther King and Malcolm X; the two model comparison/ contrast essays, one on rugby/ football and the other one on ant and human societies; and the guidelines for writing a comparison/ contrast essay. So that subjects would not have to memorize which computer key went with each text, this information was listed on the blackboard in the front of the room, for the rest of the session, in letters large enough for all subjects to read. Then subjects practiced accessing all five pieces of text, without actually reading the texts, until the experimenter determined that all subjects had mastered this procedure.

The assignment was to write a comparison/ contrast essay on the lives of Martin Luther King and Malcolm X. For the next twenty-five minutes, subjects accessed and read texts on computer, and they took notes in longhand on a standard blank sheet of paper. The experimenter circulated sporadically to ensure that students were taking notes and not writing the essay. On the rare occasion that he found a subject writing an essay, he took away the subject's essay and asked the subject only to take notes at that time. Other than that, the experimenter did not give feedback to subjects in any way.

At the end of the twenty-five minutes, the experimenter asked subjects to cease taking notes and to begin writing their

essays. During this time, subjects could refer to their notes and to any of the five texts on computer. Subjects wrote their essays in longhand on a separate sheet of blank paper. At the end of this twenty-five minutes, the experimenter collected the essay and the notes from each subject, and the subjects were free to leave. Subjects did not receive feedback about their work at a later date.

CHAPTER IV

RESULTS: STUDY 1

Descriptive statistics of the main variables are summarized in Table 1. The mean score for writing quality for all subjects was 5.2. Standard deviation was 1.7, and the range was 2 - 8. Average reading score was 32.4 (s.d. = 6.9), with a range of 16 - 44. Self-efficacy for writing scores ranged from 66 - 138, with a mean of 92.1 and a standard deviation of 14.0.

With respect to organizing/ transforming, mean score was 4.3 (s.d. = 1.1, range = 1 - 6). Analyzing this process further, subjects' note-taking methods could be categorized into five predominant types. Simple list-making consisted of making two headings, one for Martin Luther King and the other for Malcolm X, and then writing the relevant information under each heading, making little or no connections between the two sources. A more advanced procedure, which we call arrow-drawing, took this process further. Once the lists were in place, subjects drew arrows between the places of comparison and contrast in the two lists, or otherwise indicated the connections between them. Other subjects chose a procedure which we labelled alike/ different, consisting of making a list of similarities and a second list of differences between the two men. The remaining two strategies were making a formal outline and creating a gridded chart. Of these five categories, list-making was the most common, carried out by 28

Table 1

Mean, Standard Deviation, and Range of the Main Variables, Study 1

Variable	Mean	S.D.	Range
Writing Quality	5.2	1.7	2 - 8
Reading Ability	32.4	6.9	16 - 44
Self-Efficacy	92.1	14.0	66 - 138
Organizing	4.3	1.1	1 - 6
Information Seeking (min.)	3.46	2.48	0 - 11.0

subjects, or 39.4% (see Figure 3). Alike/ different was second, carried out by 21 subjects (29.6%). Arrow-drawing occured in 7 pre-writing notes (9.9%). Formal outlines were seen in 7 notes (9.9%). Only 2 subjects (2.8%) created a chart, and the remaining 6 subjects (8.4%) either took almost no notes or organized their notes in ways not easily categorizable. Almost all subjects engaged in transforming original text into shortened or paraphrased notes. Only four subjects engaged in a significant amount of copying source text word for word onto their pre-writing notes.

With regard to information seeking, subjects referred to written models and guidelines an average of 3.46 minutes (s.d. = 2.48), with a range of 0.0 - 11.00 minutes. Sixty-eight subjects (95.8%) engaged in at least some information seeking (see Figure 4). The remaining three subjects (4.2%) accessed the two source texts, as they were required to do, but did not even once access the model essays and guidelines. Of the subjects who engaged in information seeking, 10 (14% of all subjects) did so for less than one minute. The remaining 58 subjects (81.7% of all subjects) accessed the models and guidelines for at least one minute, of their own volition.

Information seeking was further broken down into the two phases of the writing task: pre-writing and writing, each of which lasted twenty-five minutes. As it happened, subjects accessed much more information in the pre-writing phase (M = 3.07 min.,

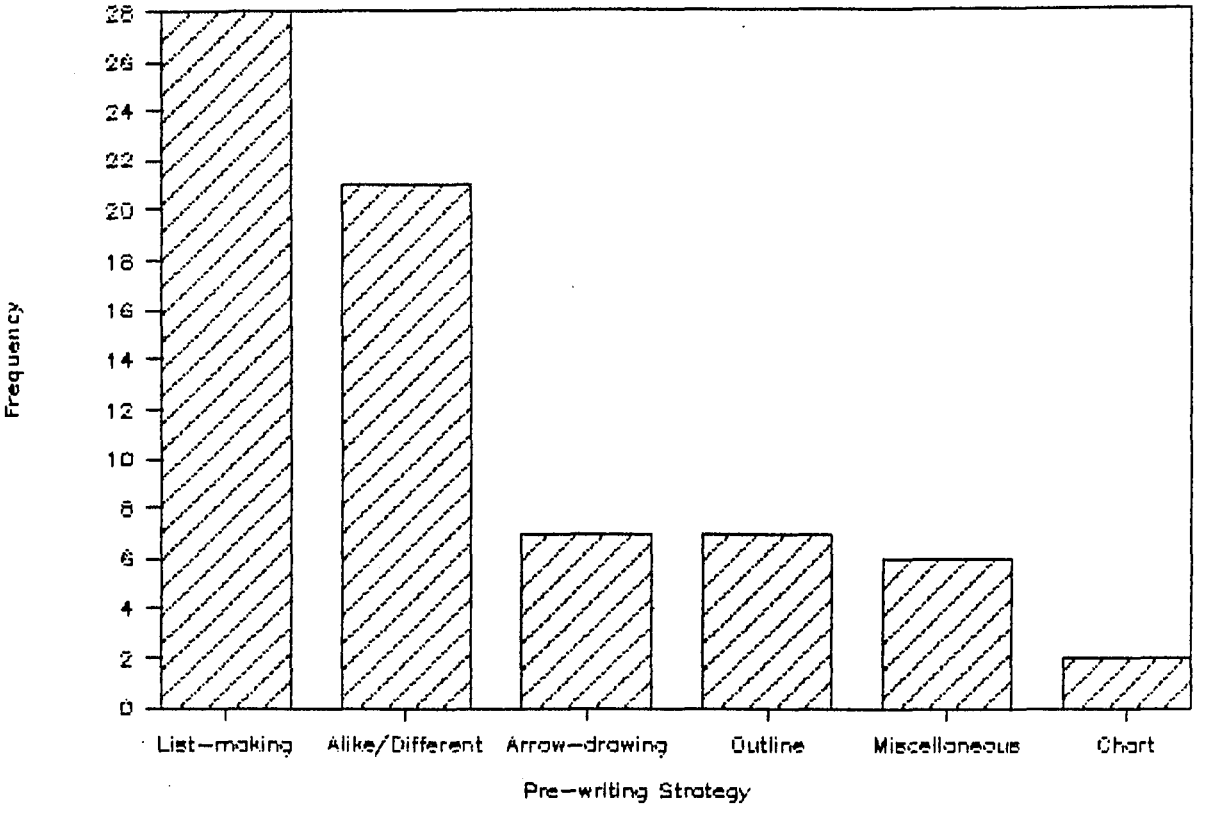


Figure 3. Frequency distribution for types of organizing/ transforming strategies used, Study 1.

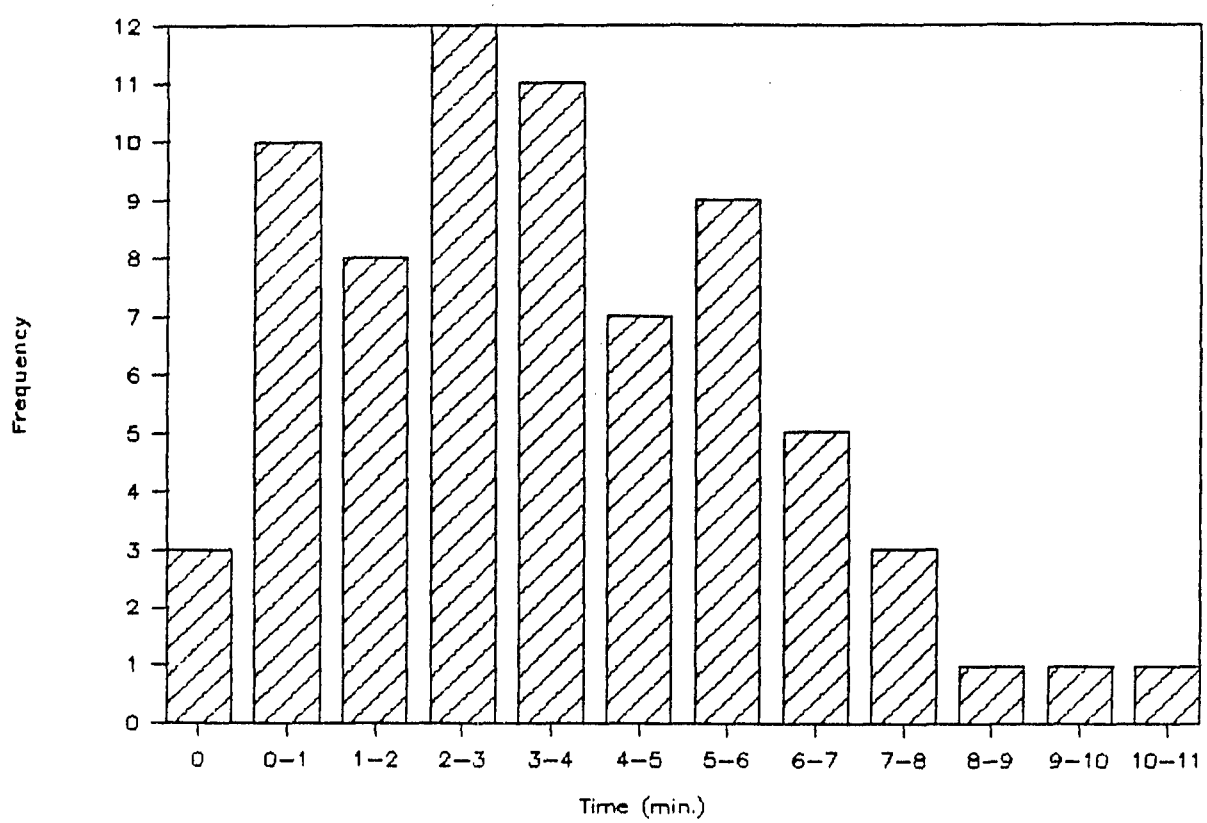


Figure 4. Frequency distribution for information seeking, Study 1.

s.d. = 2.29, range = 0 - 10.9 min.) than during the writing phase (M = 0.39 min., s.d. = 0.82, range = 0 - 4.40 min.). In fact, 88.7% of the total information seeking occurred during pre-writing, and only 11.3% occurred in the writing phase. During pre-writing, fully 65 subjects (91.6%) engaged in at least some information seeking, as compared to only 31 subjects (43.7%) who did so during the writing phase.

Four background variables were also examined: English vs. non-English native language, community college attendence, remedial writing courses taken, and previous experience with comparison/ contrast essays. All four were dichotomous variables. Therefore, using each variable separately as the independent variable, four t-tests were conducted to determine their effects on the dependent variable, writing quality. Results, as displayed in Table 2, showed that subjects whose native language was English (N = 46, M = 5.5, s.d. = 1.6) wrote better essays than did subjects whose native language was not English (N = 25, M = 4.7, s.d. = 1.7); these differences, however were not statistically significant (d.f. = 69, t = 1.93, p > .05). Subjects who had attended community college at least one semester (N = 17, M = 5.7, s.d. = 1.5) had higher writing quality scores than did subjects who had never attended (N = 54, M = 5.0, s.d. = 1.7); these differences were likewise not statistically significant (d.f. = 69, t = 1.51, p > .05). Subjects who reported having taken at least one remedial writing course (N = 27, M = 4.9, s.d. = 1.4)

Table 2

Relation of Four Background Variables to Writing Quality, Study 1

	No			Yes			
Variable	N	Writing Quality	S.D.	N	Writing Quality	S.D.	t
Native Language is English	25	4.7	1.7	46	5.5	1.6	1.93
Community College Attendance	54	5.0	1.7	17	5.7	1.5	1.51
Remedial Writing Course Taken	44	5.3	1.8	27	4.9	1.4	1.03
Previously Taught Compare/Contrast	33	4.9	1.6	38	5.4	1.7	1.46

Note: in all cases, $p > .05$

had slightly lower writing scores than did subjects who reported never having taken such a course (N = 44, M = 5.3, s.d. = 1.8); again, these differences were not significant (d.f. = 69, t = 1.03, p > .05). Finally, subjects who had been previously taught to write comparison/ contrast essays at least once in their academic lives (N = 38, M = 5.4, s.d. = 1.7) wrote better essays than did subjects who had never been previously taught (N = 33, M = 4.9, s.d. = 1.6); once again, these differences were not statistically significant (d.f. = 69, t = 1.46, p > .05). On the basis of these negative findings, these variables were excluded from further analysis regarding the outcome measure.

Table 3 illustrates the correlations among the remaining main variables. In support of H1, writing quality was found to be significantly positively correlated with each of the four process variables. Reading was the most highly correlated with writing outcome (Pearson's r = .46, p < .01), followed by organizing (r = .35, p < .01), and to a lesser extent self-efficacy (r = .29, p < .05) and information seeking (r = .27, p < .05).

Among the process variables themselves, only one correlation was statistically significant: reading ability with organizing (r = .27, p < .05). Self-efficacy was only weakly correlated with reading ability, organizing, and information seeking (r = .14, .21, and .03 respectively, p > .05). Likewise, information seeking was weakly correlated with reading ability and organizing (r = .08 and .13 respectively, p > .05).

Table 3

Intercorrelation Matrix of the Main Variables, Study 1

	Reading Ability	Self-Efficacy	Organizing	Information Seeking
Writing Quality	.46**	.29*	.35**	.27*
Reading Ability	--	.14	.27*	.08
Self-Efficacy	--	--	.21	.03
Organizing	--	--	--	.13

* $p < .05$, ** $p < .01$

Information seeking was then divided into its two phases: pre-writing and writing. Results showed that information seeking during pre-writing was positively correlated with writing quality (r = .33, p < .01). In contrast, information seeking during the writing phase was negatively, though not significantly, correlated with writing quality (r = -.10, p > .05). Thus, it is information seeking during pre-writing, and not during the writing task itself, that is associated with writing outcome. Information seeking in neither phase was significantly correlated with any of the other process variables.

Next, a series of regression analyses were carried out, beginning with four simple regressions, using each of the four main process variables as separate predictors of writing quality. In each case, these variables by themselves significantly predicted writing quality (see Table 4). Standardized beta-weights (β) were calculated for this and subsequent regressions. Results indicated that for reading, β = .460 (p < .001); for self-efficacy, β = .294 (p < .05); for organizing/ transforming, β = .351 (p < .01); and for information seeking, β = .273 (p < .05).

In order to test H2 -- that self-efficacy, organizing, and information seeking would each contribute uniquely to writing quality -- a multiple regression was carried out. In this regression, the three process variables were entered together as predictors, and writing quality was the dependent variable. Results, as shown in Table 5, indicated that each of the three

Table 4

Four Simple Regressions Predicting Writing Quality, Study 1

Variable	B	S.E. B	Beta	t
Reading Ability	.110	.026	.460	4.31***
Self-Efficacy	.035	.014	.294	2.56*
Organizing	.506	.162	.351	3.12**
Information Seeking	.181	.077	.273	2.36*

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 5

Multiple Regression, Using Three Main Variables to Predict Writing Quality, Study 1

Variable	B	S.E. B	Beta	t
Self-Efficacy	.027	.013	.231	2.10*
Organizing	.395	.159	.274	2.48*
Information Seeking	.154	.072	.232	2.15*

* $p < .05$

variables contributed uniquely to writing quality. Beta-weights for self-efficacy, organizing, and information seeking, respectively, were .231, .274, and .232 ($p < .05$ in each case). However, when reading ability was entered into the picture, the situation changed. For this analysis, another multiple regression was carried out, entering all four process variables as predictors of writing quality. Table 6 displays these results. Using this analysis, only reading ($\beta = .365$, $p < .001$) and information seeking ($\beta = .215$, $p < .05$) made significant, unique contributions to writing quality. β-weights for self-efficacy and organizing, respectively, were .037 and .030 ($p > .05$). Thus, with reading included as a predictor, the variables self-efficacy and organizing were no longer found to contribute uniquely to writing quality.

Table 6

Multiple Regression, Using Three Main Variables Plus Reading to Predict Writing Quality, Study 1

Variable	B	S.E. B	Beta	t
Reading	.087	.025	.365	3.53***
Self-Efficacy	.023	.012	.198	1.94
Organizing	.267	.152	.186	1.76
Information Seeking	.143	.067	.215	2.14*

* $p < .05$, *** $p < .001$

CHAPTER V

METHOD: STUDY 2

Subjects

Subjects were 71 college undergraduates, taking an introductory psychology course at Lehman College. None of these subjects participated in Study 1. The reason for the different sample is that subjects from the pool were available to participate in only one session, not two. No subjects were paid for participating in this study. They participated as part of a course requirement. All subjects filled out consent forms as per the guidelines of the Lehman College Institutional Review Board and the C.U.N.Y. Graduate Center Human Subjects Committee.

Demographic breakdown was as follows. Subjects who participated included 58 females and 13 males. There were 24 Caucasians, 23 African Americans, 22 Latinos, and 2 Asians. When asked for their native language, 24 reported a language other than English, as follows: 18 Spanish, 2 Italian, 1 Albanian, 1 Chinese, 1 Greek, and 1 Hebrew. Regardless of their native language, subjects were required to have spent all four years of high school in an English speaking country. Those who reported otherwise were precluded from participating. All subjects were required to have taken their college's reading placement exam. Sixty-three subjects attained a passing grade on this exam; the remaining

eight received a failing score. With regard to other background information, 16 subjects previously attended community college for at least one semester, 34 reported having taken at least one remedial writing course in college, and 42 had at one point been taught to write compare-and-contrast essays.

Subjects were randomly assigned to two groups, and these groups were randomly assigned to two conditions: graphic organizer training, N = 36 (30 female, 6 male), and control group, N = 35 (28 female, 7 male).

Design

Study 2 was a training study. Although most training studies involve a pretest-posttest design, the subjects in this study were only available to participate for one session. Therefore, by necessity, this was a posttest only control group design. Subjects were randomly assigned to two conditions. One group, the experimental group, read passages and were trained in the use of graphic organizers. The other group, a control group, read the same passages and wrote about them but were not exposed to graphic organizers. After training, all subjects composed a comparison/ contrast essay from new sources. As in the descriptive component, measured variables were self-efficacy for writing, organizing/ transforming, information seeking, and writing quality.

Measures

Self-Efficacy for Writing

The Self-Efficacy for Writing Questionnaire (see Appendix A) was identical to the instrument used in Study 1.

Organizing/Transforming

The Organizing/ Transforming Scale (see Appendix A) was identical to the instrument used in Study 1. Neither rater knew the experimental condition to which each subject was assigned.

Information seeking

Information seeking was measured in the same manner as was used in Study 1, with one modification. In addition to the five pieces of text on computer, subjects in the experimental group had access to two additional texts: a skeletal graphic organizer and a sample graphic organizer. For these subjects, information seeking was operationally defined as the total length of time that subjects accessed five pieces of text: the two model essays, the guidelines, and the two graphic organizer texts, when pre-writing and writing one essay. Subjects in the control group did not have access to the graphic organizers; for them, information seeking was operationally defined as the total length of time that subjects accessed three pieces of text: the two model essays and the guidelines, when pre-writing and writing one essay.

Writing Quality

The Writing Quality Primary Trait Scoring Scale (see Appendix A) was identical to the instrument used in Study 1. Neither rater knew the experimental condition to which each subject was assigned.

Reading Ability

The Reading Comprehension Test of the Descriptive Tests of Language Skills (Educational Testing Service, 1985) was administered to all subjects upon admission to college. This was the same instrument used in Study 1.

Materials

Text Sources

The same two text sources (see Appendix B) were used as in Study 1. One was on the topic of Martin Luther King; the other was on the topic of Malcolm X.

Model Comparison/ Contrast Essays

The same two model comparison/ contrast essays (see Appendix B) were used as in Study 1. One compared and contrasted the games of football and rugby; the other compared and contrasted ant and human social organization.

Guidelines for Writing Comparison/ Contrast Essays

The same guidelines for writing comparison/ contrast essays (see Appendix B) were used as in Study 1.

Training Texts

Six texts (see Appendix C) were read by subjects in the course of training the experimental group to utilize graphic organizers. The first, a source text on the topic of Roman Catholicism, was 268 words in length. The second, a source text on the topic of Voodoo, was 271 words in length. The third, a source text on the topic of cocaine, was 308 words in length. The fourth, a source text on the topic of heroin, was 271 words in length. The fifth, a source text on the topic of Cuba's economy, was 293 words in length. The sixth, a source text on the topic of Puerto Rico's economy, was 274 words in length. Texts were typewritten, single spaced, on six separate standard pieces of paper. All six texts were at the tenth-eleventh grade reading level, as measured by Fry's (1972) Readability Scale.

Graphic Organizers

Subjects in the experimental group were shown three graphic organizers (see Appendix C) as part of their training in the use of graphic organizers. The first was a skeletal graphic organizer that provided subjects with a framework for this tool. The second was a fully filled out graphic organizer comparing and contrasting

the religions of Catholicism and Voodoo. This graphic organizer was used in conjunction with the two training texts on the topics of Catholicism and Voodoo. The third was a partially filled out graphic organizer comparing and contrasting the features of cocaine and heroin. This graphic organizer was used in conjunction with the two training texts on the topics of cocaine and heroin. The three graphic organizers were typewritten on separate standard pieces of paper.

Subjects in the experimental group also had access on computer to a fourth graphic organizer (see Appendix B) that compared and contrasted the games of football and rugby. This graphic organizer was meant to be seen in conjunction with the model comparison/ contrast essay on the topic of football and rugby. This text, as well as an additional copy of the skeletal graphic organizer (see Appendix B), took up one screen each on a standard computer terminal.

Computer Program

Two computer programs were custom made for this study. One program, utilized only by subjects in the control group, was identical to the computer program used in Study 1, and it allowed subjects to access five texts: the two source texts on Martin Luther King and Malcolm X; the two model comparison/ contrast essays, one on rugby/ football and the other one on ant and human societies; and the guidelines for writing a comparison/ contrast

essay. It was designed so that subjects sitting at an IBM computer could access each of the five above-mentioned texts, using a different key for each text. In order to read the screen's contents, subjects had to keep their finger on the key. As soon as the finger was released, the screen would go blank. A timer built into the program secretly recorded the number of seconds that each text stayed on the screen at any one time. A programmed print-out listed the order in which each subject accessed each text, and for how long. This program fit onto one 5 1/4 inch floppy disk.

The second computer program, utilized only by subjects in the experimental group, was identical to the computer program used by the control groups subjects, with the exception of having two additional texts that could be accessed by separate keys. One text was the skeletal graphic organizer and the other text was the graphic organizer on the topic of football and rugby. Thus, this program allowed subjects to access a total of seven texts: the two source texts on Martin Luther King and Malcolm X; the two model comparison/ contrast essays, one on rugby/ football and the other one on ant and human societies; the guidelines for writing a comparison/ contrast essay; and two graphic organizer texts, one skeletal one and the other one on football and rugby. In all other aspects the two computer programs were identical.

Computers

Subjects used the same IBM personal computers, Model 5150, as in Study 1.

Demographic Questionnaire

One of two demographic questionnaires was administered to subjects. The Demographic Questionnaire, Form 1 (see Appendix D) consisted of six questions about subjects' backgrounds that were deemed relevant to the study. This questionnaire was identical to that given to subjects in Study 1. In Study 2 this questionnaire was administered only to subjects in the control group.

The Demographic Questionnaire, Form 2 (see Appendix D) consisted of seven questions about subjects' backgrounds: the same six as in the Demographic Questionnaire, Form 1, plus an additional question relating to having been previously been taught to use graphic organizers. This questionnaire was administered only to the subjects in the experimental group.

Procedure

Subjects were randomly assigned to two groups, and the groups were randomly assigned to two conditions: graphic organizer training (the experimental group) and a no-training control group. Subjects met in a computer classroom, in groups of 6-10, for a total of two hours and fifteen minutes each.

There were two phases to this study. Phase 1, the training phase, lasted one hour and fifteen minutes. During this phase, subjects in the experimental group were trained to use graphic organizers. No computers were involved during the training period. All materials were pen and paper. Instruction proceeded in three steps. The experimenter administered the instructions (see Appendix E) in a standard manner. In step 1, experimental subjects were given four texts: two source texts, one on Catholicism and one on Voodoo; the skeletal graphic organizer; and the completed graphic organizer on the topic of Catholicism/ Voodoo. Subjects read the two source texts, and then the experimenter explained to subjects the features of a graphic organizer. Subjects did not do any writing during this step.

Next, in step 2, experimental subjects read two texts: one on cocaine and one on heroin. On the basis of reading these texts, subjects filled out in writing the partially completed graphic organizer on cocaine/ heroin. While subjects completed this task, the experimenter circulated to give individual feedback to subjects, until the experimenter deemed that all subjects completed the task in a satisfactory manner.

Finally, in step 3, subjects read two more texts: one on Cuba's economy and the other on Puerto Rico's economy. On the basis of reading these two texts, subjects constructed their own graphic organizer in writing on a blank sheet of paper. Once again, the experimenter circulated to give individual feedback to

subjects, until he deemed that all subjects completed the task in a satisfactory manner. At no time during this training period did subjects write essays, nor did they receive any instruction regarding the writing of essays.

Control subjects during Phase 1 read the same text sources, carried out analogous writing activities, and spent the same amount of time with the experimenter, as did experimental subjects. In order to keep control subjects from learning about graphic organizers, they received no information or materials regarding graphic organizers. Thus, control subjects received neither the skeletal graphic organizer, the partially completed graphic organizer, nor the fully completed graphic organizer. These subjects did, however, receive the same six source texts that the experimental subjects received during their training period. And they spent the same amount of time writing as did experimental subjects.

Phase 1 for control subjects lasted one hour and fifteen minutes, and the procedure was carried out in three steps. Again, the experimenter administered the instructions (see Appendix E) in a standard manner. Subjects first read the two texts on Catholicism and Voodoo. After this, the experimenter pointed out the similarities and differences in the features of these two religions. These were the same features, similarities, and differences that the experimenter pointed out to the experimental group, except that this time he stopped short of mentioning

anything to do with graphic organizers. As with the experimental subjects, control subjects did no writing in this step. In step 2, control subjects read the two texts on cocaine and heroin. On the basis of reading these texts, subjects wrote notes on a blank sheet of paper, summarizing the texts. The experimenter circulated among subjects to give feedback on the accuracy of their notes. Finally, in step 3, subjects read the texts on the economies of Cuba and Puerto Rico. On the basis of reading these texts, subjects wrote notes on a blank sheet of paper, summarizing the texts. Once again, the experimenter circulated to give feedback on the accuracy of their notes. At no time during this phase did subjects write essays, nor did they receive any instruction regarding the writing of essays.

Phase 2, the posttest, was virtually the same for experimental and control subjects. All written materials from Phase 1 were removed, and this procedure was carried out in much the same way as the entire procedure in Study 1. Phase 2 lasted one hour. Under the supervision of the experimenter, subjects first filled out the Demographic Questionnaire. Control subjects filled out Form 1 of this survey. Experimental subjects filled out Form 2, which is identical to Form 1 except for an additional question on their having been previously taught to use graphic organizers. Then all subjects filled out the same Self-Efficacy for Writing Questionnaire.

Each subject was seated in front of his or her own personal computer. Each computer contained the various texts to which subjects could eventually refer. The experimenter then gave subjects a standard set of brief directions. Control subjects received the same directions given to subjects in Study 1 (see Appendix E). Experimental subjects were given a slightly modified version of these directions (see Appendix E), which included directions regarding the additional access to the two graphic organizer texts on computer, and directions stating that they were to write graphic organizers during the note-taking period.

When the directions were over, the experimenter demonstrated how to access the pieces of text that were available on computer. Control subjects had access to five pieces of text, as follows: the two source texts on Martin Luther King and Malcolm X; the two model comparison/ contrast essays, one on rugby/ football and the other on ant and human societies; and the guidelines for writing a comparison/ contrast essay. Experimental subjects had access to these five texts, plus two additional ones: the skeletal graphic organizer and the completed graphic organizer on football/ rugby. So that subjects would not have to memorize which computer key went with each text, this information was listed on the blackboard in the front of the room, for the rest of the session, in letters large enough for all subjects to read. Then all subjects practiced accessing the pieces of text, without actually reading

the texts, until the experimenter determined that subjects had mastered this procedure.

The assignment was to write a comparison/ contrast essay on the lives of Martin Luther King and Malcolm X. For the next twenty-five minutes, subjects accessed and read texts on computer, and they took notes in longhand on a standard blank sheet of paper. Experimental subjects at this time wrote graphic organizers, while control subjects were free to choose their mode of note-taking. The experimenter circulated sporadically to ensure that students were taking notes and not writing the essay. On the rare occasion that he found a subject writing an essay, he took away the subject's essay and asked the subject only to take notes at that time.

At the end of the twenty-five minutes, the experimenter asked subjects to cease taking notes and to begin writing their essays. During this time, subjects could refer to their notes and to any of the texts on computer. Subjects wrote their essays in longhand on a separate sheet of standard blank paper. At the end of this twenty-five minutes, the experimenter collected the essay and the notes from each subject, and the subjects were free to leave. Subjects did not receive feedback on their work at a later time.

CHAPTER VI

RESULTS: STUDY 2

Descriptive statistics of the main variables are summarized in Table 7. For all subjects combined, mean score for writing quality was 5.4, standard deviation was 1.5, and the range was 2 - 8. Average reading score was 32.1 (s.d. = 5.8), with a range of 21 - 44. Self-efficacy for writing scores ranged from 61 - 128, with a mean of 95.9 and a standard deviation of 15.4.

Mean organizing/ transforming score was 4.9 (s.d. = 1.2, range = 2 - 6). Thirty-three of the thirty-six experimental subjects (91.6%) constructed graphic organizers during pre-writing for their final essay, as they were asked to do. This indicated a successful training phase. Of the remaining subjects, 2 (5.6%) engaged in simple list-making, and 1 used the alike/ different strategy (see Figure 5). Furthermore, only three experimental subjects (8.3 %) reported having been taught to write graphic organizers. As this N was so small, no comparisons were made between these subjects and the large majority of experimental subjects who reported never having been previously exposed to graphic organizers. Control groups subjects' pre-writing notes could be categorized into three types. Simple list-making, carried out by 18 subjects (51.5%) was the most common. Alike/ different was utilized by 13 subjects (37.1%). The remaining 4 subjects (11.4%) engaged in arrow-drawing (see Figure 6). None of

Table 7

Mean, Standard Deviation, and Range of the Main Variables, Study 2

Variable	Mean	S.D.	Range
Writing Quality	5.4	1.5	2 - 8
Reading Ability	32.1	5.8	21 - 44
Self-Efficacy	95.9	15.4	61 - 128
Organizing	4.9	1.2	2 - 6
Information Seeking (min.)	2.54	2.18	0 - 8.76

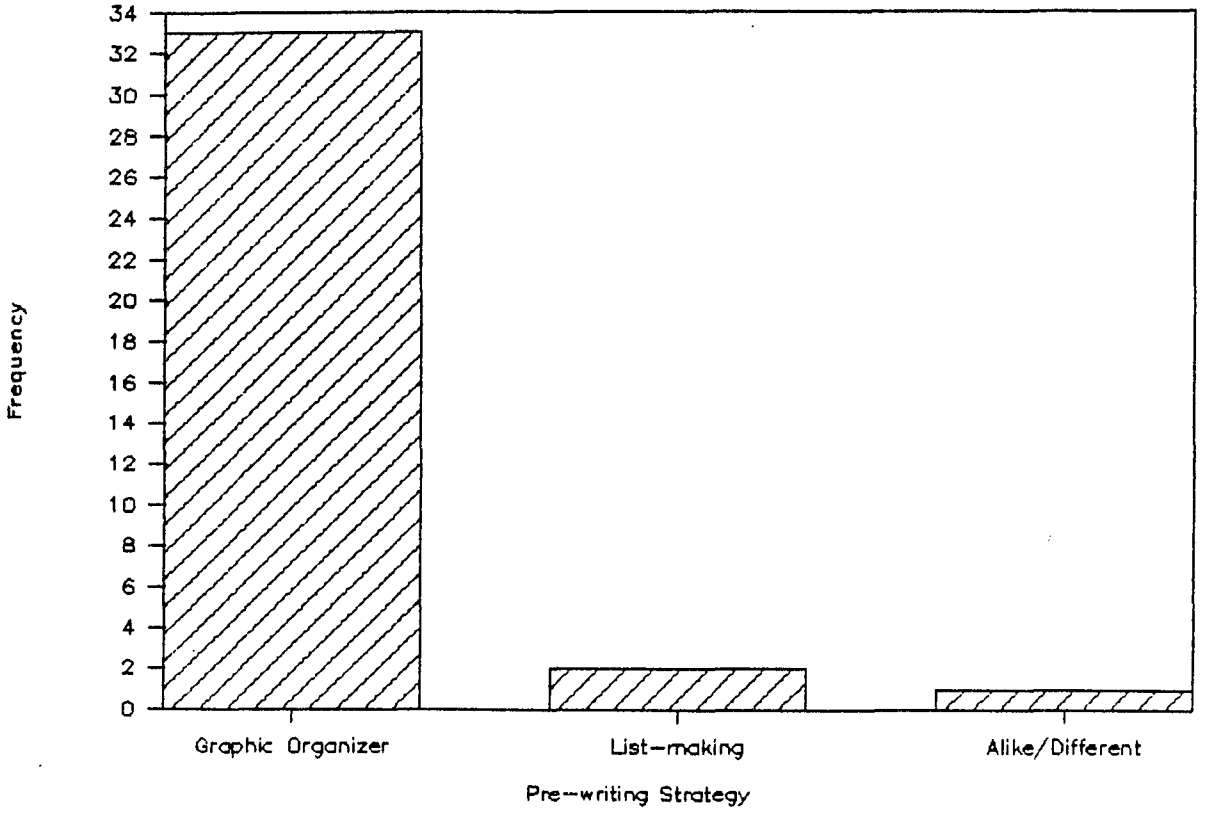


Figure 5. Frequency distribution for types of organizing/ transforming strategies used by the experimental group, Study 2.

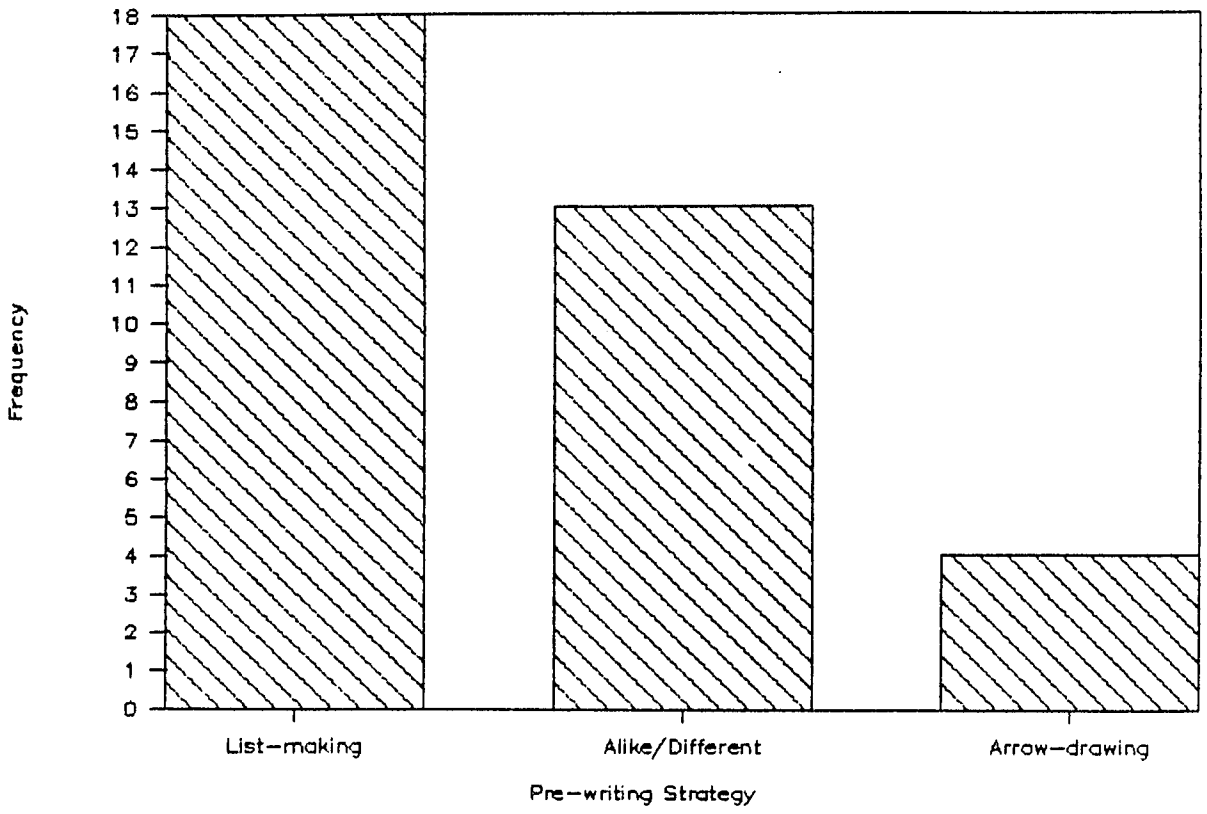


Figure 6. Frequency distribution for types of organizing/ transforming strategies used by the control group, Study 2.

the control group subjects constructed formal outlines or made any charts or graphic organizers. With regard to transforming processes, almost all subjects shortened or paraphrased material from the source text. Only two subjects in the control group, and no subjects in the experimental group, copied a significant amount of source text into their notes.

Subjects referred to written guidelines and models an average of 2.54 minutes (s.d. = 2.18), with a range of 0.0 - 8.76 minutes. Sixty-three subjects (88.7%) engaged in at least some information seeking. The remaining eight subjects (11.3%) accessed the two source texts, as they were required to do, but did not even once access any additional texts. Of the subjects who engaged in information seeking, 14 (19.7% of all subjects) did so for less than one minute. The remaining 49 subjects (69.0% of all subjects) accessed the models and guidelines for at least one minute, of their own volition. In the experimental group, 20 subjects (55.6%) engaged in information seeking for one minute or more; the remaining 16 (44.4%) either did not access additional text or did so for less than one minute (see Figure 7). In the control group, 29 subjects (82.9%) accessed additional text for at least one minute; the remaining 6 subjects (17.1%) either did not seek information or did so for less than a minute (see Figure 8).

Information seeking was further broken down into the two phases of the writing task, pre-writing and writing, each of which lasted twenty-five minutes. As in Study 1, subjects accessed much

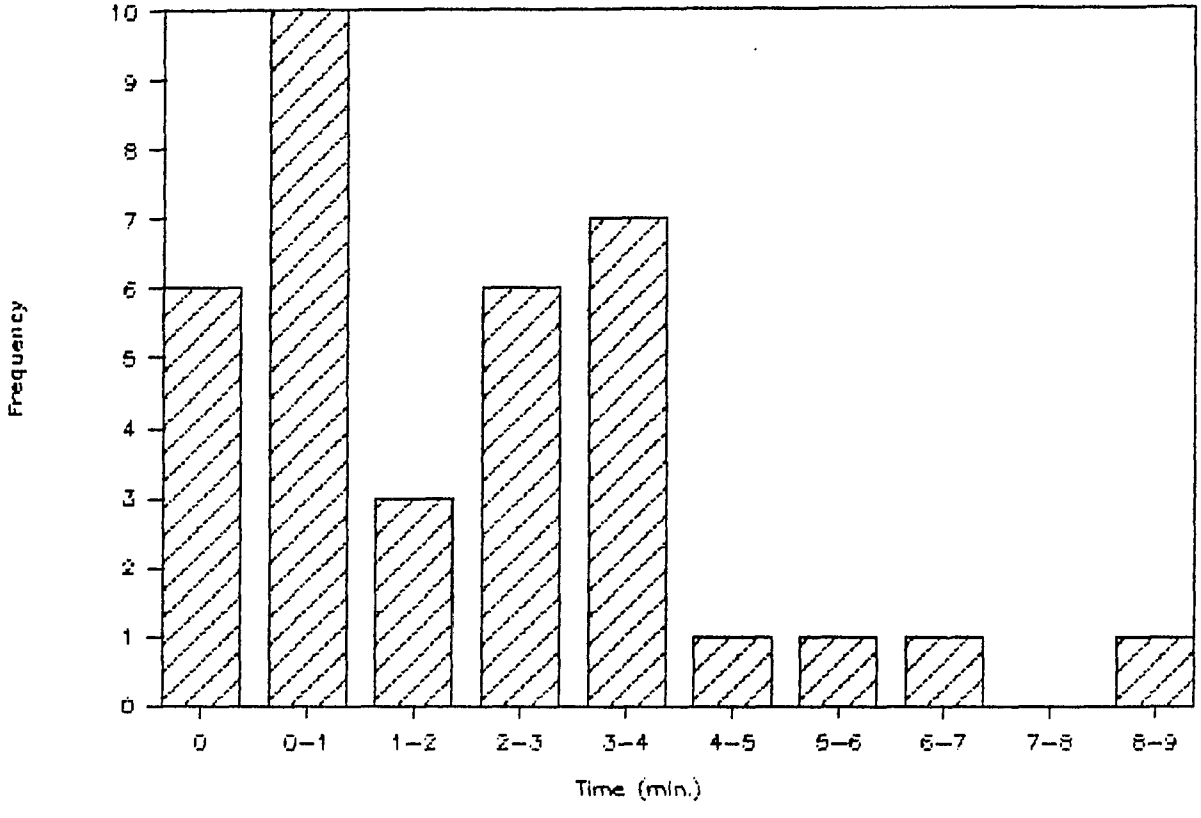


Figure 7. Frequency distribution for information seeking by the experimental group, Study 2.

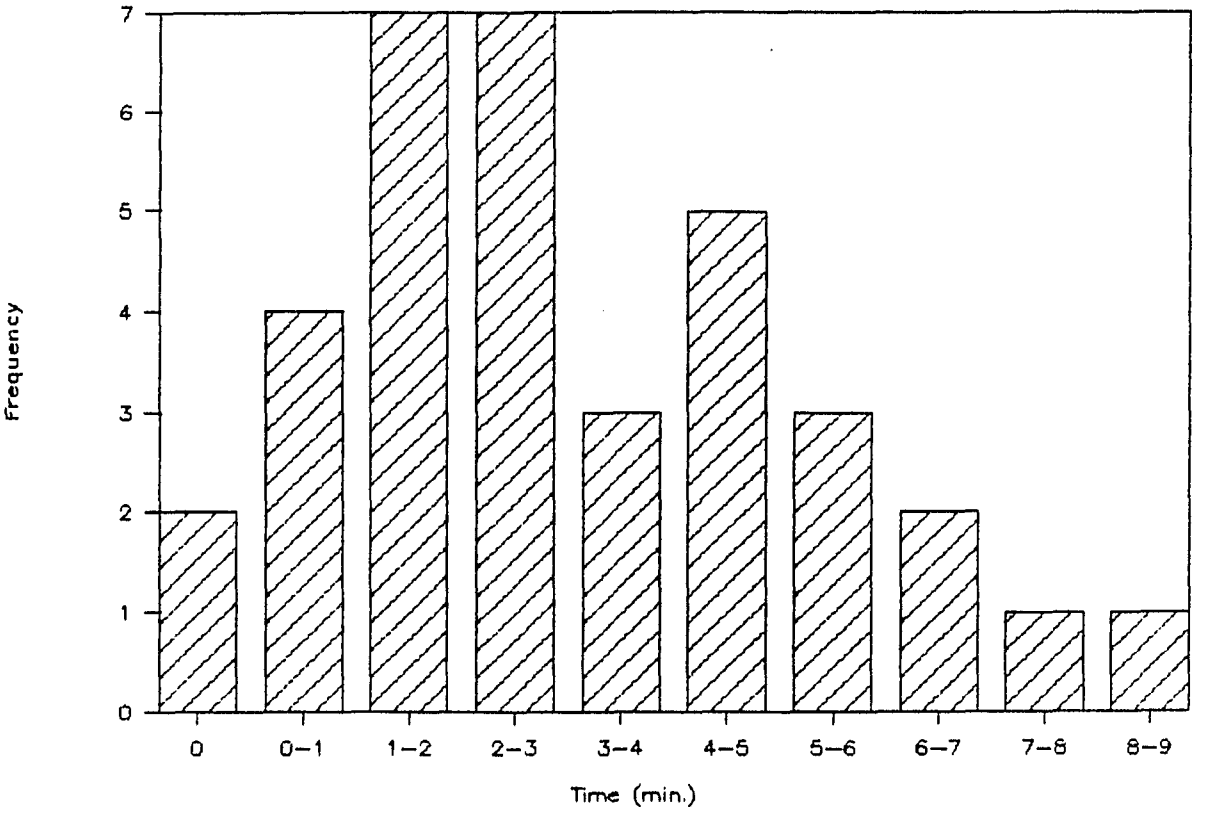


Figure 8. Frequency distribution for information seeking by the control group, Study 2

more information in the pre-writing phase (M = 1.99 min., s.d. = 1.96, range = 0 - 7.32 min.) than during the writing phase (M = 0.55 min., s.d. = 0.95, range = 0 - 5.55 min.). Indeed, 78.3% of the total information seeking occurred during pre-writing, and only 21.7% occurred in the writing phase. During pre-writing, fully 55 subjects (77.5%) engaged in at least some information seeking, as compared to only 34 subjects (47.9%) who did so during the writing phase. In the experimental group, 25 subjects (69.4%) sought information during pre-writing, while 21 (58.3%) did so during the writing phase. In the control group, while 30 subjects (85.7%) engaged in information seeking during pre-writing, only 13 (37.1%) did so during the writing phase.

This study included five background variables: reading ability, English vs. non-English native language, community college attendence, remedial writing courses taken, and previous experience with comparison/ contrast essays. Reading ability was a continuous variable; the remaining four were dichotomous variables. In order to demonstrate that the two groups were equivalent on background variables, six separate analyses were conducted (see Table 8). All analyses showed that there were no differences between the two groups. First, to show that the two groups were equal in reading ability, a t-test was conducted using group as the independent variable and reading as the dependent variable. Results showed that the two groups were essentially the same in reading ability: experimental group M = 32.5 (s.d. = 6.1,

Table 8

Differences in Background Variables Between the Two Groups, Study 2

	Experimental Group (N=36)			Control Group (N=35)			
Background Variable	Mean	S.D.	Range	Mean	S.D.	Range	t
Reading	32.5	6.1	22-44	31.6	5.5	21-41	0.67
	No	Yes		No	Yes		Chi-square
Passed Reading Test	4	32		4	31		0.02
Native Language is English	11	25		13	22		0.34
Community College Attendance	25	11		30	5		2.69
Remedial Writing	18	18		19	16		0.13
Previously Taught Compare/Contrast	14	22		15	20		0.12

Note: In all cases, $p > .05$

range = 22 - 44); and control group M = 31.6 (s.d. = 5.5, range = 21 - 41); with t (69) = 0.67 (p > .05). Next, to show that there were equal numbers of subjects between groups who had failed the reading test, a chi-square test was performed, with the result that chi-square = 0.02, p > .05. Finally, to show that the two groups were equal in the remaining four dichotomous variables, four separate chi-square tests were performed. Results showed that the two groups were essentially the same in native language (chi-square = .34), community college attendance (chi-square = 2.69), remedial writing courses taken (chi-square = 0.13), and having previously been taught to write comparison/ contrast essays (chi-square = 0.12), all ps > .05.

Next, using each dichotomous variable separately as the independent variable, four t-tests were conducted to determine their effects on the dependent variable, writing quality. Results, displayed in Table 9, showed that subjects whose native language was English (N = 47, M = 5.5, s.d. = 1.4) wrote better essays than did subjects whose native language was other than English (N = 24, M = 5.1, s.d. = 1.6); these differences, however, were not statistically significant (d.f. = 69, t = 1.20, p > .05). Subjects who had attended community college at least one semester (N = 16, M = 5.1, s.d. = 1.5) had lower writing quality scores than did subjects who had never attended (N = 55, M = 5.5, s.d. = 1.5); these differences, as well, were not statistically significant (d.f. = 69, t = 0.96, p > .05). Subjects who reported

Table 9

Relation of Four Background Variables to Writing Quality, Study 2

	No			Yes			
Variable	N	Writing Quality	S.D.	N	Writing Quality	S.D.	t
Native Language is English	24	5.1	1.6	47	5.5	1.4	1.20
Community College Attendance	55	5.5	1.5	16	5.1	1.5	0.96
Remedial Writing Course Taken	37	5.5	1.4	34	5.2	1.6	0.94
Previously Taught Compare/Contrast	29	5.2	1.5	42	5.5	1.5	0.64

Note: in all cases, $p > .05$

having taken at least one remedial writing course (N = 34, M = 5.2, s.d. = 1.6) had slightly lower writing scores than did subjects who reported never having taken such a course (N = 37, M = 5.5, s.d. = 1.4); again, these differences were not significant (d.f. = 69, t = 0.94, p > .05). Finally, subjects who had been previously taught to write comparison/ contrast essays at least once in their academic lives (N = 42, M = 5.5, s.d. = 1.5) wrote better essays than did subjects who had never been previously taught (N = 29, M = 5.2, s.d. = 1.5); once again, these differences were not statistically significant (d.f. = 69, t = 0.64, p > .05). On the basis of these negative findings, these variables were excluded from further analyses regarding the outcome measure.

Table 10 illustrates the correlations among the main variables. In partial support of H3, writing quality was found to be significantly positively correlated with three of the four process variables. Organizing/ transforming was the most highly correlated with writing outcome (Pearson's r = .61, p < .01), followed by reading (r = .43, p < .01), and self-efficacy (r = .33, p < .01). Information seeking was the only variable not correlated with writing quality (r = -.01, p > .05). Among the process variables themselves, organizing was significantly correlated with reading (r = .33, p < .01) and with self-efficacy (r = .37, p < .01), but not with information seeking (r = -.04, p > .05). Self-efficacy was significantly correlated with reading

Table 10

Intercorrelation Matrix of the Main Variables, Study 2

	Reading Ability	Self-Efficacy	Organizing	Information Seeking -
Writing Quality	.43**	.33**	.61**	-.01
Reading Ability	--	.43**	.33**	.09
Self-Efficacy	--	--	.37**	-.05
Organizing	--	--	--	-.04

** $p < .01$

(r = .43, p < .01), but not with information seeking (r = -.05, p > .05). Neither was reading correlated with information seeking (r = .09, p > .05). Information seeking was again broken down into the two phases during which it occured. As in study 1, writing quality was positively correlated with information seeking during pre-writing (r = .11, p > .05), and negatively correlated with information seeking during the writing phase (r = -.22, p > .05). However, neither correlation was statistically significant.

Then two separate intercorrelation matrices were produced, one for control group subjects only, and the other for experimental subjects only. For control subjects (see Table 11), writing quality was found to be significantly positively correlated with three of the four process variables: organizing/ transforming (r = .67, p < .01), reading (r = .54, p < .01), and information seeking (r = .39, p < .05). Self-efficacy was the only variable not significantly correlated with writing quality (r = .25, p > .05). Among the process variables themselves, reading was significantly correlated with self-efficacy (r = .48, p < .01), organizing (r = .38, p < .05), and information seeking (r = .38, p < .05). Self-efficacy was not significantly correlated with either organizing (r = .18, p > .05) or information seeking (r = .11, p > .05). Organizing was not significantly correlated with information seeking (r = .29, p > .05). When information seeking was broken down into the two phases during which it occured, writing quality was positively correlated with

Table 11

Intercorrelation Matrix for the Control Group, Study 2

	Reading Ability	Self-Efficacy	Organizing	Information Seeking
Writing Quality	.54**	.25	.67**	.39*
Reading Ability	--	.48**	.38*	.38*
Self-Efficacy	--	--	.18	.11
Organizing	--	--	--	.29

* $p < .05$, ** $p < .01$

Table 12

Intercorrelation Matrix for the Experimental Group, Study 2

	Reading Ability	Self-Efficacy	Organizing	Information Seeking
Writing Quality	.33*	.20	.17	-.20
Reading Ability	--	.39*	.39*	-.14
Self-Efficacy	--	--	.25	-.03
Organizing	--	--	--	-.02

* $p < .05$

information seeking during pre-writing (r = .49, p < .01), and negatively correlated with information seeking during the writing phase (r = -.43, p < .05).

For experimental subjects, (see Table 12), writing quality was significantly correlated only with reading (r = .33, p < .05). Writing quality was not significantly correlated with either self-efficacy, organizing, or information seeking (rs = .20, .17, and -.20, respectively, p > .05). Among process variables, reading was significantly correlated with both self-efficacy (r = .39, p < .05) and with organizing (r = .39, p < .05). No other correlations among process variables were significant. When information seeking was broken down into the two phases during which it occurred, writing quality was not correlated with information seeking during pre-writing (r = .04, p > .05), but was significantly negatively correlated with information seeking during the writing phase (r = -.38, p < .05).

The effects of graphic organizer training on all of the main variables were analyzed next, through a series of t-tests (see Table 13). Next, in order to substantiate H4, three separate t-tests were conducted, using group as the independent variable and the variables writing quality, organizing/ transforming, and self-efficacy as the three dependent variables. In support of H4, the experimental group outperformed the control group on all three measures. In writing quality, the experimental group had a mean score of 5.9 (s.d. = 1.4, range = 3 - 8), while the control group

Table 13

Effects of Graphic Organizer Training on the Main Variables, Study 2

	Experimental Group (N=36)			Control Group (N=35)			
Variable	Mean	S.D.	Range	Mean	S.D.	Range	t
Writing Quality	5.9	1.4	3-8	4.8	1.4	2-7	3.47**
Self-Efficacy	101.2	15.3	68-128	90.5	13.7	61-115	3.12**
Organizing	5.7	0.8	3-6	4.1	1.1	2-6	7.07***
Information Seeking	2.01	2.05	0-8.52	3.09	2.20	0-8.76	2.14*

* $p < .05$, ** $p < .01$, *** $p < .001$

had a mean score of 4.8 (*s.d.* = 1.4, range = 2 - 7), with *t* (69) = 3.47 (*p* < .01). With regard to self-efficacy, the experimental group's mean score of 101.2 (*s.d.* = 15.3, range = 68 - 128) was superior to that of the control group (*M* = 90.5, *s.d.* = 13.7, range = 61 - 115), *t* (69) = 3.12 (*p* < .01). Organizing scores showed the greatest differences: the experimental group *M* = 5.7 (*s.d.* = 0.8, range = 3 - 6), was higher than the control group *M* = 4.1 (*s.d.* = 1.1, range = 2 - 6), with *t* (69) = 7.07 (*p* < .001).

In addition, although no training effects were hypothesized for information seeking, these effects were analyzed as well. Results of a *t*-test, using group as the independent variable and information seeking as the dependent variable, showed that subjects in the experimental group (*M* = 2.01 min., *s.d.* = 2.05, range = 0 - 8.52 min.) spent significantly less time seeking information than did subjects in the control group (*M* = 3.09 min.,*s.d.* = 2.20, range = 0 - 8.76 min.), with *t* = 2.14 (*p* < .05). When information seeking was broken down into the two writing phases, it was found that during pre-writing, subjects in the experimental group (*M* = 1.20 min., *s.d.* = 1.29) sought information significantly less than did subjects in the control group (*M* = 2.80, *s.d.* = 2.20), with *t* (69) = 3.75 (*p* < .001). In contrast, during the writing phase, experimental subjects (*M* = 0.81 min., *s.d.* = 1.18) accessed text slightly but significantly more often than did control subjects (*M* = 0.29 min., *s.d.* = .54), with *t* (69) = 2.39 (*p* < .05).

In order to test H5 -- that the main variables would each contribute uniquely to writing quality -- a multiple regression was carried out. The predictor variables under consideration were reading, self-efficacy, organizing/ transforming, and information seeking. Because half these subjects had been trained, additional variables that had to be entered were training and four interactions of training x process variables: training x reading, training x self-efficacy, training x organizing, and training x information seeking. Thus, a total of nine variables were entered into the regression. Results, as shown in Table 14, indicated that two of the four variables contributed uniquely to writing quality: organizing (β = .681, p < .001) and training x organizing interaction (β = -1.440, p < .05). No other process variables or interaction effects contributed uniquely to writing quality.

Next, variables that were found to not contribute uniquely to the outcome variable were removed from the regression in a step-wise manner, until only significant predictors remained. In each step, the least significant predictor variable was removed. Results, as shown in Table 15, were that four variables uniquely contributed to writing quality: organizing (β = .705, p < .001), reading (β = .281, p < .01), training (β = 1.374, p < .05), and training x organizing interaction (β = -1.496, p < .05). Neither self-efficacy, information seeking, nor any of the other interactions contributed uniquely to the outcome variable. Thus, H5 was only partially supported, and H6, which postulated that

Table 14

Multiple Regression, Using Main Variables to Predict Writing Quality, Study 2

Variable	B	S.E. B	Beta	t
Reading	.069	.045	.265	1.51
Self-Efficacy	.000	.016	-.006	-0.03
Organizing	.818	.193	.681	4.25***
Information Seeking	.065	.098	.095	0.66
Training	3.870	2.275	1.302	1.70
Training x Organizing	-.735	.331	-1.440	-2.22*
Training x Info. Seeking	-.169	.136	-.200	-1.25
Training x Self-Efficacy	.009	.021	.299	0.40
Training x Reading	-.011	.058	-.123	-0.19

* $p < .05$, *** $p < .001$

Table 15

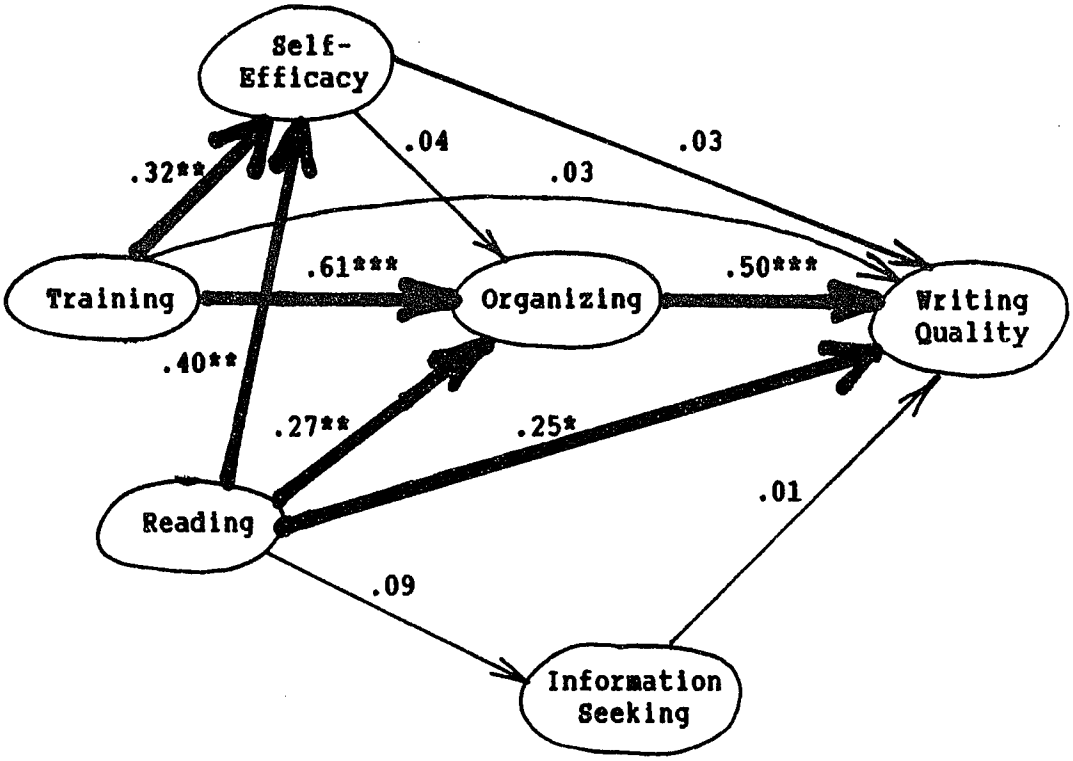
Multiple Regression, After Step-Wise Removal of Non-Significant Predictors, Study 2

Variable	B	S.E. B	Beta	t
Reading	.073	.025	.281	2.93**
Organizing	.846	.178	.705	4.75***
Training	4.082	1.584	1.374	2.58*
Training x Organizing	-.773	.297	-1.496	-2.57*

* $p < .05$, ** $p < .01$, *** $p < .001$

training and information seeking would interact to improve writing quality, was not supported.

Finally, in order to elucidate the findings, a path analysis was conducted (see Figure 9). In this analysis, the path of the background variable reading ability to the outcome variable writing quality was traced alone and through self-efficacy, organizing, and information seeking. Likewise, the path of training to writing quality was traced alone and through self-efficacy and organizing. Finally, the path of self-efficacy to writing quality was traced alone and through organizing. Results showed that four paths led significantly to writing outcome: organizing alone (path coefficient = .50, $p < .001$), reading alone (path coefficient = .25, $p < .05$); reading, through organizing (path coefficients = .27 and .50, $p < .01$); and training, through organizing (path coefficients = .61 and .50, $p < .001$). Self-efficacy, information seeking, and training alone (path coefficients .03, .01, and .03, respectively, $p > .05$) did not predict writing quality. Thus, as intended, training in the use of graphic organizers had its effects on writing outcome through its effects on enhancing subjects' organizing. Lastly, though both training and reading predicted self-efficacy independently (path coefficients = .32 and .40, respectively, $p < .01$), neither of these paths ultimately led to writing quality.



* p < .05, ** p < .01, *** p < .001

Figure 9. Path coefficients for the main variables, Study 2.

CHAPTER VII

DISCUSSION

Summary of the Results: Studies 1 and 2

A complex writing task in which subjects wrote a comparison/ contrast essay from sources enabled the investigator to directly examine two self-regulated learning processes, organizing/ transforming and information seeking, as well as a third intermediary variable, self-efficacy.

In support of H1 in Study 1, writing quality was significantly positively correlated with each of the four main process variables: reading ability, organizing/ transforming, self-efficacy for writing, and information seeking. However, the process variables themselves were not significantly correlated with one another, the exception being a significant positive correlation between reading and organizing. When information seeking was broken down into its component writing phases, it was found that writing quality was significantly positively correlated with information seeking during pre-writing, but negatively (though not significantly) correlated with information seeking during the writing phase.

A series of regressions was then conducted, each using writing quality as the outcome variable, in order to test H2. First, four separate simple regressions showed that reading, self-

efficacy, organizing, and information seeking each contributed significantly to writing quality. Then a multiple regression was carried out, entering self-efficacy, organizing, and information seeking as predictors for writing quality. Results showed that each of the three predictors contributed uniquely to writing quality. Finally, a multiple regression that included reading as the fourth predictor variable showed that only two of the four variables contributed uniquely to writing quality: reading and information seeking. Self-efficacy and organizing no longer contributed uniquely. Thus, H2 was only partially supported.

In study 2, a new set of subjects was assigned to either a graphic organizer training condition or a control condition. In addition, the same process variables as in Study 1 were measured.

A correlation matrix of the main variables was constructed. In partial support of H3, writing quality was shown to be significantly positively correlated with reading, self-efficacy, and organizing, but not with information seeking. Among the process variables, there were significant positive correlations between reading and organizing, reading and self-efficacy, and organizing and self-efficacy. Information seeking was not significantly correlated with any of the variables. Then two separate intercorrelation matrices were constructed, one each for control group subjects and for experimental group subjects. For control group subjects, writing quality was significantly positively correlated with organizing, reading, and information

seeking, but not with self-efficacy. Also, reading was positively correlated with each of the process variables. For experimental group subjects, writing quality was correlated only with reading score, and not with any of the other process variables. In addition, reading was correlated with self-efficacy and organizing, but not with information seeking.

In support of H4, graphic organizer training effects were found to occur. An examination of background variables, including reading ability, native language, community college attendance, remedial writing courses taken, and experience with compare-and-contrast essays, showed that the two groups did not differ initially. After the intervention, *t*-tests showed that the experimental group, as compared to the control group, had significantly higher scores of self-efficacy, organizing, and writing quality. Furthermore, the experimental group engaged in information seeking significantly less as compared to the control group, and this effect was most pronounced during the pre-writing phase.

In order to test H5 and H6, a multiple regression analysis was conducted, using writing quality as the outcome variable. Nine predictor variables were entered: reading, self-efficacy, organizing, information seeking, training, and four interactions between training and the four process variables. This procedure showed that only two of the predictors contributed uniquely to writing quality: organizing and training x organizing interaction.

Next, predictor terms that were non-significant were removed in step-wise fashion. After this procedure four variables remained, each of which contributed uniquely to writing quality: organizing, reading, training, and training x organizing interaction. Neither self-efficacy, nor information seeking, nor any of the other interaction terms contributed uniquely to writing outcome. Thus, H5 was only partially supported, and H6 was not supported.

Finally, a path analysis was conducted for Study 2. Results showed that there were four significant paths leading to writing outcome: reading alone; organizing alone; reading, through organizing; and training, through organizing. Though both training and reading significantly predicted self-efficacy, their paths through self-efficacy to writing outcome were not significant.

Explanation of the Findings

Relationships Among the Variables

It should come as no surprise that reading ability was consistently associated with writing quality in the two studies. Indeed, the makers of the reading comprehension test utilized in the current study (Educational Testing Service, 1985) found that scores on their reading test were correlated with essay quality of two essays written by college students, one at $\underline{r}$ = .56 and the other at $\underline{r}$ = .58. These values are comparable to the values

obtained in the current study. Likewise, in a study analyzing the reading-writing relationship, Shanahan (1984) broke down writing into its components and showed that reading and the various writing components were correlated at about $r = .50$. The reasons for the relationship are obvious: reading and writing share the same orthographic system with all its features and rules. If anything, this relationship was enhanced in the current study, in which the writing task involved synthesizing two read sources. Though an attempt was made to lighten the cognitive demands of reading by keeping the texts at a tenth grade reading level, the relationship between reading and writing could expect to remain strong, as was the case. Nonetheless, this study was mainly about self-regulatory learning processes, not reading ability. The important questions concern the contributions of the three self-regulatory processes to writing outcome, over and above that of reading ability.

One such variable, organizing/ transforming, which was measured by scoring the level of organization of subjects' pre-writing notes, showed a moderate and mostly consistent effect on writing quality. These results echoed Bloom's (1988) findings that highly organized pre-writing strategies had the highest association with final writing outcome. In Study 1, organizing was second only to reading in its strength of correlation with writing outcome. In Study 2, control subjects and all subjects combined showed high correlations between organizing and writing

quality, higher even than that between reading and writing quality. Only experimental subjects in the training study exhibited no significant correlation between organizing and writing. This can readily be explained by the fact that all but a few experimental subjects wrote graphic organizers, as they were told to do, and thus had the same high score for organizing, yet they showed normal variation in the quality of their writing. A significant correlation under circumstances of such restricted range for one of the variables could not be expected.

Another question arises as to the difference in magnitude of the organizing-writing quality correlation in Study 1 and in the control subjects in Study 2. Both correlations are significant, and yet the correlation coefficient in Study 2 is considerably higher than in Study 1. Recall that these two sets of subjects carried out the identical writing task, with the exception that control subjects in Study 2 participated in an additional hour and fifteen minutes of sham training prior to the posttest. Apparently sham training showed its effects not on organizing or in writing quality; the two groups had comparable scores on each of these measures. Rather, the effect of sham training was to enhance the association between organizing and writing outcome. This can be explained, perhaps, by the control subjects' practice in Study 2 of taking pre-writing notes. Unlike subjects in Study 1, control subjects in Study 2 wrote two sets of pre-writing notes prior to the final pre-writing and writing task. It is possible

that the two practice trials in Study 2 brought out the true potential of subjects to write organized notes. Had subjects in Study 1 been allowed to practice note taking, they too may have written notes that better reflected their true potential for organizing.

Organizing, in addition to being significantly correlated with writing quality, was found to uniquely predict writing score, over and above the other two self-regulatory variables of self-efficacy and information seeking. Nevertheless, when reading score was included as a predictor, organizing no longer contributed significantly to writing quality. This can be explained by the fact that organizing and reading were found to be significantly correlated. With reading more strongly associated with writing quality, the regression favored reading over organizing in the end. This situation does seem to weaken the case for organizing being an important process in the task of writing. To jump to the conclusion that organizing is unimportant, however, is unwarranted. There are two explanations for this phenomenon. One has to do with the constructivist view of reading text. Schema theories of reading comprehension suggest organization during reading (Spivey, 1990). Perhaps in addition to organizing occurring during writing, organizing occurs during reading as well, but this registers simply as reading "ability," and as such goes unrecognized as organizing. A supplemental explanation is that both reading and organizing are tapping into

the same general intelligence factor. In Study 2, the importance of these variables was reversed: with control subjects, organizing was a more significant factor than reading for predicting writing quality. Thus, were the subjects in Study 1 given more time to practice note-taking, even without any training, their note-taking may have come to reflect their true potential for organizing, and organizing may have remained a significant predictor for writing quality.

In Study 2, organizing was the strongest predictor of writing quality. This was a reflection of two factors. One was the relatively high association between organizing and writing in control subjects. The other was the strong training effect that was seen. After all, the training was in an organizational strategy.

Information seeking was another self-regulatory strategy that was investigated. Measured by counting the length of time that subjects accessed models and guidelines for writing essays, information seeking was found to be significantly correlated with writing quality, both in Study 1 and with control subjects in Study 2. These results supported Cavenagh's (1989) findings in an analogous computer-related task. In Study 1, though information seeking was the most weakly correlated with writing, nevertheless it was shown to uniquely predict writing quality when all the main variables were entered. This indicates that information seeking has a small but important effect in the writing process. The

large majority of subjects sought information for a minute or more. But the ones who did so for longer periods of time produced the better writing on the whole.

To try to identify which subjects engaged in information seeking, an examination of the correlation between this and other process variables is in order. Such an inspection in Study 1 revealed that information seeking had almost no association with reading. Thus, it was not necessarily the better readers, who were motivated to do the best writing job possible, or the worse readers, who needed any help they could get, who particularly sought new information. Likewise, self-efficacy and information seeking had no relationship. Thus, one's confidence level apparently had no bearing in searching behavior.

One significant finding was that information seeking during pre-writing served to enhance writing quality, while doing so during essay writing detracted from writing quality. This occurred in both Study 1 and Study 2 and was possibly due to the circumstances of the task. Given a time constraint of 25 minutes to read texts and take notes, and only 25 more minutes to write the essay, subjects who waited until the essay writing phase were perhaps too late to do much good. Had subjects been given additional time with which to write a second draft of the essay, information seeking after pre-writing might have shown to enhance, rather than detract from, final writing product.

In contrast to Study 1, Study 2 showed no contribution of information seeking to writing quality. This was apparently due to the overriding influence of training in organizing. While control subjects did demonstrate a significant positive correlation between information seeking and writing quality, as in Study 1, experimental subjects showed a non-significant negative correlation. Thus, when subjects are trained in a particular strategy, the effects of the training take precedence over their own self-initiated efforts.

Self-efficacy, the last of the self-regulatory process variables, also showed an association with writing quality, albeit a weaker one. Echoing McCarthy etal.'s (1985) findings, self-efficacy was found to be significantly correlated with writing quality in both Study 1 and Study 2. In addition, in Study 1 self-efficacy uniquely predicted writing quality, over and above the contributions of organizing and information seeking. This would suggest that self-efficacy is an important variable in the writing process. However, in both Study 1 and Study 2, when reading ability was entered into the regression, the contribution of self-efficacy was no longer significant. One explanation for the lack of a greater effect for self-efficacy may lie in the nature of the scale. The Self-Efficacy for Writing Scale is a scale for relatively general aspects of writing and contains few questions specific to the task at hand. Zimmerman (1993) found that self-efficacy measures that were more specific to the task

predicted outcome better than more general self-efficacy measures. Therefore, perhaps a self-efficacy scale in the current study more specific to comparison/ contrast essay writing would have better brought out the impact of self-efficacy.

Another explanation is as follows. Though self-efficacy has been found to be predictive of various abilities, its main function is to predict motivation. Thus, it is not surprising that its association with ability is not as strong as are other process variables. In studies on self-efficacy, rarely if ever is this variable examined with respect to its unique contributions, over and above the contributions of other variables. Apparently, as demonstrated by this study, the motivational drive indicated by self-efficacy does not in and of itself improve writing skills; the skills themselves outshadow the effects of self-efficacy. However, it would be hasty to conclude from this that self-efficacy is irrelevant. Indeed, one is confident about writing because one is capable of organizing, or looking up writing models, or spelling, or some other writing skill. Thus, perhaps it is enough to show that self-efficacy was associated with final outcome, even if it did not make a unique contribution to the outcome measure.

In the path analysis, self-efficacy was not found to be part of a significant path towards writing outcome. This is possibly due to the placement of the self-efficacy term in the model, namely between training and organizing. In the current study,

self-efficacy was measured prior to organizing, thus its position in the model. Nevertheless, a valid alternative would be to place self-efficacy between organizing and writing outcome. Conceivably, subjects' organizing skills could have led to higher self-efficacy, and then this enhanced motivation to persist on task could have led to a better writing product. A more extensive examination of self-efficacy in academic tasks is called for.

The last main variable under consideration, graphic organizer training, showed positive effects in Study 2. As predicted, experimental subjects trained to use graphic organizers, compared with control subjects, showed higher scores of self-efficacy, organizing, and writing quality. All but three of the experimental subjects were able to construct a graphic organizer when directed to do so at the posttest. This indicated that the training, though lasting only one hour and fifteen minutes, was effective. These findings partially refuted the findings of Hitchcock (1987) and Balajthy and Weisberg (1990), who showed only mixed effects of graphic organizer training on writing outcome at the college level. It is possible that in the previous studies training was not as effective as in the current study, during which subjects wrote progressively more of a graphic organizer by themselves, in combination with individual feedback.

The reasons for the positive effects of graphic organizer training on the outcome variables differ with each measure. The increase in writing quality is most likely due to an enhancement

in the structural knowledge of a comparison/ contrast essay, which to some extent was part of the dependent measure. Its effects on self-efficacy probably stem from the fact that experimental subjects were shown a technique that they believed would improve their writing. Control subjects never received any formal instruction but only practiced what they already knew. Thus, their confidence level and hence motivation to write would be lower. Also interesting are the training effects on information seeking, whereby experimental subjects engaged in information seeking significantly less than did control subjects. The implication is that when students are taught a strategy, they feel less of a need to seek out information on their own.

The path analysis revealed that graphic organizer training had its effects primarily through enhanced organizing. This was to be expected, since the training consisted of teaching an organizational strategy.

An analysis of the interactions of training with the various process variables showed that only one interaction, training x organizing, was statistically significant. This interaction is explained by the fact that all but three subjects in the trained group had the same high organizing score, the maximum score allowed. Thus, while subjects in the control condition increased their organizing scores as writing scores went up, subjects in the experimental group kept their organizing scores constantly high, regardless of writing score, reducing the variance for this group.

Essentially, the fact of the experimental group achieving mastery of training is what led to the seeming interaction effect. The negative beta-weight that was attained by this interaction is not indicative of any negative interaction effects, and can be explained as follows. The regression equation predicting writing outcome consists of three terms: a constant, a beta-weight for organizing, and a beta-weight for the interaction. The negative beta-weight for the interaction simply countered the positive beta-weight for organizing, leaving a flat constant line that reflected experimental subject mastery of the use of graphic organizers.

However, the one hypothesized interaction effect, training x information-seeking, did not materialize. Indeed, experimental subjects sought information less than expected. Again, the reason for the lack of an effect was probably the overriding effects of training, making information seeking seem less of a necessity.

None of the background variables showed effects on writing outcome. Native language came the closest, with non-native English speakers showing almost significantly lower writing scores, as compared with native English speakers. Lack of facility in English is the obvious explanation for this trend. Having attended community college influenced writing quality positively in Study 1, but negatively in Study 2, and in neither case significantly. Perhaps the lower general academic ability that community college students probably possess has been offset

by the extra time spent in community college. Subjects who reported having taken a remedial writing course, as compared with those who had not, scored lower in writing quality in both Study 1 and Study 2, but in neither case was the difference significant. Again, the lower starting point in writing ability was apparently made up for in part by attendance in remedial classes.

Finally, having been taught to write comparison/ contrast essays, as most subjects had, did enhance their writing in both studies, although not significantly. This result reflects the common occurence of being taught a subject area and then forgetting much of the information as time passes. Still, this question could have been better phrased. As the question stood, someone having been taught comparison/ contrast essay writing once, briefly, in seventh grade would be counted the same as someone having been taught this essay form in depth in the last few months in college. Subjects could have been asked how often, and to what depth, they had been taught to write this particular type of essay.

Relating the Findings to the Models

This study examined the effects of two self-regulatory strategies -- organizing/ transforming and information seeking -- on a specific, complex writing task. Using Bandura's (1986) triadic model for self-regulation, we can categorize the two strategies as belonging to two separate components of the model.

The first, organizing/ transforming, is covert self-regulation, a metacognitive process. Organizing is a person-centered process that, because it is carried out internally, is usually not overt. In the current study, however, through the use of a pre-writing activity, the construct was operationalized. The second self-regulatory strategy, information seeking, is more overt. This activity we can categorize as belonging to environmental self-regulation, in which the subect interacts with the environment so as to promote learning. In the current study, the environment was a selection of non-social sources of information, including models, to which subjects had the option of referring. In the current study, information seeking was self-initiated and self-directed. Each strategy led independently to the enhancement of writing.

Self-efficacy, a key construct in self-regulation theory, was shown to be associated with writing outcome in the current studies. Although the construct of self-efficacy per se is not an explicit component in Bandura's (1986) triadic model, self-efficacy is hypothesized to be an important underlying variable. Self-efficacy is believed to act on outcome measures via subject motivation, affecting such areas as persistence, effort expended, and task choice. Having the confidence to perform a task has been theorized and then shown to enhance student motivation (Covington, 1983). In accord with this belief, students with higher self-efficacy will choose more challenging tasks and then persist on

these tasks longer than will students with lower self-efficacy. In Study 2, self-efficacy presumably had its effects by enhancing subject persistence. Subjects who were taught the graphic organizer strategy felt more confident in their ability to write a compare-and-contrast essay. The writing task was relatively challenging for the time frame in which it was given, and, with a content strategy in hand, they may have persisted more as compared to subjects who lacked training in the content strategy.

In Study 1, self-efficacy may also have had these effects on effort and persistence. However, caution must be exercised in interpreting the results in this way, since self-efficacy did not uniquely predict writing outcome over and above the other process variables. This study was unusual in entering self-efficacy as a term in a multiple regression. More typically, self-efficacy is entered alone, and it is usually found to affect outcome. Perhaps a contribution that this study has made to self-regulation theory is to demonstrate that the motivational component is not enough in itself to effect change in the outcome. Indeed, Zimmerman (1990) states that learning and motivation are interdependent processes that cannot be fully understood apart from each other. Self-efficacy is both a motive for learning and a result of learning. Thus, one explanation for the study's findings is that it is not one's confidence about performing well in a task, but that one's confidence is based on knowingly having specific abilities for

performing the task, that contributes the most to the outcome measure.

Zimmerman and Martinez-Pons (1986) later classified fourteen self-regulated learning strategies. Of these, three were determined via subject interviews to best differentiate high achieving and low achieving students: organizing/ transforming, keeping records/ monitoring, and information seeking. In the current study, two of these three strategies -- organizing/ transforming and information seeking -- were observed behaviorally during the carrying out of a specific writing task. The strategies were shown to enhance the outcome variable, thus confirming the validity of one aspect of the self-regulated learning interview.

With regard to models of writing, the current study validated Flower and Hayes' (1981) fluid model of writing. Subjects, as predicted by the model, were seen to shift frequently among many modes of planning and writing, e.g., from reading, to organizing, to information seeking, to writing, back to reading, then back to information seeking, etc. Two particular aspects of the model were examined. One, labelled organizing by the model, was subsumed under the process labelled planning. The other, information seeking, was the interaction of two components of the model: writing process and task environment. Rather than using protocol analysis, the time-consuming speak-aloud generally used

to validate this model, the current study tapped into these processes directly and non-orally.

Of interest is the overlap between the two major models on which this study is based. Flower and Hayes' (1981) cognitive model of the writing process, though not patterned after Bandura's (1977, 1986) triadic model of self-regulation, shares some key features. Most prominently, both models emphasize a self-monitoring component. In the self-regulation model, this is evident in the existence of a feedback loop, whereby a person, after performing a task, compares one's performance with internal or external standards and makes adjustments accordingly. Analogous to this process is the existence in the writing model of a monitor that fluidly shifts the writer among various writing processes, among them planning, writing, and reviewing. The self-regulation model, with its three major components -- person, behavior, and environment -- has its counterpart in the writing model. In this model, the construct "person" takes the form of such covert processes as generating, goal setting, organizing, and the existence and utilization of long-term memory. As the act of writing is inherently behavioral, examples of processes that would fit under the category "behavior" are evident as writing, editing, and monitoring. Finally, the writing model has an entire component labelled task environment, consisting of the rhetorical problem and the text produced thus far. And, though the writing model does not explicitly label the components person, behavior,

and environment, the model includes arrows drawn in a reciprocal way among the various components, in much the same way that the self-regulation model shows reciprocal interaction among the major components.

The current study calls to attention a shortcoming in Flower and Hayes' (1981) model: the process that we call self-directed information seeking is not explicitly in the model, nor is it easy to infer its place. Information seeking is a process that involves the person interacting with the environment. Relating this to the writing model, information seeking is an interaction between writing process and task environment. However, it is difficult to find on the model where information seeking would actually fit in, either in the writing process or task environment components. With regard to writing process, information seeking could be viewed as a combination of planning and reviewing. It is planning when the writer seeks additional information as a way of getting a better handle on the writing task. The act of looking up models and guidelines for the task at hand better prepares the writer for achieving optimal performance. But information seeking could occur under the rubric of reviewing, in that the writer could refer to the models and guidelines throughout the course of writing as a way to ensure that the writing is conforming to the appropriate standards. The current study suggests that information seeking is more often a planning than a reviewing activity, although it appears to exist in both domains. As such,

the component labelled monitor would serve to transport the writer back and forth between planning and reviewing.

The component in the writing model labelled task environment is incomplete as well. As the model stands, task environment consists of two parts: the text produced so far, and the rhetorical problem, which itself is comprised of topic, audience, and exigency (the demands of the particular task). An important sub-component that is missing is the existence of models and guidelines. Many if not all writing tasks have available such models. Flower and Hayes' (1981) theory would benefit from the inclusion of this feature.

Organizing is a feature that is made explicit in their model, subsumed under planning. Certainly the current study tapped into organizing processes during the act of writing, but in the task of writing from sources, organizing takes on a broader meaning. According to Spivey's (1990) constructivist view, organizing also occurs during the reading of text, as readers use their knowledge of text structure in order to garner meaning from the text. We made no attempt to observe this process in the present study, which is not to underrate its importance. Though the writing model does not differentiate between the two types of organizing, nevertheless they both fit within the framework.

Besides organizing, Spivey (1990) specified two other processes when writing from sources: selecting and connecting. Selecting, similar to the transforming process of deletion, in

which writers choose from the text what information they will utilize, was observed in pre-writing notes. The process of connecting was also observed, though not coded, in the essay. Subjects often went beyond the factual material they read in the sources to make connections between the text and their own personal viewpoints. This was particularly evident in the conclusion sections of essays. With regard to Bandura's (1986) self-regulation model, these processes would be considered person-centered and covert, being that the cognitions generally take place internally. Flower and Hayes (1981) would likely label selecting as a part of planning, in that it occurs prior to writing; they would likely view connecting as an interaction between the writer's long-term memory and the writing process. Indeed, it is from long-term memory that writers access points of view to connect with the information found in the text source.

Finally, Kintsch and van Dijk (1978) theorized about transforming processes during the composition of text. They formulated three rules of transformation: deletion (the removal of unimportant information), generalization (placing information into superordinate and subordinate categories), and construction (creating a topic sentence not explicitly present in the text read). In the current study, each of the three processes were observed. The first, deletion, was observed in pre-writing notes. Almost all subjects took notes from the source text and shortened the original text by paraphrasing and condensing. The second

process, generalization, was directly measured in pre-writing notes and became the major basis for the organizing/ transforming score. Finally, construction was observed and coded in the finished written essay. Creation of new topic sentences was one of the main criteria for assessing writing outcome. Again, all three processes would be considered examples of covert self-regulation.

Implications

Educational Implications

The findings of this study will be important for educators and for educational researchers. Studies conducted in the area of writing have all too often focussed on product and have neglected process. This is undoubtedly due to the fact that it is more difficult to tap into covert functions than it is to assess performance on a task. Even when studies on writing have attempted to measure process variables, the measures have often been limited.

One important self-regulatory process that was examined was organizing when writing. Unlike past measures of writing organization, which were generally inferred from the finished written product, the measure for organizing in this study was more process-oriented. By having subjects take notes on their material prior to writing and then analyzing the organization of these

notes, on-line organizing processes emerged. As expected, organizing when writing was found to contribute significantly to the quality of the written product. Thus, we recommend to teachers of writing to stress instruction in organizing, not just in the final product but in all stages of writing.

One method of instruction in organizing when writing is the content-based strategy of using graphic organizers. This study found this strategy to be worthwhile for enhancing the writing quality of college students. Unlike traditional organizing methods, such as outlining, which are completely verbal and unappealing to students, graphic organizers combine the verbal with the visual and may thus be utilized by more students. Furthermore, graphic organizers are not limited to the comparison/ contrast domain but exist for all the types of expository essays. Thus, teachers at the college remedial level and at the secondary level would be well advised to teach this particular strategy as part of their writing curriculum.

This study also shed light on a heretofore rarely studied phenomenon: information seeking from non-social sources. We found that when students had the option of referring to good models for writing, those who did so enhanced their writing product. Thus, we would recommend that teachers of writing include more models of well written essays during instruction, and that they instruct students on accessing the various resources available in the

classroom and the library that contain models and guidelines for writing.

We include a word of caution, however, regarding writing instruction. Based on our finding that subjects taught a content strategy subsequently made fewer self-directed attempts at information seeking, we recommend that teachers stress the importance of using a variety of strategies for completing a complex writing task. After being taught a particular writing strategy, students need to be informed that the particular strategy is valuable but is not enough for doing the best job possible.

Limitations of the Study

Although this study shed some light on the processes involved in carrying out a complex writing task, limitations in this study must be noted.

With regard to organizational processes, this study did not fully tap the covert processes involved. In some ways it came closer than previous studies, in that the measure for organizing was more on-line and less product-based. Nevertheless, cursory examination of pre-writing notes and final written essays revealed that a further process of organizing occurs after the pre-writing is completed. A think-aloud could tap into this process; however, the act of verbalization could interfere with the organizing

process itself. Perhaps an alternative method of tapping into the remaining on-line organizing processes could be developed.

Information seeking was tapped in a fairly direct and conceptually logical manner. However, in some ways the opportunity for seeking information was not realistic. In our study, students had access to writing models at their fingertips. They did not have to rummage through shelves of books to get at them, as students often have to do in an actual report writing task. Obviously, this process would expend more energy and would likely halt all but the most conscientious students. One could say that the current study provided data with respect to information seeking when the information was readily available with little effort on the student's part, but that the task did not approximate information seeking that would have to go on in many real-world settings.

Another possible problem with our operationalization of information seeking is the differential skills subjects have in using computers. Conceivably, subjects could have sought information or failed to seek information in relation to their confidence in using computers, rather than in an attempt at self-regulation. However, these concerns are probably unfounded. Observation of subjects during the writing task indicated that subjects had no problem in utilizing the computer for information seeking. As presented in this study, information seeking was far simpler than the average computer task: subjects pushed only five

keys in total. The experimenter gave subjects thorough instruction in the use of these five keys, and then each subject was tested individually to ensure their mastery of this simple process. Without exception, subjects learned the use of the computer rapidly and smoothly. Nevertheless, it is possible that even with equal knowledge in handling this particular computer program, subjects who were generally more comfortable with computers would utilize the computer to a greater extent.

The writing task itself, though reasonably approximating an actual academic assignment, was limited in scope. Because of logistical constraints in the study, subjects had enough time to write only one draft of the assigned essay. Although many students do in fact complete writing assignments in one sitting, ideally assignments take several drafts to complete. In addition, subjects had at their disposal all the material they needed to compose the essay. In a more realistic setting, they would have had the more complex chore of searching for material among many sources in a library. Thus, a writing teacher would complain that the task was not representative of what goes on in a writing classroom. Giving subjects a chance to revise their essays and observing information seeking in a library setting would have given a different perspective on the process studied. For one thing, under these circumstances self-efficacy would perhaps have been more predictive of outcome, since the predictiveness of self-

efficacy is optimal when student motivation is more, rather than less, taxed.

Subject motivation itself must be questioned in this study. After all, subjects' reward (credit towards completing a course) was contingent on their participation in the study, rather than on performance. In defense of the study, it must be noted that subjects did have a choice as to which experiment they would participate in. Knowing the topics of the various studies, the subjects who signed up for the current study knew they would be asked to write a composition. Presumably this eliminated those subjects who were the least motivated to write. Furthermore, observation of subjects during training and during the writing task gave the impression of subjects who were putting forth real effort. Many subjects even requested more time to complete the writing task (this request was denied, so as to keep time constant). Nevertheless, the motivation to perform to maximum capacity may not have been what it should.

A possible weakness specific to Study 2 is the fact that no writing pretest was administered to subjects. The lack of a pretest limits interpretation of the results in that no claims can be made for improvement in writing as a result of the intervention. All that can be concluded is that the experimental group performed better than the control group. Furthermore, there is no assurance that the two groups were equivalent in writing ability prior to the intervention. In defense of the way the

current study was carried out, subjects were randomly assigned to groups, and the two groups were found to be equivalent on all four background variables, including reading ability and history of having taken remedial writing courses. It would seem unlikely that subjects would be equivalent on all other background factors but not on writing. Furthermore, Campbell and Stanley (1963) consider a posttest-only control group design (the design used in Study 2) to be perfectly appropriate in training studies. Indeed, this design is in one way superior to the pretest-posttest control group design, in that the pretest in the latter design may have sensitizing effects on subjects.

Finally, the subject composition itself makes generalization of findings limited. On the positive side, subjects were a very good cross-cultural slice of urban society, comprised in approximately equal numbers of Latinos, African Americans, and whites, with a few Asians. Nevertheless, these were relatively motivated individuals, having worked hard enough in secondary school to be enrolled in a four-year college. Thus, to generalize our findings beyond the population of public college students would be inappropriate. Typical students in urban public secondary school settings, faced with a similar writing task, might approach the task in a different manner.

Recommendations for Future Research

In light of this study's limitations, a number of suggestions are made for future investigation. To begin with, covert organization processes need to be tapped more fully. Perhaps a combination of pre-writing notes and think-aloud between the time of pre-writing and writing would accomplish this task. Alternatively, a new, more comprehensive measure of organizing could be devised. With regard to information seeking, an examination could be made of time spent seeking information in a real classroom or library, much as was carried out by Nelson and Hayes (1988), but more behavioral in scope. In order to make the writing task more of a real-world situation, time could be given for subjects to revise their compositions and then further access new information. This longer-range investigation would better reveal information seeking processes for complex, academic tasks.

Areas not looked into in this study need to be addressed. Out of the fourteen self-regulated learning strategies outlined by Zimmerman and Martinez-Pons (1986), only two have been examined in a behavioral way in this study. The remaining twelve strategies need to be similarly investigated. Perhaps some of the strategies that did not appear to distinguish high achieving from low achieving students during the interview would emerge behaviorally as important variables. Likewise, other parts of the Flower and Hayes (1981) model of writing need to be examined directly. The functioning of the monitoring component, in particular, could

reveal important aspects of the writing process. And the interaction of the various components, e.g., the three planning components, leaves room for much research.

Graphic organizers are a promising tool for writing teachers, and research in this area needs to be expanded. Questions include what methods of teaching this strategy are the most effective, and for what writing tasks are graphic organizers particularly suitable.

The writing task itself could be changed in order to investigate the processes used to write many different types of compositions, among them argumentative essays, descriptive essays, and even narratives and poems.

Subject motivation needs to be better addressed. One solution would be to make subject rewards contingent on performance, rather than on participation. This could be accomplished by carrying out a study in an actual writing class, and assigning grades to subjects' essays that would count as part of their final course grade.

The design of Study 2 would be strengthened by adding a writing pretest, in that this inclusion would expand on the number of conclusions that could be made. Improvement in writing as a result of the intervention would be better and more directly ascertained. In addition, there would be more definitive evidence that the two groups were equal in writing ability prior to training.

An additional factor, not examined in the current study but of potential importance, is the moderating variable of perceived difficulty. One factor that would have affected perceived difficulty is prior knowledge of the text content. Specifically, subjects from African American backgrounds may have been more familiar with the information they read regarding the two famous black leaders. This knowledge may have reduced their level of perceived difficulty for the task and thus have aided in their motivation to complete it. Subjects who experienced greater perceived difficulty, either because of lack of prior knowledge or lack of experience on the specific writing task, may not have persisted on task as well. A future study could have subjects indicate their level of perceived difficulty during or shortly after task completion. Analyses could then be made to determine the contribution of perceived difficulty to writing outcome.

Finally, writing process research needs to be expanded across different subject populations. The current study could be carried out with various groups, including secondary education students, the learning disabled population, non-native English speaking students, and even students from other countries and cultures.

Appendices

Appendix A

Scales of Measurement

Self-Efficacy for Writing Questionnaire

Subject code #: _____

You are going to read two articles and then write a compare-and-contrast essay based on the articles. Tell us how well you can do the things listed below by entering a number to the left of each question. Please be as honest as possible in your answers. Use the following scale for your responses:

Not well at all		Not too well		Pretty well		Very well
1	2	3	4	5	6	7

___ 1. After reading two articles, I can find several ideas to compare and contrast them on.

___ 2. I can figure out what information in a reading is the most important to include in my paper.

___ 3. Before writing the essay, I can create a good outline.

___ 4. I can start writing with no difficulty.

___ 5. I can write a good introduction for the essay.

___ 6. I can use my first attempts at writing to refine my ideas on a topic.

___ 7. I can find ways to concentrate on my writing even when there are many distractions around me.

___ 8. I can meet the writing standards of a grader who is very demanding.

___ 9. I can come up with good examples quickly to illustrate an important point.

___10. I can rewrite my wordy or confusing sentences quickly.

___11. I can write sentences that smoothly shift from one idea to another.

___12. I can refocus my concentration on writing when I am worried or find myself thinking about other things.

___13. When I get stuck writing, I can find ways to solve the problem.

___14. I can find ways to motivate myself to write a paper even when the topic holds little interest for me.

___15. I can write a good conclusion that ties all the parts together.

___16. I can revise a first draft of a paper so that it is shorter and better organized.

___17. I can find and edit all my grammatical and spelling errors.

___18. I can be efficient so as to finish my paper on time.

___19. I can create good topic sentences for each paragraph.

___20. I can use my own words to explain the author's point.

Organizing/Transforming Scale

1 Copying text; no particular order

2 Combination of copying text and gist statements; no particular order

3 Formulation of gist statements; no particular order

4 Gist statements organized in the simplest way

5 Gist statements organized more than minimally, but not fully

6 Well-organized outline or chart

Writing Quality Primary Trait Scoring Scale

Text structure:

0: The essay has no resemblance to a comparison/ contrast essay. Little, if anything, is being compared or contrasted.

1: The essay compares and contrasts at least one feature, but it is in the form of one, shapeless paragraph with the barest introduction or conclusion, if any.

2: The essay has two separate sections: either an introduction and comparison/ contrast section, or two comparison/ contrast sections, or a comparison/ contrast section and conclusion.

3: The essay has three separate sections: either an introduction, comparison/contrast section and conclusion, or an introduction and two comparison/ contrast sections, or two comparison/ contrast sections and a conclusion.

4: The essay has all the required sections, all separate from one another: an introduction, at least two comparison/contrast sections, and a conclusion.

Topic sentence and supporting details:

0: Essay content has almost no relation to the sources.

1: The essay has virtually no comparison/ contrast topic sentences and simply lists comparisons and contrasts.

2: The essay uses comparison/ contrast topic sentences with supporting details less than half the time; mostly the essay simply lists comparisons and contrasts.

3: The essay uses comparison/ contrast topic sentences with supporting details more than half the time; the rest of the essay simply lists comparisons and contrasts.

4: The essay uses comparison/ contrast topic sentences with supporting details virtually throughout the essay.

Appendix B

Computer Texts

Source Text: Martin Luther King

Martin Luther King, a black Baptist minister, was the main leader of the U.S. civil rights movement in the 1950's and 1960's. He was born in 1929 in Atlanta, Georgia, where he was also raised. As the son of a minister, King did well in school, going on to get a Ph.D. in theology at Boston University.

King's civil rights work began with a protest of Montgomery, Alabama's segregated bus system in 1955. King was the president of a group that successfully urged blacks to boycott the city's buses. Though King's home was bombed, he continued to insist on non-violent protests.

In 1963, King and other civil rights leaders organized the massive March on Washington, which highlighted black unemployment and inequality. The high point of the rally was King's stirring "I have a dream" speech. Thereafter, he was famed by both blacks and whites for his speaking skills. In 1964, King received the Nobel Peace Prize for leading non-violent civil rights demonstrations.

Continued violence against civil rights workers frustrated many blacks. Student and militant groups urged a more aggressive response to the violence and began to use the slogan "Black Power." That phrase troubled King, who wanted to emphasize religious, non-violent activities.

In 1968, while King was in Memphis, Tennessee to support a strike of black sanitation workers, he was shot and killed by James Earl Ray, an escaped convict. King's assassination produced shock, grief, and anger. Blacks rioted in more than 100 cities. In 1983, Congress passed a federal holiday honoring King. He became only the second American whose birthday is a national holiday.

Source Text: Malcolm X

Malcolm X, a black militant leader, led a controversial life in the 1950's and 1960's. He was rejected first by civil rights leaders for urging violence in the black struggle. Later, when his views softened, he was killed by three Black Muslims at a rally in Harlem. After his assassination, "The Autobiography of Malcolm X" made him a hero among black youth.

Malcolm's troubles began early. He was born in Lansing, Michigan with the name Malcolm Little. The Ku Klux Klan burned down his family's house, and two years later his father was murdered. He spent many years in detention homes.

While in prison for burglary at age 21, he converted to the Black Muslim faith. They believed that black people were superior and whites were evil. When released from prison, Malcolm went to Black Muslim headquarters in Chicago and became involved in the group, even becoming a minister. He changed his last name to "X", as did other black nationalists who considered their family names to have been given to them by white slave-owners.

Malcolm X went on speaking tours and became the Black Muslims' best speaker and organizer. Eventually he became minister of a Muslim mosque in Harlem. Speaking brilliantly, Malcolm criticized the white exploitation of black people. But he also spoke out against the civil rights movement. Instead of integration, Malcolm called for black separatism and black pride.

In time, Malcolm left the Black Muslim group and formed his own religious group. He no longer preached the inherent evil of white people, but spoke of living in harmony. Yet, he will always be remembered for his separatist views.

Model Comparison/Contrast Essay: Football/Rugby

Like many American institutions, football began in England, where it is known as rugby. In crossing the Atlantic Ocean, the game kept some of its original features, but in other ways the two sports became distinct.

To a casual spectator, the surface features have remained the same. In both sports, two teams pass, kick, and run with an oval ball on a rectangular field. And, to be successful, players must use mental skills involving teamwork.

One difference between the games is the greater specialization of football players. In football, there is a separate defense and offense. Not so in rugby, where the same players handle both defense and offense. Though rugby players have specific positions, players throw the ball back and forth many times in a play, so that most players handle the ball.

Americans who watch rugby comment on the lightness of the rugby uniform. Absent are the crash helmets and bulky pads found in the football uniform, necessary in a game with so much blocking and tackling. The rugby uniform, consisting of a jersey, shorts, and cleated shoes, allows for easier movement and greater speed. Thus, in rugby, finesse is more important than brute strength.

Another difference is the games' playing times. Though football is alloted 60 minutes, the huddling, penalties, and time outs make playing time 3 hours. Rugby, in contrast, is played in two 35 minute halves, with no huddling and few time outs. Thus, playing time is only 90 minutes.

It is said that every sport reflects its society. Therefore, it is little wonder that the same game on two continents could have evolved as they did.

Model Comparison/Contrast Essay: Ant/Human Society

From outward appearances, it would seem that humans and ants have little in common. In their social structures, though, the two groups show some striking similarities. Ants can be classified according to the way they obtain food -- hunter, farmer, and harvester -- similar to human classes.

The hunter ants, like human hunters, chase their prey. Some march in huge swarms organized by columns. They conquer animals as large as mice or snakes. Other swarms attack plants, sometimes stripping an entire bush of its leaves.

Farmer ants resemble human livestock farmers. These ants raise domestic animals, such as lice and caterpillars, to produce food. Others capture aphids ("ant cows"), set them loose, then "milk" them for the honeydew they gather.

The third class, harvester ants, behave like agricultural farmers. They collect seeds, then husk and store them. During rainy seasons the workers keep the seeds dry so that they do not sprout or get moldy.

Against these resemblances is the fact that workers in ant societies are all female. The few male ants are there only to fertilize the queen ants' eggs. Also, since there is only one queen who lays eggs, all the ants in a colony are related to each other and live as one huge family. Though some humans live in large extended families, none can compare with an ant colony, consisting of up to 500,000 members, all related genetically.

In summary, it is evident that ants do not resemble humans in their family structure, though the groups are similar in the ways they obtain food. Each group has separately arrived at a number of methods that are effective.

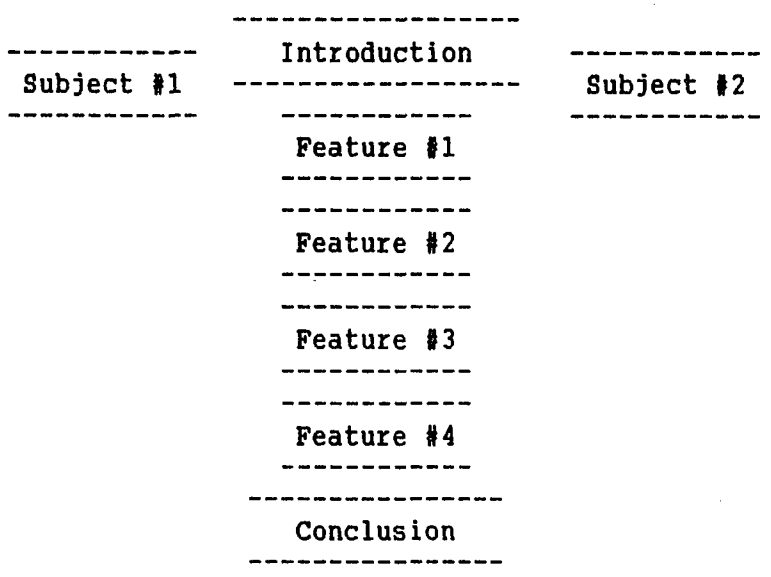
Guidelines for Writing a Comparison/Contrast Essay

In a comparison/ contrast essay, the writer describes the various ways that two things are alike and the ways that they are different.

The essay should be approximately 1-2 sides of a page long and neatly written. Spelling, punctuation, and grammar should be as correct as possible. When making corrections, do not erase, but simply cross out the original words and write in whatever space is available.

A good comparison/ contrast essay contains several sections: an introduction, a central body, and a conclusion, all in separate paragraphs. The introduction presents the topic to the reader and gives a brief overview of what is to come. The central part of the essay should describe at least two major similarities and two major differences between the two subject areas. It is best to break this section down into different paragraphs, with each paragraph containing a topic sentence followed by supporting details. Finally, the conclusion should tie together the main points in such a way as to arrive at a new perspective.

Graphic Organizer: Skeleton



Graphic Organizer: Football/Rugby

Introduction: originated in England; games somewhat same, but became distinct

Football		Rugby
Pass, kick oval ball Rectangular field	Surface Features	Pass, kick oval ball Rectangular field
Highly specialized Few touch ball	Player Specialization	Not as specialized All handle ball often
Helmets, bulky pads For tackling, blocking	Uniform	Jersey, shorts, cleats For speed, finesse
3 hours; much huddling, time outs, penalties	Playing Time	90 minutes; few time outs and interruptions

Conclusion: every sport a reflection of its society; no wonder games differed

Appendix C

Training Texts

Source Text: Catholicism

The Roman Catholic Church is the largest religion in the world. Followers of the Catholic faith are found on every continent, though most live in Europe, North America, and South America.

Catholics believe in one God, who is in the form of a "trinity": the Father, the Son, and the Holy Spirit. According to their belief, God sent his son Jesus Christ to save humanity from all its sins. Though Catholics worship one God, they have deep respect for persons closely related to god, including Mary (the mother of Jesus) and various saints.

The pope is the leader of the Roman Catholic Church. He governs the church from Vatican City within Rome, Italy. There, the pope and a body of cardinals dictate the religious laws to be observed throughout the world. All Catholic priests are male, and they are forbidden from marrying and having any sexual relations.

Catholic rituals are highly structured and ceremonial. Among them is the Eucharist, in which worshippers eat the body of Jesus symbolically in the form of a wafer. Another ritual is baptism, during which a child or adult is cleansed of sin through being dunked in water. Catholics also go to "confession," in which they admit their sins to a priest and are forgiven.

One rarely performed Catholic ritual is known as Exorcism. Catholics beieve that an evil spirit can take conrol of a person. When this occurs, the possessed person changes in personality, often becoming hostile. A priest known as an exorcist holds a crucifix and carries out a series of prayers over the possessed person to ward off the spirit.

Source Text: Voodoo

Voodoo is the folk religion of Haiti that combines Catholic elements with African religious practices. This religion was started by African slaves who were sent to Haiti, an island in the Carribean Sea, in the 18th century. The word "voodoo" comes from the African word "vodun", which means a god or spirit.

Voodoo ceremonies are headed by a male priest or female priestess who has gone through initiation. There is no central organization for priests. The priests and priestesses are all independent of one other, with no person in a position of higher power.

People who practice voodoo believe in a high god, but mostly they worship hundreds of saints known as "loas." These "loas" include St. Patrick and St. Anthony, as well as a number of African gods. Each family worships one or more of these "loas" throughout their lives.

Voodoo ritual has elements from a mixture of religions. Worshippers play drums, dance, and practice ancestor worship. They also celebrate Christmas, do baptisms, make the sign of the cross, display the crucifix, and recite prayers such as the Hail Mary and the Lord's Prayer.

There is no evidence that voodoo involves human sacrifice. Sometimes during a ceremony an animal (such as a chicken, goat, or pig) is killed, but it is then cooked and eaten. Services for the "loa" involve a feast and a dance. The "loa" supposedly joins the dance by "possessing" people in the ritual. The possessed individuals move, talk, and act like the "loa" that is in their body. At the end of the possession, the individual is expected to have no memory of the experience.

Source Text: Cocaine

Cocaine is a powerful stimulant drug extracted from the coca shrub, grown in the mountains of Peru, Bolivia, and Ecuador. The leaves from this plant, containing small amounts of cocaine, were chewed hundreds of years ago by Indians from the Inca empire. The drug helped them cope with the stress of living and working at high altitudes.

When cocaine was extracted into its pure form in the 1800's by Europeans, it was considered a "wonder drug" that could help sufferers of asthma and digestive problems. Cocaine is also a pain killer, and it was used for a while as a local anesthetic. The soft drink Coca-Cola once contained small amounts of the drug. When cocaine's highly negative effects were determined, however, its use was made illegal.

Cocaine is most commonly taken by inhaling, or "snorting," the powder into the nose, from which it is absorbed into the blood. Users feel the effects within minutes, and the feeling lasts about 30 minutes. Another way of taking the drug is through smoking. Here, users either "freebase" a form of cocaine or smoke a pellet known as crack. Smoking these forms of cocaines is felt by the user in only seconds. These effects are intense but short-lived.

As is true with other stimulant drugs, cocaine produces the following effects: increased blood pressure, faster heart rate and breathing; reduced appetite; and feelings of well being. Cocaine is highly addicting. When taken in the form of crack, addiction may occur after only one or two doses. Cocaine addicts will continue using the drug, regardless of cost or its effects on their lives. Using large amounts of cocaine, or repeated use, lead to any or all of the following: depression, anxiety, paranoia, mental confusion, and death. In the U.S., cocaine has become responsible for a large increase in drug-related deaths.

Source Text: Heroin

Heroin is a highly addictive narcotic drug derived from the Oriental poppy, grown mostly in Mexico and countries in the Middle East, such as Turkey. An unripe capsule of the poppy plant, when cut, oozes a gum known as opium. When treated with chemicals, opium becomes heroin.

Originally, heroin was used in hospitals as a pain killer. But its undesirable effects were found to far outweigh its value as a pain killing drug, and most countries strictly prohibit its use. Since heroin is a narcotic, it dulls the senses and reduces memory. For these reasons it decreases pain and may produce sleep or a dream-like state. Many users describe a feeling of relaxation or euphoria. Like other narcotics, heroin causes a slowdown in heart rate, breathing, and digestive activity. It also makes the pupils of the eye contract.

Most heroin users inject the drug directly into their bloodstream, a procedure known as "mainlining." This method produces the fastest results, though in the course of time the veins in the arms and legs become scarred. In addition, shared use of needles leads to the spreading of infectious diseases such as hepatitis and AIDS.

Heroin users develop a tolerance towards heroin, so that they must take more and more of the drug to experience its effects. It is physically addicting, though the addiction does not occur right away, but over the course of months. Injection of an overdose of heroin can be lethal. It is estimated that two addicts die every day in New York City from a heroin overdose. Death is due to paralysis of the breathing center of the brain.

Source Text: Cuba's Economy

Cuba is the largest island in the Carribean Sea, and it is less than 100 miles from Florida. Until 1959, much of Cuba's economy was controlled by American companies. But since 1959, when Fidel Castro came into power, Cuba has been led by a Communist government. As in most Communist countries, the Cuban government plans and controls Cuba's economy.

Few farmers own their own land. Instead, crops are grown on large state farms, which used to be estates owned by American companies. As in the past, Cuba's chief crop is sugar cane. Other crops include tobacco, bananas, and coffee.

Before the Castro revolution, Cuba's fishing industry was not very important. Now that fishermen are part of fishing cooperatives, fishing has become big business. The members share in the profits of the catch, though the government owns the companies.

Cuban factories used to be owned by Americans as well, but in 1960, Cuba siezed all American owned business. Cuba's main industry is food processing, especially sugar refining. Cuban refineries also process imported oil. Other manufactured products include steel, cement, and fertilizer.

Most of Cuba's trade is with ex-Communist countries in Eastern Europe. Cuba has always had a serious trade gap, and until recently, the Soviet Union helped Cuba out by buying Cuban sugar at a very high price and selling oil to Cuba at a low price. Since the Soviet Union's collapse, however, it is subsidizing Cuba less and less.

Tourism in Cuba has suffered, mostly because of the U.S. ban on travel to Cuba. Cuba has begun building huge hotels to attract tourists from other Western countries. Even so, it will not see the huge number of American tourists from pre-Castro days until relations between the two countries warm up.

Source Text: Puerto Rico's Economy

Puerto Rico, an island in the Carribean Sea, is a commonwealth of the U.S. As such, it is not a state, but its people have most of the same rights, and follow the same laws, as Americans on the mainland. Furthermore, the economy of Puerto Rico is tied in with that of the U.S.

One large Puerto Rican industry is tourism. Puerto Rico is famous for its lovely beaches and warm weather. It is estimated that 1 1/2 million tourists visit Puerto Rico each year, most of them Americans, spending a total of almost a billion dollars.

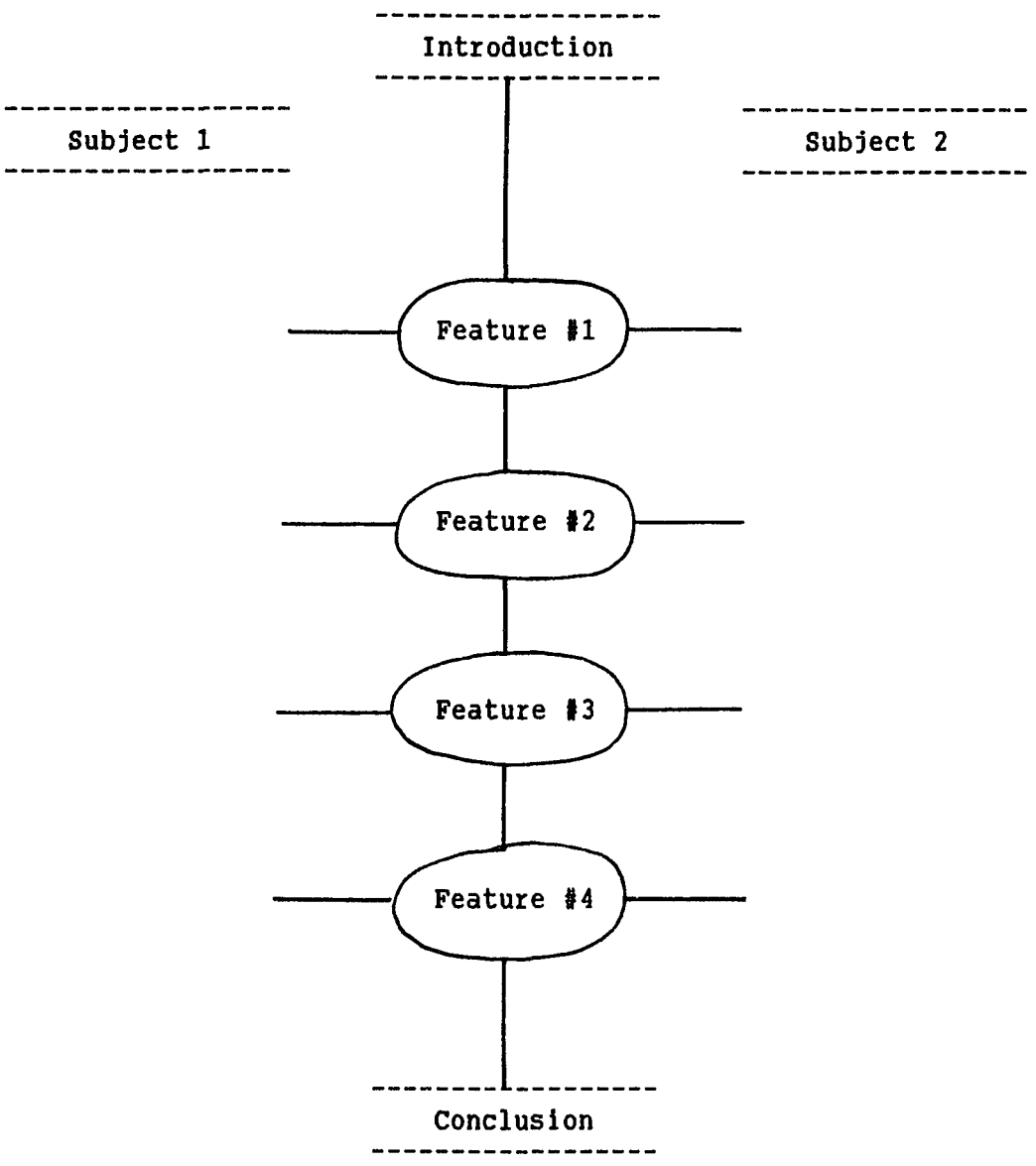
Agriculture is a smaller, though important industry. Most of Puerto Rico's total land area is farmland owned by individual farmers. The leading crop is sugar cane, followed by coffee, tobacco, and bananas. Beef cattle and poultry are also raised in large quantity, and milk is produced.

Manufacturing is central to Puerto Rico's economy. Private companies own over 2000 factories, producing (in order of value) chemicals, electrical equipment, and refined food products, such as sugar from sugar cane.

Mining accounts for a small percent of the island's economy. The most valuable minerals are stone, sand, gravel, and lime. Most of these are mined in areas in and around San Juan, the capital of Puerto Rico.

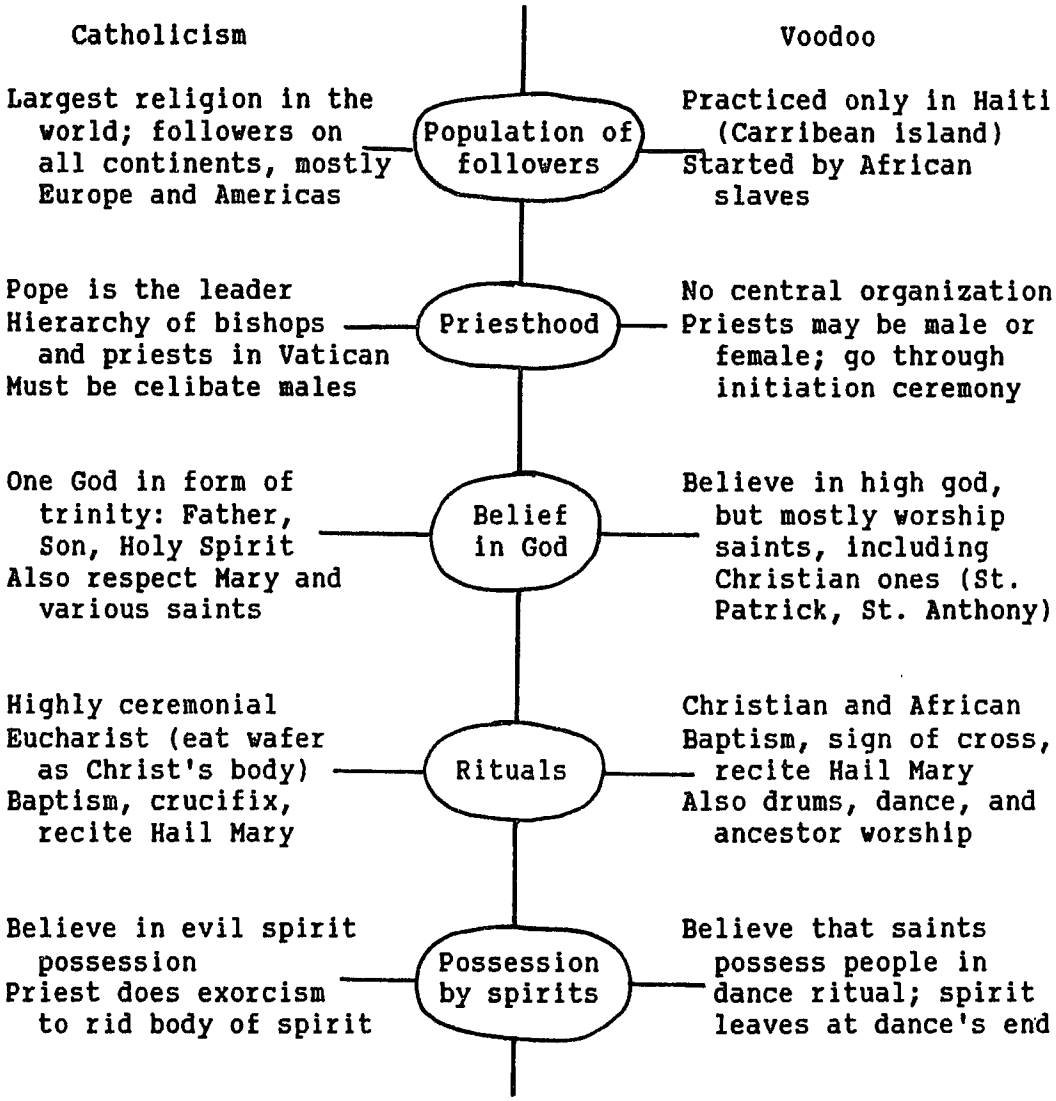
As can be expected from a commonwealth state, the great majority of Puerto Rico's trade takes place with the U.S. Puerto Rico exports tropical food, such as sugar, bananas, and pineapples, and some of its manufactured goods as well, mainly chemicals (in the form of medicine) and machinery. Puerto Rico must import advanced equipment, such as cars and computers.

Graphic Organizer: Skeleton



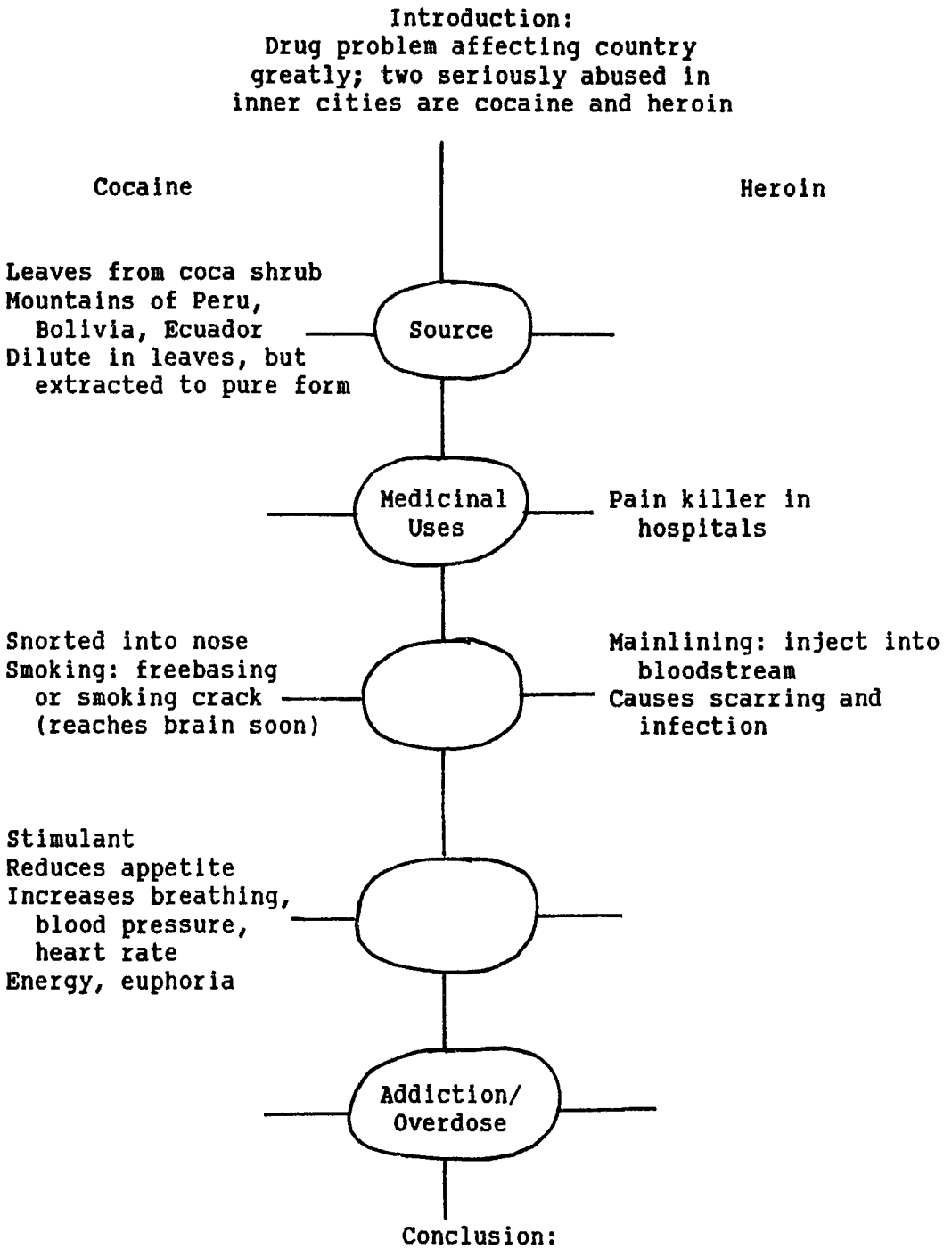
Graphic Organizer: Catholicism/Voodoo

Introduction:
Most people practice one of the many world religions; culture has effect on religious practices; some similarities in seemingly different religions



Conclusion:
Interesting to see the mixture of Christian and African elements in voodoo; both will continue to evolve as result of changes in culture

Graphic Organizer: Cocaine/Heroin



Appendix D

Demographic Questionnaires

Demographic Questionnaire, Form 1

Subject code number: _____

Sex: Male _____ Female _____

What is your native language? _____

In what country did you attend grades 9-12? _____

Did you ever attend community college? Yes ____ No ____

Have you ever taken a remedial writing course in college?
Yes ____ No ____

Have you ever previously been taught to write compare-and-contrast essays? Yes ____ No ____

Demographic Questionnaire, Form 2

Subject code number: _____

Sex: Male _____ Female _____

What is your native language? _____

In what country did you attend grades 9-12? _____

Did you ever attend community college? Yes ____ No ____

Have you ever taken a remedial writing course in college?
Yes ____ No ____

Have you ever previously been taught to write compare-and-contrast essays? Yes ____ No ____

Have you ever previously been taught to write graphic organizers?
Yes ____ No ____

Appendix E

Directions to Subjects

Directions for Writing the Essay, Given to All Subjects in Study 1 and Control Subjects in Study 2

Your task is to write a compare-and-contrast essay on the lives of Martin Luther King and Malcolm X. In other words, write an essay stating how their lives were alike, and how they were different.

In the first twenty-five minutes, you must read two texts on computer, one on Martin Luther King, and one on Malcolm X, and then take notes on these articles. You will also have access to three texts on the computer: two examples of good compare-and-contrast essays, and guidelines for writing a good compare-and-contrast essay. It is up to you to decide which of these three texts, if any, you will refer to, and in what order. During this time you may NOT begin writing your essay, but you should take good notes that will enable you to begin the essay when it is time to do so.

After the twenty-five minutes are up, you must stop taking notes. You will then have twenty-five minutes to write the essay. While writing the essay, you may refer to your notes and any of the five texts on computer. When the second twenty-five minutes are up, your notes and essays will be collected.

Directions for Writing the Essay, Given to Experimental Subjects in Study 2

Your task is to write a compare-and-contrast essay on the lives of Martin Luther King and Malcolm X. In other words, write an essay stating how their lives were alike, and how they were different.

In the first twenty-five minutes, you must read two texts on computer, one on Martin Luther King, and one on Malcolm X, and then write a graphic organizer based on these texts. You will also have access to five texts on the computer: two examples of good compare-and-contrast essays, guidelines for writing a good compare-and-contrast essay, a skeletal graphic organizer, and a completed graphic organizer. It is up to you to decide which of these five texts, if any, you will refer to, and in what order. During this time you may NOT begin writing your essay, but you must only read text and write a graphic organizer.

After the twenty-five minutes are up, you must stop taking notes. You will then have twenty-five minutes to write the essay. While writing the essay, you may refer to your notes and any of the seven texts on computer. When the second twenty-five minutes are up, your notes and essays will be collected.

Instructions Given to Experimental Subjects During Training Phase, Study 2

A graphic organizer is a way to organize your notes before writing an essay. I'm going to teach you how to write a graphic organizer for a compare-and-contrast essay. That's an essay in which you write the ways two things are alike and the ways they're different.

Please start by reading the two essays on your desk, one on the topic of Roman Catholicism and the other on the topic of Voodoo. (Give time for subjects to read the essays.)

Now that you've finished reading, let's look at two graphic organizers. First look at the one titled "Graphic Organizer for Comparison/ Contrast Essays." This is a skeletal graphic organizer. Notice it consists of three parts: an introduction, several features that get compared and contrasted, and a conclusion. Also, there are two columns for the two subjects that are being compared and contrasted -- Subject 1 and Subject 2.

Now look at the sheet titled "Graphic Organizer for Catholicism/ Voodoo Essay." Put this sheet side by side with the two essays on Catholicism and Voodoo you just read, and with the skeletal graphic organizer. Notice that the two topics that are being compared -- Catholicism and Voodoo -- each have their own column. Also notice that there are five features that are being compared and contrasted: the population of the followers, the priesthood, the belief in God, rituals, and possession by spirits.

In a graphic organizer, all of these features get put in the middle column and circled. To the left of each feature is how each feature relates to the Catholic religion. For example, we can see that Catholics are a very large population, since it's the largest religion in the world and has followers on all continents. If we want to know about the priesthood in the Catholic religion, we can see that they have a Pope for a leader and a hierarchy of bishops and priests. Also, all of their priests are male. All of this information in the graphic organizer is taken from the two essays you read.

To the right of each circled feature is how each feature relates to the religion of Voodoo. For instance, in terms of the population of followers, we can see that only the people of Haiti practice Voodoo, so it doesn't have many followers. Notice that this is in contrast to the Catholic religion, which has many followers. If we want to know about Voodoo priesthood, we see that it does not have a central organization, and the priests can be male or female. This is also in contrast with Catholic priesthood, since Catholics only have male priests, and they have a strict hierarchy.

On the other three features, we see a combination of similarities and differences. Let's examine their belief in God. It looks like both religions believe in a high God, and they both

worship Christian saints. This is a similarity. But one difference is that people who practice Voodoo emphasize the saints a bit more than God. Notice further down on the next feature -- rituals -- that the two religions share some of the same rituals: baptism, the crucifix, and the Hail Mary. But one major difference is that Voodoo also has African rituals, like drumming and dancing, that Catholics don't have. Finally, we see a similarity in the fact that both religions believe in possession by spirits.

When you write a graphic organizer, you're going to make two columns for the two topics being compared, just like the two topics of Catholicism and Voodoo. The next step is to find four or five features to compare and contrast them on. Those features get put in the middle and circled. Then, just like in this example, you write how each feature relates to each topic, going all the way down the two columns. That way, when you're finished the graphic organizer, you're ready to write your essay on how the two subjects are alike and different.

After you write down all the features and how they relate to the topics, your graphic organizer needs a brief introduction at the top and a brief conclusion at the bottom. Notice that in the Cathoicism/ Voodoo graphic organizer introduction, the author gives a general statement about religion and culture. And in the conclusion, at the bottom, the author mentions how the religions are going to continue to evolve.

Now you're ready to begin writing your own graphic organizers. To begin, please read these two essays I am handing out. One is on the topic of cocaine, and the other is on the topic of heroin. When you finish reading the two essays, use the information in the two essays to fill out this half-finished graphic organizer that compares and contrasts the two drugs. I will be circulating to give you feedback. (Give time for subjects to read essays and fill out the graphic organizer.)

Now you will write your own graphic organizer from scratch. Please read these two essays I am handing out. One is on the topic of Cuba's economy, and the other is on the topic of Puerto Rico's economy. When you finish reading the two essays, use the information in the essays to write on a blank piece of paper your own graphic organizer that compares and contrasts the two economies. I will be circulating to give you feedback. (Give time for subjects to read essays and write their own graphic organizer.)

Instructions Given to Control Subjects During Training Phase, Study 2

You are going to be practicing note-taking before writing a compare-and-contrast essay. That's an essay in which you write the ways two things are alike and the ways they're different.

Please start by reading the two essays on your desk, one on the topic of Roman Catholicism and the other on the topic of Voodoo. (Give time for subjects to read the essays.)

Now that you've finished reading, let me tell you the ways these two religions are alike, and the ways they differ. We can see that Catholics are a very large population, since Catholicism is the largest religion in the world and has followers on all continents. In terms of the priesthood in the Catholic religion, we can see that they have a Pope for a leader and a hierarchy of bishops and priests. Also, all of their priests are male. All of this information is taken from the two essays you read.

Now let's examine the religion of Voodoo. In terms of the population of followers, we can see that only the people of Haiti practice Voodoo, so it doesn't have many followers. Notice that this is in contrast to the Catholic religion, which has many followers. If we want to know about Voodoo priesthood, we see that it does not have a central organization, and the priests can be male or female. This is also in contrast with Catholic priesthood, since Catholics only have male priests, and they have a strict hierarchy.

In other features, we can see a combination of similarities and differences. Let's examine their belief in God. It looks like both religions believe in a high God, and they both worship Christian saints. This is a similarity. But one difference is that people who practice Voodoo emphasize the saints a bit more than God. Notice also that the two religions share some of the same rituals: baptism, the crucifix, and the Hail Mary. But one major difference is that Voodoo also has African rituals, like drumming and dancing, that Catholics don't have. Finally, we see a similarity in the fact that both religions believe in possession by spirits.

Notes may also contain a brief introduction and a brief conclusion. If preparing to write a compre-and-contrast essay on this topic, the author could write a general introductory statement about religion and culture. And in conclusion, the author could mention how the religions are going to continue to evolve.

Now you're ready to begin taking notes. To begin, please read these two essays I am handing out. One is on the topic of cocaine, and the other is on the topic of heroin. When you finish reading the two essays, use the information in the two essays to take notes for a hypothetical essay that would compare and contrast the two drugs. I will be circulating to give you feedback. (Give time for subjects to read essays and take notes.)

Now you will take notes one last time. Please read these two essays I am handing out. One is on the topic of Cuba's economy, and the other is on the topic of Puerto Rico's economy. When you finish reading the two essays, use the information in the essays to take notes for a hypothetical essay that would compare and contrast the two economies. I will be circulating to give you feedback. (Give time for subjects to read essays and take notes.)

Appendix F

Samples of Subject Writing

Sample Pre-Writing Notes

similarities

- both brilliant speakers
- both great leaders
- both ~~was~~ made impact in 1950's + 1960's
- both wanted black equality
- both had their houses destroyed by the KKK
- both assasinated

Differences

- King son of minister, did well in school, Ph.d. in theology at Boston University.
  X house burned down and father murdered by KKK. spent years in detention homes, went to jail at age 21.
- King was Baptist
  X was black Muslims.
- King nonviolent
  X urged violence

Sample Graphic Organizer

Introduction: The difference of Martin Luther King and Malcolm X. Beliefs and ideas.

	King	Malcom X
Born	born In 1929 in Atlanta, Georgia.	Born in Lansing, Michigan
Works	Civil rights, President of the civil rights group. Minister.	inroled in Black Muslim headquarters group. Minister of import muslim mosque
Beliefs	non-violent activities.	Black people were superior and white people were evil. Believe of violence in the black struggle. Later changed viewed wanted to live in harmony
Assassination Death	Shot and killed by James Earl Ray In 1968. 2nd American whose birthday is a national holiday	Killed by ~~three~~ Black muslim at a rally in Harlem.

Conclusion: Both men had an ideas for a good causes but expressed them differently

Sample Comparison/Contrast Essay

Both Malcolm X and DR Martin luther Kings lives make for a good study in contrast and comparison DR King spoke for Peace and Non violence and was killed for this. Malcolm X Called for Seperation and Black pride But when his views modified and he called for the races to living in Harmony he was killed DR Kins By a white man and Malcolm X By three Black men

It would be hard to find 2 men of more Dissimilar Background DR King was from rural Georgia Son of a minister good Student who recieved a phd in theology from Boston ~~College~~ University and Became a Baptist minister. Malcolm X Father was murdered By the Klan he spent time in Detention Homes and finally went to Prison while there Became Black muslim minister.

DR King Belived in CHRISTIAN NON Violence led boycots and marches even when his house was burned and Violence was used against Civil Rights Workers He Still wanted to emphasise religious and Non Violent activities.

Malcolm X originally wanted Black Seperatism and ~~DR King~~ spoke out against the Civil Rights movement. He was also a Dynamic Speaker was given pulpit at Harlem mosque

DR King recieved Nobel prise For his Civil Right Work. Malcolm X wrote a Very influencial Book for Black youth his Auto Biography

DR King a non Violent man dies a Violent Death at the Hands of James Earl Ray His followers Rioted across the US after his Death His Birthday was made a National Holiday

Although both Malcolm X and DR King were both very different people in the End Both were killed for Calling for Peace and tollerance in a intolerint world.

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