Instructional Approaches to Improving Students' Writing of Compare-Contrast Essays: An Experimental Study

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Students find compare-contrast writing more difficult than other expository formats (Hiebert, Englert, & Brennan, 1983). Difficulties include problems with acquiring source information, with organizing information into compare-contrast format, or both. This study examined instruction in each area: (a) Summarization Skills supporting acquisition of source information, (b) Compare-Contrast Text Structure supporting organization of information, and (c) Summarization Skills and Text Structure for both processes. Students read two descriptive passages and wrote a compare-contrast essay. Students receiving Text Structure instruction had significantly higher scores on compare-contrast Structure but lower ones on Content than did those in the other groups. Students receiving Summarization Skills instruction had significantly lower scores on Structure than did students in the other groups. Explicit instruction in text structure is recommend for compare-contrast writing, including specific strategy instruction to match learning goals and tasks. Further research is recommended about the interaction of content knowledge and writing strategy knowledge, as well as the role of text structure in reading-writing expository text.

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"Compare and contrast Bach and Beethoven." "How are Little Red Riding Hood and Goldilocks alike? How are they different?" "What are the differences between acids and bases? Between proteins and carbohydrates?" "Compare and contrast Willy Loman and Oedipus as tragic heroes."

From elementary to graduate school, students are expected to learn and remember information from texts.

They are expected to connect new knowledge with previous knowledge and to identify similarities and differences among concrete concepts (e.g., squares and triangles) as well as abstract ones (e.g., two psychology theories). Expository writing tasks are often used to assess students' understanding of these processes.

Writing expository text is an important part of academic learning (Englert & Hiebert, 1984), and students' ability to present information and ideas through their writing plays "an integral role" in academic success (Applebee, Langer, Mullis, Latham, & Gentile, 1994, p. 25). Students at the secondary and college level often write expository text about the content they are learning, yet often have difficulties with this writing (Applebee et al., 1994; Bruning & Horn, 2000). Furthermore, students have more difficulty with compare-contrast organization than with other formats (Englert & Hiebert, 1984).

Recent research has focused on the instructional needs of students learning how to write expository texts (Graham & Harris, 2000; Sitko, 1998). However, many of these recommendations have focused on reading or writing as separate processes, not the integration of these processes in one task. Moving back and forth between content and organization demands may be difficult for students, especially in compare-contrast writing tasks where the organization seems to be part of the content generation. The goal of this study was to examine instruction designed to support students' knowledge acquisition and text structure organization as related to compare-contrast writing.

Students have two concerns when given a writing task: what to say and how to say it (Bereiter & Scardamalia, 1987). Meeting both content and organization demands may be difficult for students. First, writers need to understand the content in order to present it in a written form. Presenting content knowledge is the major task demand in writing expository papers. Organizing content to be readily understood is the second major task demand. Different kinds of text structures have been identified as effective organizational frames.

Role of Text Structure

Text structure, the type of organization used to present ideas in text, usually relates to the writer's goals or objectives. Meyer (1999) identified five types of expository text structures: description, sequence, causation, problem/solution, and compare-contrast. Each type presents different writing challenges. For example, compare-contrast writing requires students to understand and remember the organization,

points of comparison, and similarities or differences as they read and identify relevant content. These are "what to say" demands. Simultaneously, writers must make decisions about arranging these similarities and differences to make them clear. These are the "how to say it" demands (Bereiter & Scardamalia, 1987).

Of the five text structures, compare-contrast may be the most difficult type of expository writing for students of various ages because of the interaction of content and organizational demands (Englert & Hiebert, 1984). These demands are challenging for younger, middle-grade students (Englert & Hiebert, 1984) as well as for older, college-age students (Spivey, 1990, 1991).

In compare-contrast discourse form, students should not simply recall and list information they have acquired from reading about two topics; instead, they should actively work with knowledge of both simultaneously. Compare-contrast writing usually answers several questions: What two things are being compared? What are the points of comparison? How are they alike? How are they different? (Raphael & Kirschner, 1985). To address these four questions, students must go through two steps as they write: (a) acquire information about each of the topics, and (b) organize the information to make similarities and differences between topics clear to readers.

Causes of student difficulty in writing compare-contrast text are not always clear. Writers may not adequately understand the content material, a knowledge acquisition problem. Or they have problems with the compare-contrast structure, a task production problem. The third possibility is that writers have a combination problem of both acquiring content and organizing it into compare-contrast text. Thus, any intervention to improve students' abilities to write compare-contrast text should consider both students' knowledge acquisition and their ability to organize the text while writing, as well as the interaction of the two.

Writing researchers have emphasized the importance of content knowledge in effective writing performance (Bereiter & Scardamalia, 1987; Langer, 2001). As students progress in school, their knowledge acquisition becomes increasingly dependent on their ability to read and retain text information (Meyer, 1999). At the same time, writing tasks take on a larger role in assessing students' knowledge of the content as they progress through school. These writing tasks put heavy demands on students' ability to acquire and retain content that has been presented in text.

However, research about the interaction of reading and writing from texts is sparse (Fitzgerald & Shanahan, 2000; Spivey, 1991). Gaps exist about the role of text

structure knowledge (Meyer & Poon, 2001), development of writing self-regulation (Graham & Harris, 2000), prior knowledge (Murphy & Alexander, 2002), and motivational factors (Zimmerman, 2000). Langer (2001) has pointed out the importance of skills integration from high-performing language arts programs, yet little systematic research has focused on classroom instruction. Instead we must draw from the reading research literature to inform our efforts.

Summarization Instruction

Training students to write summaries about sections of factual text is a practical and effective way to increase their acquisition of text information (Brown & Day, 1983; Malone & Mastropieri, 1992; Wong, 2000). Writing summaries is effective because it: (a) encourages active cognitive engagement with texts (Kirkland & Saunders, 1991); (b) supports understanding the relationship among main and subordinate ideas (Armbruster, Anderson, & Ostertag; 1987; Brown & Smiley, 1977); and (c) facilitates encoding and retrieval of ideas (Jitendra, Hoppes, & Xin, 2000; Kintch & van Dijk, 1978). Writing summaries while reading helps students organize and retain information presented in text and may offer a solution to knowledge acquisition problems for students preparing for expository writing tasks.

Text Structure Instruction

Content knowledge is important but not sufficient for writing expository text; students must also organize the content to meet the writing task demands (Bereiter & Scardamalia, 1987; Meyer & Poon, 2001). In a writing task, writers typically select a text structure to support readers' comprehension of the information (Meyer, 1999). However, in academic contexts, tasks may be assigned.

Previous research has documented positive effects of explicit instruction on different text structure characteristics on the improvement of students' writing (Raphael & Englert, 1990; Wong, 2000). This research has illustrated the beneficial effects of text structure instruction on planning, content generation, organization and the quality of expository writing. However, although compare-contrast writing is often used in schools, little writing research has explored this challenging text structure.

Compare-Contrast Structure

In a typical compare-contrast writing task, students begin by reading two expository source texts and extracting the main ideas and supporting details from each, with an eventual goal of being able to describe the two main topics, how they are alike, and how they are different. To be able to compare and contrast concepts or topics is an essential part of students' conceptual and metacognitive knowledge

(Sitko, 1998). The process of comparing and contrasting supports learners making cognitive connections between topics and groups of topics to "identify and learn key concepts and networks of information" (Dickson, Simmons, & Kameenui, 1995, p. 29). Writers aware of the task demands for specific discourse types can more easily produce appropriate texts (McCutchen, 2000). For example, writers focused on comparing and contrasting two topics may specifically search for content on which to address similarities and differences. In producing compare-contrast writing, students typically use one of three organizational structures: point by point (attributes), similarities and differences clusters, or item by item (topic) (Spivey, 1990, 1991). Students' knowledge of compare-contrast structures transfers to other areas in their writing process, such as planning, organization of ideas, and source use (Raphael & Englert, 1990; Wong, 2000).

Writing in the compare-contrast text structure presents unique problems for students (Spivey, 1990, 1991), and students' ability to write compare-contrast compositions seems to be resistant to change (Englert & Thomas, 1987). Students' difficulties in writing compare-contrast may be related to: (a) ability (Hiebert et al., 1983; Wong, 2000); (b) awareness of text structure demands (Englert & Hiebert, 1984); (c) topic or content knowledge (Langer, 1984); (d) intertextual importance (Spivey, 1990) and (e) organizational options (Spivey, 1990, 1991). For compare-contrast writing, planning and organization are tied together because the organization to be followed is part of the planning itself (Raphael & Kirschner, 1985; Spivey, 1990). For compare-contrast writing the task demands are such that deficits in either knowledge or organization can debilitate the writing process, resulting in an inferior product. Given the complexity and simultaneous processes that must occur, it is of little surprise that it is considered the most difficult structure to write (Englert & Hiebert, 1984; Hiebert et al., 1983)

Methods

Design

We used a quasi-experimental design for the study. The treatments were part of regular classroom instruction, and it was not possible to randomly assign participants to treatment groups. Therefore, following quasi-experimental procedures, we randomly assigned intact classes to treatments, using a 2 x 2 pretest-posttest design and analysis of covariance to control for pretest differences among groups.

Independent variables were Summarization Skills instruction and Text Structure instruction. Due to the factorial design, one group received Summarization Skills training only; one received Text Structure treatment only; one received the

combination of Summarization Skills and Text Structure instruction. Since there were a total of five classes in this team of the middle school, the two remaining classes were assigned to the comparison group and received no experimental treatments until after posttesting.

In both pretest and posttest, students were asked to write compare-contrast compositions based on two informational texts, described below. The premeasure was used to determine students' initial abilities and also as a covariate to increase the power in analyses of the outcome measures. Dependent measures were Content (number of important ideas used from source texts) and Structure (compare-contrast organization), described in more detail below. We counterbalanced the texts used in the posttests to control for the students' knowledge about the topics. In other words, a student whose pretest was about ruins wrote an essay on deserts for the posttest.

Participants

The participants were students in five intact eighth grade classes at a large eastern middle school. Because of scheduling constraints, the actual instructional time was limited to six class days, plus a day each for the pretesting and posttesting. The students in these classes comprised one of the eighth-grade teams; this heterogeneous group of students rotated classes among the four primary subject-area teachers (language arts, math, science, and social studies). Teachers decided that students who were classified Learning Support and ESL would not participate in the study.

Instruction took place as part of the language arts class. The team leader (language arts teacher) and social studies teacher volunteered for participation in this study because they believed compare-contrast writing is important for students in this grade level. The language arts curriculum for the district recommends a unit on compare-contrast writing in eighth grade. We consulted frequently with the teachers as we constructed instructional materials and chose topics. We wanted passages to be about topics that had not been studied either that academic year or the previous one. The teachers reviewed and approved the materials before the study began.

Only students who returned informed consent forms (signed by their parents) had their measures included in the study. There were 36 females and 27 males, for a total of 63 students, whose essays were used in the data analyses.

Passages and Practice Materials

In order to control for readability and length, Lynne (first author) constructed all passages used in pretests and posttest (see Appendix), as well as all practice materials except two passages from the *Encyclopedia Britanica* (1993 ed.). During instruction we began with shorter, more easily understood passages and progressed to longer, more challenging ones as students gained mastery (Rosenshine & Meister, 1992). All participants used the same passages for both interventions. For the summarization activities, students used individual passages; for the compare-contrast structure training they used pairs of passages written about comparable topics.

We decided not to control for idea units among the texts themselves because we wanted them to be as authentic as possible. Source texts were written in a descriptive or collection format. Readability (Flesch-Kincaid) levels of single passages varied from 7.61 to 9.46, and word counts ranged from 153-323. Readability levels for compare-contrast passages varied from 8.29 to 9.19, and word counts ranged from 303-654. Practice materials for the Summarization instruction included summary rules (Brown & Day, 1983) and summary planner (Brady, cited in Rosenshine & Meister, 1997). Text Structure instructional materials consisted of compare-contrast planners and models, based on text structure research (Meyer, Young, & Bartlett, 1989; Raphael, Kirschner, & Englert, 1986; Spivey, 1990).

Procedures

The classroom teacher administered the pretest writing measure and prior knowledge test the day before instruction began. Instructional treatments (described below) took place for six instructional periods of 45 minutes each over six consecutive school days. The teacher administered the posttest writing measure on the first day after the instruction was completed. For pretest and posttest measures, students were asked to read both texts and write a compare-contrast composition using the information in these texts. The teachers read directions aloud while students read silently:

> Please print your name on the outside of the envelope. Do not put your name on the materials inside. Take out the materials. You should have 2 topics, unlined paper for making notes, and notebook paper for writing your essay. Please read the two texts that you have been given. Write a compare-contrast paper about the two topics in these texts, using the information. Please write only on one side of the notebook paper. You may use the plain paper for notes, and you may write on the topic sheets if you like. When you are done, please put all of the materials back into the envelope and turn it in. You have one class period to complete this.

Treatments

Lynne designed and taught the treatments using direct teaching procedures (Rosenshine & Stevens, 1986). The first lesson for each treatment group began with an introduction of the particular topic to be taught (Summarization Skills, Text Structure, or Combined Summarization Skills and Text Structure), a definition, and an explanation of its usefulness in academic writing. She used overhead transparencies of all materials as well.

Each subsequent lesson began with a brief review of the previous lesson. Students' work with written feedback (identification of strengths, constructive suggestions, no grades) was returned. Then several examples of students' work (typed, no names) were displayed on the overhead projector. Lynne and the students identified strong points and areas needing improvement, including suggestions for this improvement. The new material for the day was then introduced; Lynne modeled the application of the rules and procedures and planner sheets (for the specific treatment), eliciting student participation. She scaffolded participation by providing students with the steps and questions to guide each procedure and prompting to elicit student answers. As the students became more familiar with the procedure during their lessons, they were expected to supply the steps and questions themselves, in addition to the answers. Students were given an opportunity for guided practice, then independent practice; they turned in completed tasks at the end of class. During both guided and independent practice, Lynne monitored students' activities, moving around the room, answering questions, etc. (Throughout the instruction, she encouraged students to take notes and/or write on their own materials, texts, and planners to support their use and memory for rules and procedures.)

Summarization Skills Treatment. Summarization Skills instruction began with the explanation that summarizing would help students learn from a variety of academic source texts, both now and in their later courses. Lynne defined a summary as "a shorter form of the original passage that contains only the important points" (Armbruster et al., 1987, p. 338). Then she explained that summarizing a passage supports students' understanding of the material in the text, their identification of the main ideas, and their memory of this information, particularly for use in academic tasks, such as essay questions, reports, writing assignments, and studying for tests. Students were told that being able to summarize would help them with a primary challenge in writing: what to say.

Students in the Summarization Skills treatment group received instructional materials consisting of summary rules and summary planners. The summary rules were based on those used by Brown and Day (1983). The summary planner included a

main idea sentence to guide students in their summary planning (Brady, as cited in Rosenshine & Meister, 1997).

Students began by learning and applying summary rules to individual sentences, then to single paragraphs, then longer texts. Lynne elicited students' responses during all phases of the lessons. As students responded, she wrote their answers on the overhead, and students wrote on their own materials. She also elicited more than one acceptable answer to illustrate that there was more than one "right" way to summarize a passage. She also pointed out nonessential details may be eliminated from the summaries.

Text Structure Treatment. Text Structure instruction began with the explanation that students would learn to write compare-contrast papers. Lynne explained that some academic writing assignments and essay questions on exams may require them to read and/or remember information from two source texts and use this information in a compare-contrast writing assignment. Students would learn a strategy to help them with a primary challenge in writing: how to organize their ideas and information.

Students in the Text Structure group received instructional materials consisting of compare-contrast planners and three models of compare-contrast texts. Planning materials were based on guidelines identified in text structure research (Meyer et al., 1989; Raphael et al., 1986; Spivey, 1990) (See Appendix). Lynne used the overhead projector and explained the compare-contrast planner. Students were given two short paragraphs, each about a pet cat, then shown a completed compare-contrast planner based on the information from both texts. Lynne explained how the information from both paragraphs was used to complete the planner. She identified the main idea sentence, the points of comparison, and the compare-contrast cue words, as well as overall structure.

Next, Lynne explained how this text answered the four questions that compare-contrast text structure asks: (a) what two items are being compared? (b) what are the points of comparison? (c) how are they alike? and (d) how are they different? She also pointed out that each paragraph was a point of comparison, a group of details with each topic's similarities and differences. These points of comparison were not lists of details but categories or themes of ideas. She also explained that within each paragraph similarities between two topics were first explained, then differences.

Students were given descriptive versions of two short texts, diamonds and bauxite, to read silently in preparation for completing a compare-contrast planner. Lynne explained that before students could discuss similarities and differences,

they had to read both texts to identify the points of comparison. Student volunteers read the texts aloud. Students identified the topic of each paragraph as Lynne listed them on the board under separate headings, "diamonds" and "bauxite." Then Lynne asked students what from these lists could be used to plan the compare-contrast paper. Students noticed similar topics (location, formation, and uses of each mineral) which they could use to plan their compare-contrast paper. Together Lynne and the students completed a planner with students supplying necessary information: points of comparison first, with similarities and then differences listed by topic. Students recognized that the order of main ideas used for points of comparison (location, formation, uses) was not identical. They discussed how to order the points, and Lynne pointed out that more than one sequence was acceptable, particularly since students could explain their reasons for their preferred order (i.e., "formation" first because of chronological order; "uses" first as the most important idea). She also explained that students would encounter this situation in other source texts, so this awareness would be useful to them in the future.

Lynne then asked students for suggestions for constructing the main idea sentence using information in the planner. She explained that the main idea sentence is based on information in the planner, particularly points of comparison, which can be used to determine if individual source texts contain enough information to support these points.

Combined Treatment. The Combined summarization skills and text structure group received instructional materials from both of the single-treatment groups. The first three instructional periods of the Combined treatment involved instruction on writing summaries about factual text, which was similar to methods used in the Summarization Skills treatment. The text structure instruction, also similar to the Text Structure treatment, was introduced in the third lesson and linked to the summarization training.

Measures

Prior Knowledge. Students' prior knowledge influences their learning tasks (Alexander & Judy, 1988; Murphy & Alexander, 2002). However, research studies have not provided a generally accepted and reliable assessment method. Typical measures of prior knowledge more often focus on procedural knowledge of interest (e.g., how to summarize) than declarative (or domain) knowledge. Approaches for assessing prior knowledge are scarce but range from a free association stimulus

(Langer, 1984) to listing facts (Kardash & Noel, 2000) to multiple-choice items (Murphy & Alexander, 2002).

The Prior Knowledge test was constructed to determine students' knowledge about the information in the pretest and posttest texts. A primary concern was the effect of instruction on students' knowledge acquisition, so we wanted to identify students who already had high degrees of this knowledge and omit them from the data analyses. Therefore, we based the Prior Knowledge measure on information from those texts (Gobi and Sahara Deserts; Stonehenge and Hagar Qim ruins). This measure was an objective quiz of 24 questions (six from each text, in random order). We decided to use a fill-in-the-blank format to minimize possible guessing (multiple-choice) or inadvertent omissions (listing). Items were constructed in accord with Gronlund's (1993) recommendations for short-answer tests.

Pretest and Posttest Writing Measures. Students read information texts as a prompt for writing compare-contrast essays on pretest and posttest. Each set of two source texts consisted of two topics: desert set, Gobi and Sahara Deserts; ruins set, stone megalith ruins of Stonehenge and Hagar Qim. Texts ranged in readability from 9.3 to 9.6 and in length from 373 to 394.

Rubric Construction

We constructed two scoring rubrics: Content measure, number of important ideas used from source texts; Structure measure, compare-contrast text organization of the paper (see Appendix). Even with the abundance of research in this area, there are many choices but no consensus about scoring. Furthermore, as Meyer (1985) has pointed out, there is "no universally accepted method" (p. 14) for analyzing the structure of a text: As goals for the analysis differ, the method does as well.

Content Measure. One goal of this study was to determine if Summarization Skills instruction would improve students' writing of compare-contrast text by supporting acquisition of knowledge from texts. Therefore, we constructed the Content measure to ascertain the number and importance level of ideas students used from source texts in compare-contrast compositions. A knowledge or idea unit could (a) be "a self-contained idea… expressed in as little as one word" (Brown, Day, & Jones, 1983, p. 970); (b) be presented as a single fact (Spivey, 1984); and (c) appear independently in students' text.

Lynne discussed the conception of knowledge or idea unit with graduate students who then independently identified idea units from several practice texts, resolving

differences by discussion and consensus. They then found idea units in the pretest and posttest texts and computed the average number for each: Sahara Desert, 81; Gobi Desert, 57; Stonehenge, 70; Hagar Qim, 59. The interrater reliability on identifying idea units ranged from 73.3% to 92.2%.

Next, five other graduate students rated the level of importance of each of the units. The students were asked to read texts and rank idea units according to the following criteria: 3–important idea, definitely include in text summary; 2–of medium importance, could be included or not included in a text summary; 1–not very important, omit if summarizing text (cf., Garner, 1985). Average values for each idea unit were calculated. Ideas with values averaging from 2.5 - 3 were considered very important; values from 1.5-2.4 were considered of medium importance; ideas 1.4 and under were considered nonessential details. This provided a list of ideas in each text by their level of importance to use in determining the number of higher-level ideas students used in their writing.

Structure Measure. Measuring the structure of an essay using a compare-contrast structure is problematic for two reasons. First, research has not identified a preferred method for organizing compare-contrast texts (point-by-point, similarities/differences, item-by-item). Second, as in content assessment, an array of methods exists with no one preferred (Meyer et al., 1989; Spivey, 1991). We decided, therefore, to use research findings from both primary trait and text structure literature (Englert, Raphael, Anderson, Anthony, & Stevens, 1991; Spivey, 1990, 1991).

The Structure rubric had seven subscales, four to measure primary traits of compare-contrast organization, one to identify overall compare-contrast organization, and two to provide quality measures of writing. The subscales for measuring primary traits of compare-contrast organization were Main Idea, Similarities, Differences, and Compare-Contrast Cue Words (Englert et al., 1991; Mullis, 1984). The quality measure scales were Progression and Development. Four subscales were used in the final analyses as the Structure measure: Main Idea, Similarities, Differences, and Compare-Contrast Cue words.

Scoring. Ten graduate students were recruited and paid to be scorers for both rubrics. Their training addressed the purpose and procedure for scoring students' essays, model scoring, and multiple opportunities for practice scoring and discussion for clarification. For scoring, we randomly assigned premeasure and postmeasure essays to rater pairs, with only master codes on each, so raters could not identify either treatment group or pretest/posttest conditions. Each

pair of raters scored all assigned essays on both the Content and Structure rubrics. Final scores were based on the average of the two raters' scores. No rater saw another's rubrics and scores.

Results

Prior Knowledge

The purpose of the Prior Knowledge measure was to determine students' content knowledge of text topics in pre- and posttests. No students had high prior knowledge (see Table 1). A paired samples *t* test indicated that students had significantly more knowledge about deserts than about ruins at the beginning of the study, ($t = 12.36$, $p < .01$, $df = 62$).

Table 1. Prior Knowledge Measure Means and Standard Deviations

Topic	*M*	*SD*
Deserts	3.80	2.17
Ruins	.71	.89

Note. Mean number correct out of 12.

Compare-Contrast Writing

We conducted a series of 2 x 2 ANOVAs on all pretest essays, collapsed across source text topics, deserts and ruins, in the pretest condition for each of the measures. No statistically significant differences were found between treatment groups for any of the analyses. We decided to use the premeasure scores as the covariate for the outcome measures to control for initial differences in content knowledge and to increase the power of the analysis.

We performed a series of 2 x 2 ANCOVAs on all postmeasure essays, collapsed across topics, deserts and ruins, for the following outcome measures: Content (number of important ideas used from source texts) and Structure (compare-contrast organization). The covariate for each measure was the pretest score for that particular measure. Posttest analyses showed that topic of the source text (desert or ruins) significantly interacted with the outcome measures. Therefore, all posttest analyses were done separately for each content topic, deserts and ruins (see Table 2). Dependent variables were Content (number of important ideas from source texts) and Structure (use of compare-contrast text structure).

Before using analysis of covariance, we calculated homogeneity of slopes for deserts and ruins topics, for Content and Structure measures. There were no statistically significant differences.

Table 2. Analyses of Covariance for Treatment Groups by Topic

Deserts Text				
Effect	*df*	*MS*	*F*	*p*
Content measure				
Summarization Skills	1	8.25	1.20	.30
Text Structure	1	44.28	6.50	.02*
Summarization Skills * Text Structure	1	.01	.00	1.00
Error	26	6.85		
Structure measure				
Summarization Skills	1	.14	.00	1.00
Text Structure	1	69.51	2.10	.16
Summarization Skills * Text Structure	1	117.50	3.53	.07
Error	26	33.24		
Ruins Text				
	df	*MS*	*F*	*p*
Content measure				
Summarization Skills	1	44.28	2.40	.13
Text Structure	1	53.00	2.70	.11
Summarization Skills * Text Structure	1	10.80	.55	.47
Error	27	20.00		
Structure measure				
Summarization Skills	1	275.35	12.10	.00*
Text Structure	1	157.21	6.90	.01*
Summarization Skills * Text Structure	1	43.10	1.90	.90
Error	27	22.81		

*$p \leq .05$

Deserts. There was a statistically significant main effect for Text Structure treatment on measures of Content in students' writing (see Table 2). Students receiving Text Structure instruction had lower means on the Content measure than students who had not received it (see Table 3). For the Structure measure, there were no significant effects for Summarization Skills treatment, Text Structure treatment, or Combined (see Table 2).

Ruins. There were no statistically significant effects on the Content measure for the ruins essay (see Table 2), but the mean for the Text Structure group is higher than the other three means (see Table 3). There were statistically significant main effects for both treatments on measures of Structure (see Table 2). There was no significant interaction between the two treatments.

Table 3. Means and Standard Errors of Writing Measures

Deserts Text						
	Text Structure			No Text Structure		
	Mean	*SE*	*n*	Mean	*SE*	*n*
Content measure						
Summarization Skills	6.20	1.00	7	8.58	.87	9
No Summarization Skills	5.12	1.00	7	7.57	.93	8
Structure measure						
Summarization Skills	17.70	2.20	7	10.72	2.00	9
No Summarization Skills	14.00	2.20	7	14.78	2.10	8
Ruins Text						
	Text Structure			No Text Structure		
	Mean	*SE*	*n*	Mean	*SE*	*n*
Content measure						
Summarization Skills	9.83	1.62	10	8.50	1.72	7
No Summarization Skills	13.93	2.10	5	9.82	1.41	10
Structure measure						
Summarization Skills	14.12	1.51	10	11.83	1.83	7
No Summarization Skills	22.71	2.15	5	15.60	1.51	10

Discussion

Both teachers' observations and research in writing provide evidence that writing compare-contrast essays is difficult for students. The task demands, in terms of acquiring and organizing the content for the essay, seem to create daunting challenges for the developing writer. The purpose of this study was to examine the effects of instructional approaches to facilitate content acquisition for and organization of compare-contrast writing by middle school students. Summarization training addressed the need to increase students' ability to extract meaningful information from expository text, and text structure instruction helped students meet the demands of organizing the content to be presented in a compare-contrast structure.

Prior Knowledge Effects

Initial analyses indicated an interaction between the topic of the source text and the treatments, indicating that the treatments produced better writing performance for the topic of ruins, than for deserts. Students in this study had significantly more prior knowledge about deserts than about ruins (see Table 1). This suggests that the efficacy of these instructional strategies may depend on students' level of

knowledge about content. This also suggests students' writing performance is affected by their domain knowledge (Langer, 1984).

Students' domain knowledge may have a different conceptual organization from that of the texts they read, which may influence processing of text information (Alexander, Jetton, Kulikowich, & Woehler, 1994). Learners may not perceive a need to utilize a strategy if they think they already understand the material (Meyer, 1987). For example, students' higher prior knowledge of deserts may have led them to use existing conceptual schema to generate and organize ideas instead of using the instructional strategies in this study. Results may also provide evidence of students' content knowledge and self-regulatory behaviors interacting in complex ways, as suggested by Murphy and Alexander (2002).

The significantly low content scores in writing on the deserts topic suggest that the students needed a better understanding of what they were expected to learn and the task demands for this information (Halpern, 1998). They may have relied on their prior knowledge about deserts even if it was insufficient for the task. This may explain the higher content scores on the ruins topic despite significantly lower initial content knowledge.

Strategy Instruction Effects

When students wrote about relatively unfamiliar content (ruins), significant effects were detected for the Text Structure strategy on their compare-contrast essays. These results provide further support for explicit text structure instruction for writing (McCutchen, 2000; Meyer & Poon, 2001; Wong, 2000). The contrasting lower scores of the Summarization Skills group on the ruins topic (see Table 2) suggest the importance of matching task and strategy instruction. Students' training focused on summarizing single texts, but their compare-contrast writing involved two texts. Reorganizing unfamiliar ideas into a compare-contrast structure may have put excessive demands on their cognitive processing.

Researchers and teachers need to remember that the task matters. Writing based on reading requires different cognitive processes than rereading (Fitzgerald & Shanahan, 2000). For example, in compare-contrast, writers work with two topics, identifying points of comparison, similarities, and differences as they acquire information from source texts (Spivey, 1991). Top levels of cognitive processing would be applicable: analysis, evaluation, and creation (Anderson & Krathwohl, 2001).

Transfer of Strategy Instruction to Writing Tasks

The nonsignificant results for Summarization Skills instruction on content were unexpected, given that previous research suggests summarizing supports identification of important ideas (Malone & Mastropieri, 1992). However, students' ability to identify important ideas may not have been reflected in their essays (Raphael & Kirschner, 1985). In writing tasks, it is not always clear if what is being measured is students' knowledge or its transfer into writing. Even with instruction, transfer is challenging and interacts with self-regulatory processes in complex ways.

These results illustrate several aspects of the complex nature of transfer. First, students may not have realized that the summarization strategy could provide them with a macrostructure of ideas to use for the compare-contrast task (McCutchen, 2000). Learners may also need explicit instruction to support/encourage their making connections across domains (Langer, 2001). Only the combined group received this instruction. Although the combined treatment used clearly structured tasks (Langer & Applebee, 1987), perhaps students lacked sufficient time for necessary practice for mastery of both summarizing and text structure strategies. Finally, cognitive processes necessary for transfer must be systematically integrated into instruction: understanding, application, analysis, creation, evaluation (Anderson & Krathwohl, 2001).

Limitations

Clearly one limitation to the present study was length of instructional treatments (45 minutes, six consecutive days), considering the difficulty of compare-contrast formats (Spivey, 1990) and students' age. Students seemed to have mastered some of the strategies, but this mastery may not have been enough to facilitate use on new tasks. This was perhaps most salient for students who received both the summarization and text structure strategies; they in effect had only three class periods to learn each strategy. Future research on these strategies alone and in combination would benefit from long-term training and use of the strategies.

Another limitation was scoring of students' use of content material from source texts. The number of idea units in each category (High Importance, Medium Importance, Nonessential) was not equal from text to text, in part the result of our decision to use more authentic texts. Our decision is in accord with the increased use of more authentic-type texts in studies (cf., Alexander et al., 1994; Buehl, Alexander, Murphy, & Sperl, 2001; Murphy & Alexander, 2002), as well as meeting criteria for essay questions (Gronlund, 1993). As a result, however, source texts varied on number of ideas at the three levels of importance. The differing totals made it difficult to compare the students' use of ideas from source texts.

Implications for Teachers and Teacher Educators

Sitko (1998) observed that "writing is a complex activity. Learning how to write is even more complex" (p. 112). Teachers and teacher educators would probably add that teaching writing may be the most complex activity of all. Instructors should view writing as a cognitive process, a means to support students making meaning for themselves (Bereiter & Scardamalia, 1987).

First, learning goals should direct the writing task. When learning goals focus on learning from texts, summarization can support students' understanding, identification of important ideas, and memory for text material (Wong, 2000). Second, comparing and contrasting supports students making cognitive connections between topics and networks of topics, identifying and explaining similarities and differences, and understanding strengths and weaknesses (Dickson et al., 1995). The positive effects of text structure instruction in this study offer teachers a way to help students make these connections in their writing, particularly with new content. Based upon the results of this and other studies (e.g., Armbruster et al., 1987; Meyer et al., 1989; Murphy & Alexander, 2002), writing teachers could readily use text structure instruction to facilitate student learning. For writing compare-contrast essays, teachers would explicitly teach the compare-contrast text structure and give students practice and feedback in using the structure to write this kind of essay.

Future Research

Several areas for future research are indicated. First, longer training periods might facilitate strategy learning and transfer. In the same vein, it would be interesting to study the interactive effects of the summarization and text structure strategies in a longer intervention. While the two showed no interactive effect in this study it seems likely that in longer term interventions students would be more capable of mastering the strategies to a high level and develop the ability to transfer them in a meaningful fashion. We also recommend further investigation of students' domain knowledge (Alexander et al., 1994), interaction with strategy knowledge and use in writing (Sitko, 1998), and effects of high and low knowledge levels (Murphy & Alexander, 2002). Including an objective knowledge measure might clarify the issue of content and structure demands in compare-contrast text.

This study adds to these areas of research, but more work is needed. Researchers and practitioners must remember that expository texts play an important role in students' learning, particularly in terms of work in actual classroom settings with

actual course content. Students' ability to write expository passages is critical for their academic success in middle school and beyond. Effective writing instruction is critical for helping students meet 21st century demands of complex problem solving and critical thinking in both academic and nonacademic contexts.

Author Note

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Appendix

Gobi Desert

The Gobi Desert is one of the most interesting of the 20 important deserts in the world. Deserts, areas receiving under 10 inches of rainfall a year, are usually considered the most forbidding areas on the earth. The Gobi is located in Asia, on the border between China and Mongolia. This desert covers about 500,000 square miles. The Gobi is mostly tablelands and the Altai Mountains. Actually, the word "Gobi" means *pebbly plain* in the Mongolian language. The temperature of the Gobi is below freezing almost the entire year. In addition to the chilling temperatures, fierce winds rage across the desert. In fact, the effects of these powerful winds can be observed in the sandy hills of the Gobi Desert which were once covered with loess, a yellowish loam (soil). This loess, blown by the strong winds, was carried to China. This yellowish loam is what gave China's Yellow River its name and caused it to be extremely muddy.

Deserts are one of the few places on earth where people have not wanted to do much exploring and traveling. Therefore, little historical information exists about the Gobi Desert. The earliest records of explorations date back to Marco Polo, who first explored it in the thirteenth century. During his journeys, between 1271 and 1292, he maintained careful records of his travels. Marco Polo had traveled from Venice to Mongolia to meet the emperor Kublai Khan. During his trip through the Gobi Desert, he recorded 28 sites where he had found water. His records were so accurate that when Europeans journeyed this route 600 years later, they found the same sites as Polo described.

Scientists have long been interested in the Gobi Desert, but much of its history still remains a mystery. However, rich fossil sites have been yielding some exciting information about the Gobi's history. Paleontologists have been discovering and studying fossils, located at several sites in the Gobi Desert. One important location at which paleontologists have been working is Ukhaa Tolgod, one of the richest locations of fossils from Cretaceous times. Skulls of mammals, lizards, and dinosaurs have been discovered here. Rare dino-

saur fossils have included dinosaur embryos and a dinosaur on an egg nest. Scientists are hoping that future excavations will continue to provide information about the history of the mysterious Gobi Desert.

Content Rubric

The Gobi

_____ Gobi one most interesting

_____ of 20 important deserts in world.

_____ Deserts, areas receiving under 10 inches of rainfall/year,

_____ usually considered most forbidding areas on earth.

_____ Gobi is located in Asia,

_____ on border between China and Mongolia.

_____ covers about 500,000 square miles.

_____ mostly tablelands

_____ and Altai Mountains.

_____ word "Gobi" means *pebbly plain*

_____ in Mongolian language.

_____ temperature is below freezing

_____ almost entire year.

_____ In addition to the chilling temperatures,

_____ fierce winds rage across desert.

_____ effects of powerful winds can be observed

_____ in sandy hills of Gobi

_____ were once covered with loess,

_____ yellowish loam (soil).

_____ This loess, blown by strong winds,

_____ carried to China.

_____ yellowish loam gave China's Yellow River its name

_____ caused it to be extremely muddy.

_____ Deserts one of few places on earth where people have not wanted to do much exploring

_____ and traveling.

_____ Therefore, little historical information exists about Gobi.

_____ earliest records of explorations date back to Marco Polo,

_____ first explored it in thirteenth century.

_____ During journeys, 1271-1292,

_____ maintained careful records of travels.

_____ Marco Polo traveled from Venice to Mongolia

_____ to meet emperor

_____ Kublai Khan.

_____ During trip through Gobi, he recorded

_____ 28 sites

_____ where he had found water.

_____ His records were so accurate

_____ that when Europeans journeyed route

_____ 600 years later,

_____ they found same sites Polo described.

_____ Scientists long interested in Gobi,

_____ but much of history still remains mystery.

_____ However, rich fossil sites yielding exciting information about Gobi's history.

_____ Paleontologists discovering

_____ and studying fossils,

_____ located at several sites

_____ in Gobi.

_____ One important location at which paleontologists have been working is Ukhaa Tolgod,

_____ one of richest locations of fossils

_____ from Cretaceous times.

_____ Skulls of mammals,

_____ lizards,

_____ and dinosaurs

_____ have been discovered here.

_____ Rare dinosaur fossils included dinosaur embryos

_____ and dinosaur on egg nest.

_____ Scientists hoping future excavations continue to provide information about history of mysterious Gobi.

Structure

Main Idea Sentence: 0-7 points (2 topics, compare & contrast format, points of comparison)

_____ 0-2 points (each item being compared, such as Gobi Desert, Stonehenge, Hagar Qim)

_____ 0-2 points (similarities & differences mentioned, 1 point each)

_____ 0-2 points (pronoun reference-*These deserts* if Gobi & Sahara or Stonehenge & Hagar Qim explicitly mentioned previously)

_____ 0-3 points (each point of comparison–location, history, explorations)

Similarities (1 point each–please record on line)

_____Total _____

Differences (1 point each–please record on line)

_____ Total _____

Compare-contrast cue words (1 point each–please record on line)

_____ Total _____

Evidence of compare-contrast text structure: 0-5 points

_____ 1 point–Introduction, introductory sentence

_____ 0-3 points Similarities AND differences (1 point each) OR

Item 1 AND Item 2 (1 point each) OR

Points of comparison (1 point each, up to 3 points)

Mixed (1 point)

_____ 1 point–Conclusion, concluding sentence(s)

Progression: logical progression from beginning to end of essay, coherence across paragraphs

____ 4 points: logical progression from beginning to end of essay: well organized w/ clear evidence of compare-contrast structure/organization; easy to follow–item (topic) by item OR point by point OR similarities/differences

_____ 3 points: organized w/clear evidence of compare-contrast structure: but compare-contrast organization (item by item OR point by point OR similarities/differences) not as consistently used and easy to follow as in 4

____ 2 points: little organization & compare-contrast structure inconsistent/mixed: some attempt at structure but inconsistent; order unclear & disjointed–not easy to follow

_____ 1 point: lacks progression and organization: little evidence of compare-contrast structure, information/details provided seemingly at random

_____ 0 points: no response, off topic (e.g., "I have always wanted to visit the Gobi Desert.")

Development: content/relevant information (facts, details, examples) to illustrate and support each point, elaborated

_____ 4 points: well developed: facts/details/examples used consistently throughout to support compare-contrast task requirement and make points explicit

_____ 3 points: some development: relevant facts/details/examples present but not consistently used throughout entire essay

_____ 2 points: little development: some details present but inconsistently used–not clearly supporting compare-contrast points

_____ 1 point: paper not developed: facts/information presented in random manner w/few supporting details which do not support compare-contrast requirements

_____ 0 points: no response, off topic (e.g., "I have always wanted to visit the Gobi Desert.")