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Effectiveness of Question Exploration to Enhance Students' Written Expression of Content Knowledge and Comprehension

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This study examined the effectiveness of a Question Exploration Routine and associated graphic organizer for enhancing the performance of students of diverse abilities when assessed on knowledge and comprehension of content and quality of written responses. Participants were 36 students with and without learning disabilities (LD) in Grades 9 through 12 in an inner city school district. Students were randomly assigned to experimental or control conditions. Results showed significant differences and moderately large to very large effect sizes for students in the experimental condition compared to students in the control condition with regard to knowledge and comprehension of content and written responses to a question. More variation in performance was found for the group of students with LD than for those without LD.

A recent report from the Carnegie Corporation of New York warns that American students are not meeting basic writing standards (Graham & Perin, 2007). Unfortunately, this comes as no surprise. According to the National

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Assessment of Educational Progress, in 2002, only 24% to 31% of students in Grades 4, 8, and 12 met writing proficiency goals (Persky, Daane, & Jin, 2003). Meeting these goals is important, as the ability to communicate effectively with others is necessary to be able to succeed in this age of globalism and instant communication (Achieve, 2006; Friedman, 2005; National Academies, 2006; National Governors Association, 2005).

National standards reinforce this need by requiring students to convey knowledge about and comprehension of important topics in written formats. For example, Bulgren (2006) noted that the need to convey topic knowledge in writing is found in (a) science standards that recommend a variety of assessment formats, including portfolios, interviews, investigative reports, or written essays (National Research Council, 2000); (b) social studies standards, in areas such as history, that require students to show their understanding of a historical issue or to create historical arguments in written form (National Center for History in the Schools, 1996); (c) language arts standards that emphasize the importance of writing about everyday, cultural, or literary topics for different audiences (National Council of Teachers of English, 1996); and (d) the national mathematics standards that encourage writing activities for students, such as keeping problem-solving journals to reflect on what they do when they think about and solve problems (National Council of Teachers of Mathematics, 2000).

As a result of these national standards and global challenges, teachers across different core content areas face the challenge of helping students acquire the necessary skills to demonstrate their knowledge and comprehension of important content topics in written form. This reality is particularly challenging, as teachers often report that they do not have ways to help students meet these writing standards, especially at the secondary level (Graham & Perin, 2007).

Fortunately, teachers in inclusive core content classes have indicated that showing students how to learn, as well as teaching content, is an important part of their instructional role (Bulgren et al., 2006). In fact, teachers reported that they did not believe in teaching content without teaching strategies and that they were willing to do both in their classes. However, these beliefs must be considered in the context of inclusive general education classes, in which teachers and students already face multiple challenges associated with ever-growing amounts of content information and higher order thinking demands (Levy & Murnane, 2004). Thus, the question is whether, despite their intentions and efforts, teachers in inclusive core content classes can, at the same time as they teach content, provide the explicit instruction needed to teach the strategic approaches necessary for all students to respond successfully on written assessments (Bulgren et al., 2006). This may also be especially challenging considering the limited planning time available to teachers (Bulgren et al., 2006).

According to Batalova, Fix, and Murray (2007), another reality in many schools is the growing diversity of students, including students with learning

disabilities (LD). In many cases, these and other students need extra support to respond to academic challenges, including those requiring written responses. According to Meltzer (2007), for example, many students with LD exhibit deficits in knowledge and in using the cognitive processes associated with writing tasks, including difficulty generating content about which to write. As a result, a variety of problems emerge in their writing, including disorganization and incomplete ideas.

These realities in today's inclusive core content classrooms create a need to identify evidence-based supports amenable for adoption and use by general education teachers to help all students succeed in writing. In one meta-analysis, Gersten and Baker (1999) found that evidence-based instructional approaches to teaching written expression to students with LD were multifaceted; these included explicit instruction of steps in the writing process in addition to provision of a framework of planning, writing, revision, and feedback. They pointed to research that indicated the importance of these principles (e.g., Englert & Mariage, 1991; Graham & Harris, 1989).

In another meta-analysis of experimental and quasi-experimental research on adolescent writing instruction, some conducted in general education settings and some in special education settings, Graham and Perin (2007) identified elements of effective instructional methods. Writing quality was used as the outcome measure in some of the studies reviewed; in others, completeness and accuracy of summaries and content learning were measured. Instruction in writing strategies and summarization skills, use of inquiry activities and models, and writing for content area learning were among the elements identified as effective. Graham and Perin recommended incorporating and interlinking these approaches.

Several authors have also made suggestions about placing writing instruction in the context of content learning. For example, Gersten and Baker (1999) contended that writing instruction focused more on content than on lower level skills such as capitalization, punctuation, and spelling would better capitalize on the strengths of students with LD. Graham and Perin (2007) also encouraged using writing as a tool to enhance students' learning of content material in all content areas. Furthermore, Baker, Gersten, and Scanlon (2002) emphasized the importance of teaching challenging content to students with disabilities using innovative instruction associated with the enhancement of content. However, these suggestions raise the question of whether, in addition to teaching rigorous content, general education teachers can teach students to write well, a role often not associated with content area instruction, particularly at the upper grade levels. A further consideration is the need to implement instruction that has been shown to help students with a wide range of abilities in the same classroom. Responsiveness to a wide range of students is essential, as teachers generally do not adopt innovative instructional procedures unless these approaches are viewed as benefiting a wide range of students (Elmore, 2004).

CONTENT ENHANCEMENT

According to Bulgren, Deshler, and Lenz (2007), a relatively new and effective type of instruction using Content Enhancement Routines (CERs) is applicable here. Shown to benefit students with a wide range of abilities, CERs are based on four key principles: (a) Content area teachers must serve as expert mediators of learning by selecting the critical features of the content and then transforming that critical content in ways that promote learning in academically diverse groups of students; (b) the instruction used must lead to meeting the needs of both the group and the individuals in the group; (c) the process must focus on the critical content associated with meeting the standards of the discipline, never compromising the integrity of content by watering down important ideas to accommodate the diversity of students; and (d) instruction provided must engage students in a coconstructive process in which both students and teachers work in a partnership that honors the role of each in the learning process.

CERs involve the use of graphic devices, teaching routines, and instructional procedures. *Graphic devices* are specially designed instructional tools used to enhance learning by mirroring strategic thinking processes needed to understand critical content. Graphic devices help students learn by providing an illustrative "road map" that makes the process of learning about concepts and relationships visually explicit. Research on graphic organizers as mediating devices to help students learn has a long history (Bulgren & Schumaker, 2006). Content enhancements also involve other important instructional components to promote the mediation of learning. Among these are the use of (a) steps provided on each graphic organizer representing cognitive prompts to scaffold the thinking and reasoning required to learn the targeted critical content; (b) explicit instruction in the step-by-step process of thinking and generating information that is captured on the graphic device; (c) guidelines for supporting essential note taking on key features of the critical content as cued by features of the graphic device; (d) prompts to provide advance, during, and post organizers to cue the structure of learning; (e) cues to ensure student practice and generalization of the content and of the thinking processes involved; (f) guidelines for coconstructing the graphic device to help students learn the critical content; and (g) opportunities for flexibility in grouping students during instruction.

Therefore, CERs add to the existing knowledge base about graphic organizers by focusing both on the importance of the process needed to effectively incorporate graphic organizers in teaching and on how the addition of other mediational components are often required to enhance student learning in diverse groups of students. Teaching routines and instructional procedures guide the use of these mediational components. *Teaching routines* provide a framework that involves the students in the repeated use of the graphic device so that they have sufficient opportunities to practice important strategic processes as they construct, learn, record, review, and

generalize learning. The use of the routine helps students use the thinking process prompted by the graphic device during group instruction, leading to regular, generalized, and independent use of that thinking process. *Instructional procedures* define how the teacher informs students about the use of the graphic device, explicitly teaches content with the device and routine, and arranges for student interaction and coconstruction of learning.

Research studies conducted on the effectiveness of CERs have shown that teachers can learn to use CERs to enhance student acquisition of content and extend the knowledge of a discipline when students are required to (a) recall information (Bulgren, Deshler, & Schumaker, 1997; Bulgren, Schumaker, & Deshler, 1994), (b) learn a concept by analogy (Bulgren, Deshler, Schumaker, & Lenz, 2000), (c) explain and explore the answers to critical content questions (Bulgren, Lenz, Deshler, & Schumaker, 2001), (d) compare concepts (Bulgren Lenz, Schumaker, Deshler, & Marquis, 2002), or (e) analyze a single concept (Bulgren, Schumaker & Deshler, 1988).

The purpose of this study was to determine whether the Question Exploration Guide (QEG), with its associated Question Exploration Routine (QER), could effectively and efficiently improve the learning of required content as demonstrated in studies of previous CERs. Another question was whether the graphic device, in combination with the QER and writing prompts, could provide students with the supports needed to enable them to convey their understanding of the content in a written format. Therefore, given the recognized need to incorporate writing instruction into inclusive core content classes, this experimental study was conducted to determine whether students (both with and without LD) being provided with an experimental condition consisting of the Question Exploration graphic device, teaching routine, and instructional procedures would perform better than students participating in a control condition as demonstrated on a measure of content knowledge and comprehension and a measure of writing proficiency evaluated by a scoring method commonly used to assess written responses.

METHOD

Participants and Settings

Participants were recruited from high school (Grades 9–12) special education classes and general English language arts classes in an urban school located in a metropolitan area of the midwestern United States. Enrollment in the school was approximately 1,150 students. Researchers visited classes, explained the study, and made available consent forms for students and parents interested in participating. All students, both with and without disabilities, were eligible to participate.

A total of 36 students who returned consent forms, met eligibility requirements, and attended the scheduled sessions subsequently participated

TABLE 1 Student Demographics

Characteristic	Control group		Experimental group		Total
	With LD	Without LD	With LD	Without LD	
Gender					
Male	7	2	6	3	18
Female	1	7	4	6	18
Age					
M	16.7	15.8	15.6	15.7	
Range	16.0–19.2	14.5–16.3	15.0–16.3	14.3–16.3	
Race/ethnicity					
Anglo	4	1	4	2	11
Hispanic	2	0	0	0	2
African American	2	7	6	7	22
Not available	0	1	0	0	1
Socioeconomic status					
Free/reduced lunch	1	5	2	6	14
Grade level					
9	1	1	5	1	8
10	6	8	5	8	27
12	1	0	0	0	1
Intelligence (WISC–III FS)[a]					
M	90.57	—[b]	82.0	—[b]	
SD	4.89	—[b]	8.66	—[b]	
Range	90–99	—[b]	75–101	—[b]	

Note. WISC–III FS = Wechsler Intelligence Scale for Children–Third Edition, Full Scale.
[a]IQ scores were unavailable for one student with learning disabilities in each condition.
[b]IQ scores were unavailable for students without learning disabilities.

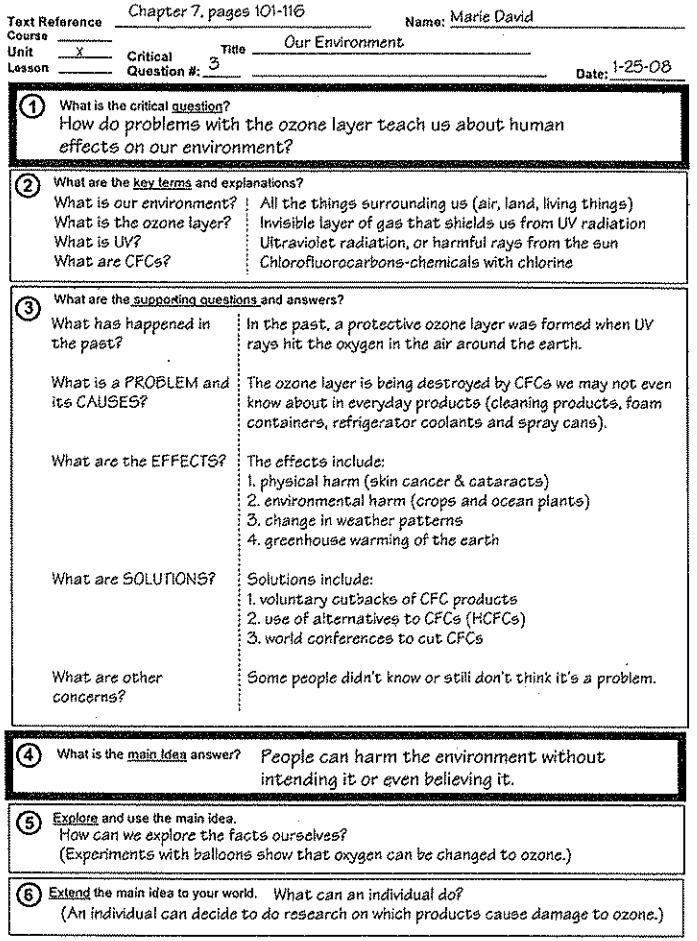
in the study; the study was held during a seminar period. Students were paid $10 for participating. Students were randomly assigned to experimental or control conditions using a stratification procedure to help ensure that the groups were relatively balanced with respect to the numbers of general education students and students with LD. See Table 1 for demographic data on students.

The QEG and QER

The main goal of the study was to assess the usefulness of an instructional graphic, the QEG, used with its associated instructional routine, the QER, to serve as a scaffold for written responses in addition to supporting the acquisition of content. (See Figure 1 for a sample QEG.) The QER is carried out in three instructional phases that are common to all CERs.

Phase 1

The first phase involves cueing students about the upcoming use of the routine and the importance of understanding the information, describing the use


Text Reference Chapter 7, pages 101-116 Name: Marie David
Course ____ Unit X Lesson ____ Critical Question #: 3 Title Our Environment Date: 1-25-08

① What is the critical question?
How do problems with the ozone layer teach us about human effects on our environment?

② What are the key terms and explanations?

What is our environment?	All the things surrounding us (air, land, living things)
What is the ozone layer?	Invisible layer of gas that shields us from UV radiation
What is UV?	Ultraviolet radiation, or harmful rays from the sun
What are CFCs?	Chlorofluorocarbons-chemicals with chlorine

③ What are the supporting questions and answers?

What has happened in the past?	In the past, a protective ozone layer was formed when UV rays hit the oxygen in the air around the earth.
What is a PROBLEM and its CAUSES?	The ozone layer is being destroyed by CFCs we may not even know about in everyday products (cleaning products, foam containers, refrigerator coolants and spray cans).
What are the EFFECTS?	The effects include: 1. physical harm (skin cancer & cataracts) 2. environmental harm (crops and ocean plants) 3. change in weather patterns 4. greenhouse warming of the earth
What are SOLUTIONS?	Solutions include: 1. voluntary cutbacks of CFC products 2. use of alternatives to CFCs (HCFCs) 3. world conferences to cut CFCs
What are other concerns?	Some people didn't know or still don't think it's a problem.

④ What is the main idea answer? People can harm the environment without intending it or even believing it.

⑤ Explore and use the main idea.
How can we explore the facts ourselves?
(Experiments with balloons show that oxygen can be changed to ozone.)

⑥ Extend the main idea to your world. What can an individual do?
(An individual can decide to do research on which products cause damage to ozone.)

FIGURE 1 Question Exploration Guide for the question "How do problems with the ozone layer teach us about human effects on the environment?"

of the graphic device, and explaining the students' role in taking notes on the Guide and in coconstructing understanding. A blank Guide is provided to each student for note taking, and the teacher and students collaborate to explore and share information, discuss, and construct the Guide.

Phase 2

The second phase involves (a) asking a critical question; (b) identifying key terms and associated definitions or explanations; (c) exploring smaller

questions and answering those questions as a means of "unpacking" and exploring the larger question; (d) coconstructing an accurate, concise main-idea answer to the critical question; (e) exploring the extended use of the answer in the content area; and (f) exploring the main idea within a larger context such as generalization to real-world issues. As each step is completed, information is recorded in the appropriate section of the Guide. These steps reflect cognitive supports embedded in the graphic device. The goal is for students to own and internalize the process of exploring background knowledge, self-questioning, thinking about and unpacking a difficult question, summarizing answers, and generalizing both the content learning and the thinking processes involved in that learning.

PHASE 3

The third phase involves reviewing the information on the Guide, checking student understanding of the information, and discussing the process involved in analyzing the critical question and arriving at an answer. In combination, the components of these three phases incorporate elements that the National Reading Panel (National Institute of Child Health and Human Development, 2000) has identified as effective in supporting comprehension, including summarization, use of graphic organizers, and various aspects of questioning.

Lesson Content

The lesson used in the study focused on the problem, causes, effects, and solutions related to the depletion of the ozone layer in the Earth's atmosphere. This topic was selected because the content was of the type that students might be expected to understand and write about in secondary content courses. Teachers of the students involved in the study concurred that the topic had not been covered in their courses.

Researchers selected a 30-min film, "The Ozone Layer," from *The Earth at Risk Environmental Video Series* (Schlessinger Video Productions, 1993), which provided the content in a relevant and engaging way. A lesson based on the content of the film was written by a research assistant with bachelor's degrees in zoology and education, a master's degree in reading, and experience as a classroom teacher. Three independent researchers agreed that the information contained in the lecture was also contained in the film.

The main points and important details from the film were included in the lesson; no further materials were added. The critical question and its main-idea answer were taken directly from the film, as were key words, details, extensions, and generalizations.

Procedures

The intervention took place during two sessions, 5 days apart. Each session was held during an 89-min seminar period at the school. The first session, which was attended by all of the experimental and control students, took place in the school library. One researcher who had teaching experience in general education classes presented the 30-min lesson about the depletion of the ozone layer, and all students were instructed to take notes as they normally would. Following the lesson, a pretest was administered. All students received a sheet of paper with the question "How do problems with the ozone layer teach us about human effects on our environment?" They were told they could use their notes to write the answer. Students were allowed 30 min to complete the essay. Essays and notes were collected, and students were reminded that the next part of the study would take place the following week. Another researcher was present to record and time all aspects of the presentation.

At the beginning of the second session of the study, the students in the experimental group met in the school cafeteria, whereas the students in the control group met in the library. Every effort was made to create similar instructional environments (e.g., desks, chairs, similar levels of quiet). Each student was given a sheet of paper to use for note taking during the 30-min instructional session.

Students were directed to take notes but were not given specific directions on how to take notes. Students in the control group saw the film on which the first lesson had been based; they were instructed to take notes as they normally would about the film's content. During the next 4 min of the lesson, a research assistant who had teaching experience in general education classes explained how to write a good five-paragraph essay including a topic sentence, three paragraphs in the body of the essay that dealt with issues covered, and a concluding paragraph. Students were then given 30 min to write an essay in response to the same question that they answered in the first session (i.e., "How do problems with the ozone layer teach us about human effects on our environment?"). They were also instructed that they were permitted to use their notes to write the essay. After students completed the essay assignment, their notes taken during the video and their written responses were collected. Another researcher was present to record and time all procedures.

As for the students in the experimental group, a researcher used the QER to fully develop the QEG with them (see Figure 1). Each student was given a blank copy of the Guide to use for note taking during the 30-min instructional session. Students were directed to take notes but were not given specific directions on how to take notes. The researcher asked questions to elicit from the students the information that was presented in the first session. During the discussion about the critical question, using an overhead transparency of the

Guide, the researcher wrote the key terms, supporting questions and answers, and the main idea and its uses. Then the researcher explained how the Guide could be used to write an essay, including how to develop a topic sentence, how to use the information in the supporting questions to develop three paragraphs in the body of the essay, and how to use the main idea and extensions in a concluding paragraph; this explanation took about 4 min. Another researcher was present to record and time all procedures.

Following the instruction, students in the experimental condition were given 30 min to write an essay to answer the same question posed to the control group: "How do problems with the ozone layer teach us about human effects on our environment?" Students in the experimental condition were told that they could use the notes they had taken on the Guide to write their responses. As students completed the assignment, their notes and written responses were collected.

Measures

Writing Score

A measure of each student's writing performance was obtained using the 6-Trait Model of Analytic Scoring, part of the 6-Trait Model of Writing Instruction (Northwest Regional Educational Laboratory, 1999). Research has shown positive results of the 6-Trait Model of Writing Instruction on students' writing performance (Arter, Spandel, Culham, & Pollard, 1994; Jarmer, Kozol, Nelson, & Salsberry, 2000). Responses scored using the 6-Trait Model are given up to 5 points for each of six traits (ideas, organization, voice, word choice, sentence fluency, and conventions) as well as a total score. Thus, students' essays received a score for each of these components, with a possible total of 30 points. Scorers used definitions and examples of different levels of responses for each trait to guide their scoring.

Content Score

A rubric scoring system was used to score the content of students' written responses. Criteria were drawn from Harris and Sipay (1990), who provided scoring criteria based on text structures—specifically the problem/solution and cause/effect structures. Students earned 1 point each for naming the problem, a cause of the problem, an effect of the problem, a solution, and a general statement of the main idea, for a possible total of 5 points. A scoring manual was written with guidelines for awarding scores.

The students received 1 point each if they identified the problem (i.e., destruction of the ozone layer), a cause (e.g., chemicals in the products we use), an effect (e.g., physical, environmental, or weather-pattern damage), a possible solution (e.g., cutbacks in use, alternatives or agreements), and a general statement (e.g., people can harm the environment without intending to harm it or even believing it is happening).

Reliability

Essays were scored after labels identifying students and conditions had been removed or masked. To determine the reliability of the writing scores, two high school teachers graded the essays independently; these teachers were certified in 6-Trait analytic scoring by the Department of Education in the state in which the study took place. One of the teachers scored each essay; the other scored 38 (53%) of the essays using the scoring guidelines recommended by the 6-Trait analytic scoring model. The two scorers' recordings on the 38 essays were compared item by item, and percent agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. The scores were within 1 point of each other, agreeing 226 times out of a possible 228, for 99.1% agreement.

To determine the reliability of the content scores, one researcher scored all of the essays according to the rubric that guided the scoring and awarded 1 point each for a problem, cause, effect, solution, and main idea. A second researcher independently scored 12 (17%) of the essays. The two scorers' recordings were compared item by item, and percent agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. The scorers agreed 59 times out of 60 opportunities to agree, for a percent agreement of 98.3% (range = 80%–100%).

Data Analysis

Analysis of covariance (ANCOVA) was used for all analyses. The pretest served as the covariate, and the posttest was the outcome of interest. ANCOVA is a recommended analysis procedure for studies in which the participating groups may not be equivalent on the covariate. For each analysis, the assumptions of ANCOVA (homogeneity of regression and significant relationship of the covariate to the outcome) were first checked. These assumptions were not violated in any of the analyses. Effect sizes (Cohen's *d*) were determined for all analyses. The primary analyses examined the differences between the experimental and control groups on the content scores and the total 6-Trait scores. Additional analyses examined each of the six traits separately; a Bonferroni correction (alpha level = .05/6 or .0083) was used to control for Type I error. Following each analysis of the overall effect of the intervention, a second set of analyses examined the differences between the experimental and control groups by subgroup (i.e., students with and without LD).

RESULTS

Differences on Measures of Content Knowledge

Table 2 shows the mean content scores for each group. In general, the content scores of the experimental group improved, whereas the scores of the control groups remained relatively constant or declined slightly. The ANCOVA revealed significant differences between the posttest content scores of the experimental students and the posttest content scores of the control students when the pretest was used as the covariate, $F(1, 33) = 15.90$, $p < .001$. This represents an effect size of .74, a moderately large effect according to Cohen's (1988) criteria.

Follow-up tests were conducted for the students both with and without LD. Table 3 displays the mean content scores of students with and without LD in each group. As illustrated, for students without LD, significant differences were found between the posttest scores of students in the experimental condition and those in the control condition, $F(1, 15) = 17.96$, $p = .001$, with Cohen's $d > 2.0$, which is a very large effect size. Content scores for the general education students in the control condition decreased slightly, whereas the experimental condition students exhibited more than a 50% improvement over their pretest scores. For the subgroup of students with LD, the difference in mean scores was not statistically significant, $F(1, 15) = 1.78$, $p = .20$; however, the Cohen's d value was .69, an effect size between medium and large.

TABLE 2 Mean Content Scores by Group (Total Sample)

	Pretest			Posttest		
Group	*M*	*SD*	*N*	*M*	*SD*	*N*
Control	1.88	1.32	17	1.71	1.49	17
Experimental	1.63	1.54	19	3.16	1.83	19

TABLE 3 Mean Content Scores for Students With and Without LD

	Pretest			Posttest		
Group	*M*	*SD*	*N*	*M*	*SD*	*N*
Students with LD						
Control	1.75	1.49	8	1.75	1.49	8
Experimental	0.40	0.52	10	1.80	1.40	10
Students without LD						
Control	2.00	1.23	9	1.67	1.58	9
Experimental	3.00	1.00	9	4.67	0.71	9

Note. LD = learning disabilities.

TABLE 4 6-Trait Mean Item Scores by Group (Total Sample)

	Pretest			Posttest		
Group	*M*	*SD*	*N*	*M*	*SD*	*N*
Control	2.70	.63	17	2.47	.62	17
Experimental	2.68	.81	19	3.33	.93	19

Differences on Measures of 6-Trait Writing Scores

Table 4 displays the mean 6-Trait writing scores for both experimental and control students. Results of the ANCOVA revealed significant differences between the posttest scores of the experimental and control students, $F(1, 33) = 17.14$, $p < .001$. Cohen's d was 1.44, a very large effect. Students in the control condition scored lower on the posttest than they had on the pretest, whereas students in the experimental group improved their scores by approximately 25%.

Table 5 shows the mean scores for the subgroups. Follow-up tests were conducted for students with and without LD. Differences between the posttest performances of students in both the experimental and the control groups were significant for both subgroups: for students without LD, $F(1, 15) = 6.49$, $p = .022$; and for students with LD, $F(1, 15) = 6.48$, $p = .022$. The effect size was the same for both students with and without LD: Cohen's $d = 1.32$, a very large effect.

Differences on the 6-Trait Writing Components

Mean scores for each of the 6-Trait writing components are displayed in Table 6. Statistical differences were found between the posttest scores of both the experimental and the control groups for every component except conventions: ideas, $F(1, 33) = 14.59$, $p = .001$; organization, $F(1, 33) = 11.74$,

TABLE 5 6-Trait Mean Item Scores by LD and Non-LD Status

	Pretest			Posttest		
Group	*M*	*SD*	*N*	*M*	*SD*	*N*
Students with LD						
Control	2.54	.62	8	2.27	.60	8
Experimental	2.17	.69	10	2.90	.76	10
Students without LD						
Control	2.83	.65	9	2.65	.62	9
Experimental	3.26	.50	9	3.81	.90	9

Note. LD = learning disabilities.

TABLE 6 Individual 6-Trait Mean Item Scores by Condition and Group

Group	Ideas						Organization						Voice					
	Pre			Post			Pre			Post			Pre			Post		
	M	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*
Control																		
Without LD	3.00	1.00	9	2.78	0.833	9	2.44	0.726	9	2.33	0.866	9	3.11	0.782	9	2.44	0.527	9
LD	2.63	0.744	8	2.25	0.886	8	2.50	0.756	8	2.00	0.926	8	2.50	0.926	8	2.50	0.756	8
Total	2.82	0.883	17	2.53	0.874	17	2.47	0.717	17	2.18	0.883	17	2.82	0.883	17	2.47	0.624	17
Experimental																		
Without LD	3.33	0.707	9	3.89	0.928	9	2.89	0.782	9	3.67	1.00	9	3.56	0.726	9	4.00	1.00	9
LD	2.20	0.789	10	3.20	0.789	10	1.90	0.568	10	2.60	0.966	10	2.40	0.966	10	3.10	0.876	10
Total	2.74	0.933	19	3.53	0.905	19	2.37	0.831	19	3.11	1.10	19	2.95	1.026	19	3.53	1.02	19

Status	Word choice						Sentence fluency						Conventions					
	Pre			Post			Pre			Post			Pre			Post		
	M	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*
Control																		
Without LD	2.89	0.782	9	2.78	0.667	9	2.78	0.667	9	2.67	0.866	9	2.78	0.667	9	2.89	0.601	9
LD	2.50	0.535	8	2.25	0.463	8	2.50	0.535	8	2.25	0.463	8	2.63	0.518	8	2.38	0.518	8
Total	2.71	0.686	17	2.53	0.624	17	2.65	0.606	17	2.47	0.717	17	2.71	0.588	17	2.65	0.606	17
Experimental																		
Without LD	3.33	0.500	9	4.00	1.00	9	3.22	0.667	9	3.67	0.866	9	3.44	0.527	9	3.44	0.882	9
LD	2.20	0.919	10	3.00	0.816	10	2.10	0.738	10	2.90	0.994	10	2.20	0.632	10	2.60	0.699	10
Total	2.74	0.933	19	3.47	1.02	19	2.63	0.895	19	3.26	0.991	19	2.79	0.855	19	3.00	0.882	19

Note. LD = learning disabilities.

$p = .002$; voice, $F(1, 33) = 15.71$, $p = .000$; word choice, $F(1, 33) = 12.95$, $p = .001$; and sentence fluency, $F(1, 33) = 11.42$, $p = .002$.

DISCUSSION

This research study addressed an educational challenge in schools today—that all teachers, including content area teachers, must help students respond to the literacy challenge of writing well. The instruction associated with the QER and the QEG incorporates several of the writing elements recommended in the Carnegie Corporation of New York report on writing (Graham & Perin, 2007) and addresses content and writing challenges put forth in a variety of national content standards.

Specifically, in light of significant differences and very large effect sizes on writing scores for the total group of students as well as for students with and without LD, this study demonstrates that the QER and associated Guide may be used to help students perform well on a common measure of written responses with minimal additional instructional time. This is further supported by the findings of significant differences for students' written performance in the five areas of ideas, organization, voice, word choice, and sentence fluency. As such, use of the QER and the Guide enables teachers to help students acquire ways to respond to writing assessments while they teach important content information required in rigorous content classes. This is particularly striking considering the minimal amount of instructional time spent in teaching students how to use the QEG as a support for written responses in a single encounter with the QER.

The routine also addresses teacher concerns about the impracticality of adopting methods that help only one student population by showing that students both with and without disabilities can benefit from this instruction, particularly as they respond to assessments requiring written responses. In addition, it opens up the possibility that students who may need added support on assessments requiring written responses can be supported in this type of instruction in inclusive core content classes.

Relative to performance on a measure of acquisition of content information, the analysis of the data revealed significant differences and a moderately large effect size in favor of the total experimental group and significant differences and a very large effect size for students without LD. Furthermore, it revealed a medium to large effect size for students with LD, although differences were not significant. The lack of significance for students with LD on the content score may well be due to the small number of students in that group. This requires further study; however, previous research has indicated that the use of other CERs helps students of diverse abilities learn critical content (Bulgren et al., 1988, 2000, 2001, 2002).

Limitations and Future Research

Despite the promising results, certain limitations must be taken into consideration, including the relatively small number of students who were also paid volunteers, and the controlled content and environment (i.e., not a classroom setting). Therefore, there is a need to explore the use of this instruction with more students in inclusive general education classrooms and with regularly scheduled content materials as part of ongoing content instruction. The study should also be conducted with other types of written formats in addition to the five-paragraph essay (Graham & Perrin, 2007).

A focus of a future study would be to determine how much time must be devoted to using the Guide, the QER, and associated writing prompts in ongoing classroom instruction to achieve positive results on written assessments. This was not possible in the present study because of the experimental design and time limitations. In addition, this study compared elaboration of information to repetition. Future research might compare two types of elaboration techniques.

Another line of research should determine the amount of exposure to and use of the routine needed before teachers can gradually withdraw students' reliance on using the actual QEG as a support for written responses while maintaining adequate performance levels. A future study might also explore the inclusion in instruction of other important components, such as planning, revision, and feedback, as recommended by Gersten and Baker (1999).

These are important areas to investigate because they relate to the amount of time that teachers need to spend on targeted content, the nature and type of elaboration, and the ongoing use of a routine that requires explicit instructional attention to targeted content over other content. These issues touch on the degree to which teachers in academically diverse classrooms will adopt methods that require them to engage in more explicit planning and teaching than they have used in the past in order to ensure that large numbers of students meet targeted standards, including those standards related to written expression.

Nevertheless, this study provides further indications that the use of content enhancements such as the QER and QEG can enhance the ability of a wide range of students to convey their understanding of complex content relationships in writing. In so doing, it responds to increasing calls for assessments that require written responses and for ways that all teachers can support writing literacy needs.

Furthermore, the study adds an important instructional dimension to a series of CERs shown to be effective in inclusive secondary classes at helping students of diverse abilities respond to demands in general education classes (Bulgren et al., 1988, 1997, 2000, 2001, 2002). As such, it extends the research on CERs in the important area of writing.

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