Examining the Impacts of the Structures Writing Intervention for Teaching Fourth-Grade Students to Write Informational Text

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Abstract

Expository writing may be especially difficult for elementary grade students due to lack of background knowledge and unfamiliar text structures. A text structure writing intervention aimed at teaching students to write informational text using text structures has been shown to have promise for improving the informational text writing of upper elementary grade students using small group instruction (Hebert, Bohaty, Nelson, & Roehling, 2018). There are disadvantages to small group instruction, however, because it requires additional resources. In the current study, 41 students in grade 4 were randomly assigned to receive the *Structures Writing* intervention or BAU narrative writing instruction. Both groups received instruction in a large group setting. At posttest, students who received the *Structures Writing* intervention statistically significantly outperformed the control group on researcher-created measures of simple description, compare/contrast, sequence, problem-solution, and cause-effect writing. Results indicated no differences between on distal reading outcomes. The intervention components completed within the allotted time-frame were completed with a high degree of fidelity (97%), providing an indicator of usability. However, students only fully completed 57% of lesson activities, indicating that it is not feasible to complete the lessons within a 30-minute time frame. The discussion highlights the *Structures Writing* intervention as a promising approach for improving informational text writing skills of fourth grade students with moderate to large effect sizes that support findings of a prior pilot test. A larger efficacy trial is warranted following revision of the lessons to shorten lesson duration.

Informational text writing is a complex task for elementary grade students (Hebert et al., 2016; Williams & Pao, 2011), especially students with writing difficulties (Gersten, Fuchs, Williams, & Baker, 2001). Many students lack experience reading informational text coming into elementary school (Williams & Pao, 2011), and early elementary classrooms spend very little instructional time reading informational text (Duke, 2000). Because of this, students lack knowledge of text structures used for informational text, which are different from familiar structures of stories or personal narratives (Hebert et al., 2016; Mandler & Johnson, 1977; Meyer & Rice, 1984). Specifically, authors who write to inform use a combination of five different text structures, including description, compare/contrast, sequence, problem/solution, cause/effect (Meyer, 1985). Each structure has a unique organizational pattern and signal words (Meyer, Wijekumar, & Lei, 2018). Children who lack experience with these structures in reading also have difficulty using them in writing.

Informational text writing is also difficult for elementary aged students because they often lack the background knowledge and vocabulary necessary to write about content area topics (Saenz & Fuchs, 2002). If students have not been exposed to topics or content then they have very little to draw from in their writing. One way to diminish the impacts of this lack of knowledge is to incorporate reading into writing tasks. However, this makes writing tasks more complicated and asks students to integrate reading and writing skills in a complex way. For example, if students lack vocabulary knowledge, they may have difficulty accessing and understanding it when they are reading. Therefore, they will continue to have difficulty using it in their writing.

An additional challenge is that many students have difficulty with fundamental writing skills such as handwriting and spelling, which require the use of working memory skills and attention (Berninger & Amtmann, 2003). This exacerbates their difficulty with writing informational text. If students' attention and working memory resources are overloaded by handwriting, spelling, background knowledge, and unfamiliar text structures, they are unlikely to successful when writing informational text.

To address the challenges children encounter when writing informational text, the authors of this paper developed an intervention aimed at reducing students' cognitive load when initially teaching informational text writing skills (Hebert, Bohaty, Nelson, & Roehling, 2018; Hebert, Bohaty, Nelson, & Lambert, 2018; Hebert, Bohaty, Nelson, Roehling & Christensen, 2018). The *Structures Writing* intervention was designed for fourth and fifth grade students with writing difficulties. The intervention was designed to teach students how to organize text using the five basic text structures, while also providing scaffolds for background knowledge, vocabulary, and spelling. In a recent pilot study, the *Structures Writing* program showed promise for improving informational text writing skills of fourth and fifth grade students (Hebert, Bohaty, Nelson, & Roehling, 2018).

Despite promising results, the intervention was conducted in small group and one-on-one context, which can put a strain on resources (e.g., personnel, time) and create a barrier for some schools and classrooms. Moreover, many elementary school students are not proficient writers, and there are few informational text writing curricula for the general classrooms. In the most recent writing results from the National Assessment of Educational Progress (NAEP) in 2002, 72 percent of fourth-grade students scored below proficient (Persky, Daane, & Jin, 2003). Although the NAEP does not assess informational text writing, we might expect students to perform even

lower when writing to inform (Hebert, Bohaty, Nelson, & Roehling, 2018), due to aforementioned lack of experience. Therefore, it may be more efficient, and beneficial, to implement informational text writing instruction at the whole-class level.

The purpose of this study is to determine whether the *Structures Writing* intervention can be adapted for a whole class instructional setting. Whole class instruction requires the adaptability to meet the needs of a wider range of student abilities, as well as different types of classroom management strategies than small group instruction. Therefore, this pilot study is aimed at determining whether this intervention is usable and feasible in a whole group setting, and whether it shows promise for a full range of student abilities.

Why the *Structures Writing* Intervention Might be Beneficial for Fourth-Grade Students

The *Structures* intervention was designed as a standard protocol intervention (Hebert, Bohaty, Nelson, & Roehling, 2018; Hebert, Bohaty, Nelson, & Lambert, 2018; Hebert, Bohaty, Nelson, Roehling & Christensen, 2018). The primary purpose of the intervention is to teach students how to write informational text using the five basic informational text structures. It was designed to:

- provide students with an understanding of the purposes of informational text
- help students use organizational text structures to achieve those purposes
- teach students how to use signal words and transition words that are necessary to informational text
- reduce the problems related to lack of background knowledge by providing students with information that can be used in their writing
- decrease the amount of reading that is typically required when writing about unfamiliar topics (in order to focus more on structure and purpose), and

- scaffold the writing task by supplying vocabulary and spelling supports.

We provide an overview of each of these features and how each addresses the informational text writing challenges faced by elementary students, as well as relate the components to theoretical models of writing (e.g., Graham, 2018; Hayes & Flower, 1980; Scardamalia & Bereiter, 1987).

Prioritizing Teaching About Purposes for Writing Informational Text

As previously mentioned, students have lack of experience with informational text. In some cases, students are asked to answer factual questions about or write summaries of informational text (Graham & Hebert, 2010), potentially causing them view informational text writing as something they need to memorize or demonstrate their knowledge of on tests. Because of that, they may approach informational text with the objective to simply memorize or share facts, rather than trying to understand the purposes authors may have for sharing different types of information (McNeill & Berland, 2017). When writing, this might perpetuate the *knowledge telling* approach introduced by Scardamalia and Bereiter (1987), where students simply write the relevant information they can think of for a specific topic, with little concern for structure or organization.

To address this, *Structures Writing* provides instruction about the purposes of writing informational text which helps frame the information in a way that students can write to transform the knowledge. This is designed to help students go beyond the facts by understanding how facts are being used to convey a more nuanced understanding of the topic. Specifically, we teach students that authors might intend to (a) describe something by providing information about its features, (b) compare two topics to help readers understand the similarities and differences between the topics, (c) present a sequence that helps the reader understand the

progression of a scientific cycle or historical event, (d) describe how problems can be or have been solved, and/or (e) show a cause and effect relationship. The goal is to help students think about how facts can be organized in ways that facilitate a particular outcome for their reader, thus leading to knowledge transforming rather than knowledge telling. This also aligns with the notion that the purposes of writing reflect the desired goals of the writing community, which can lead to the use of specific tools and actions (Graham, 2018).

Including a Specific Focus on Organizational Text Structures and Teaching Signal Words

The purposes of informational text writing are reflected in five unique text structures (i.e., description, compare/contrast, sequence, problem/solution, cause/effect). Each of these structures has a unique organizational pattern (Hebert, Bohaty, Nelson, & Lambert, 2018; Meyer, 1985; Williams & Pao, 2011; Wijekumar, Meyer, & Lei, 2012), and often utilizes specific signal and transition words. Sequence is among the most restrictive, in that the sequence typically presents events, processes, or tasks in a specific order, which makes it easy for the reader to follow. Signal words for sequences include words like first, second, third, then, next, subsequently, etc. The compare/contrast structure is often marked by grouping similarities and differences or alternating them throughout writing. Writers might transition between similarities and differences by using transition words/phrases, such as, “although there are many similarities between these topics, there are also differences. Other signal words might include *similar*, *same*, *alike*, *difference*, *contrast*, *unlike*, etc.

The ability to organize ideas in writing is central to several writing theories. Hayes and Flower (1980) included organizing as a key aspect of planning influenced by the writer’s knowledge of the topic and stored writing plans. Hayes (1996) expanded on this to include task schemas and genre knowledge as key contributors to the cognitive writing process, whereas

Bereiter and Scardamalia (1987) found that skilled writers rely on a rhetorical space to achieve writing goals, which, in our opinion, can be thought to include goals for presenting information in a particular way for a specific purpose.

Indeed, teaching students to organize their writing has been impactful for struggling writers in elementary and secondary settings (Graham & Perin, 2007; Rodgers & Graham, 2008). For instance, Self-Regulated Strategy Development is an effective intervention that has helped students plan and organize their writing (SRSD; see Graham & Harris, 2003), and includes components for planning to include elements for specific genres, which are remembered through mnemonics (e.g., TREE: **T**opic Sentence, **R**easons 3 or More, **E**xplanations for each reason, **E**nding). Students are then taught to organize the elements in a way that makes sense for the genre and use transition words to help their reader understand the organization.

Structures Writing includes instructional components directly aimed at teaching students how to organize informational text for each genre. Students are taught to identify the text structure in the first step, and that each text structure has some unique considerations for organization that align with the authors purpose. They are also taught how to use specific signal and transition words (introduced earlier in this section) that can help to sharpen the organization of the structure. Teaching signal words in conjunction with informational text structures was introduced by Meyer (1985), and has been shown to be effective in reading [e.g., Wijekumar, et al., 2012 (grades 4); Wijekumar et al., 2018 (grades 4 & 5)] and in reading and writing [e.g., Williams & Pao, 2011 (grade 2)]. See Hebert et al. (2016) for a comprehensive meta-analysis of the text structure interventions with signal words.

Reducing Constraints of Background Knowledge while also Limiting Reading Demands

Most cognitive models of writing recognize and include background knowledge as a critical component of writing (e.g., Graham, 2018; Hayes, 1996; Hayes & Flower, 1980; Scardamalia & Bereiter, 1987). This is a critical limitation for elementary students when writing informational text, as they may have no or incomplete background knowledge for specific content areas and topics (Englert et al., 2009).

In many cases, teachers and researchers might mitigate the limitations of students' background knowledge by having them read and conduct research prior to writing informational text (e.g., Kim, Vaughn, Wanzek, & Wei, 2011; Klein & Kirkpatrick, 2010; Reynolds & Perin, 2009). This seems to be a logical way forward, because reading it is a natural part of the writing process for authors. In fact, Hayes (1996) recognized this and included reading as a critical component in his cognitive model of writing, including mentioning reading and incorporating information from source texts. To do this, writers need to identify source material, read it (with comprehension), identify information relevant for their writing topic (including pertinent vocabulary, which they may be unfamiliar with before reading), take notes on the details related of that information, organize notes from multiple sources, and finally, write (Graham, 2018; Hayes, 1996). Indeed, an example strategy from SRSD illustrates how reading demands are placed on writers when writing informational text. The TWA + PLANS strategy (see Mason, Snyder, Sukhram, & Kedem, 2006), for example, requires students to: **T**hink before they read, think **W**hile they Read, think **A**fter they read, plus, **P**ick goals, **L**ist ways to meet goals, **A**nd make **N**otes, and **S**equence notes. They do all of these steps before writing which, although found to be effective (Mason et al., 2006), might increase students cognitive load during the writing process.

To address this, Structures Writing provides students with content to write about by providing the topic and the facts for them to organize, as well as indicating how the facts fit into the text structure (e.g., we indicate whether the facts or similarities, difference, causes, sequence, problems, etc.). By doing this we limit the amount of reading they need to do (e.g., for source materials, by eliminating source text). Additionally, instructors can read the information for the students, further reducing cognitive load. This allows the instructor and the students to focus more on how to organize the information in a way that makes sense for the text structures.

Scaffolding the Writing Task by Supplying Vocabulary and Spelling Supports

An ancillary effect of providing information for students to write about is that we can also have control over the vocabulary we ask them to include. The number of content area words, as well as their rarity and utility, can be controlled. We provide these words embedded in the facts used to build background knowledge, within an organizer that we call an *information frame* (see example in Figure 1). These *information frames* include multiple facts but they are provided primarily in phrases and sentence fragments rather than complete sentences. Student have to combine information and add transitions to link and structure the information. In addition to including vocabulary words, this also helps scaffold for spelling by providing the spelling of difficult vocabulary words and other words they will use in their text.

These scaffolds are important as the *Simple View of Writing* model indicates that students' transcription skills and idea generation are both constrained by working memory in order the produce written text (Berninger & Amtmann, 2003). Providing the information frame reduces demands on writing and working memory skills which allows students to focus on organization and relationships among ideas. Supporting vocabulary may also help improve writing (e.g., Duin & Graves, 1987).

Purpose and Research Questions

Although *Structures Writing* has shown promise for students with writing difficulties, it has yet to be tested in a whole group setting with a full range of student abilities. As previously noted, many students lack proficiency with writing. Therefore, we expect that the same components and scaffolds that we included for struggling writers will also be useful for students with average writing abilities. The purpose of this study was to examine the usability, feasibility, and promise of the *Structures Writing* intervention delivered in a whole group setting.

Additionally, we are interested in whether the intervention also may have impacts on reading. We hypothesize that teaching students text structures for writing will improve their ability to recognize these structures when reading informational text, and use that information to understand how and why the author is presenting information (e.g., comparing and contrasting two ideas to show similarities and differences). This, in turn, is expected to increase reading comprehension. Prior research has shown that writing impacts reading comprehension (Graham & Hebert, 2010). However, prior studies of the *Structures* intervention have had mixed results on reading comprehension. These studies have found that the *Structures Writing* intervention have improved students' ability to identify text structures when reading but there was no impact for reading comprehension (Hebert, Bohaty, Nelson, & Roehling, 2018; Hebert, Bohaty, Nelson, Roehling, & Christensen, 2018). It may be that including students with a broader range of abilities might lead to different outcomes. Thus, we designed the study to address the following research questions:

1. What are the effects of the *Structures Writing* instruction on proximal measures of text structure writing (i.e., simple description, compare/contrast, sequence, problem-solution,

and compare-contract) compared to an alternative writing condition (e.g., personal narrative writing)?

2. What are the effects of text structure identification and discrimination on distal measures of reading?
    a. What are the effects on an informational text structure identification measure?
    b. What are the effects on an informational text reading comprehension measure?
3. Is the Structures Intervention usable and feasible to implement?
    a. Can the instructor implement the components of the intervention with fidelity?
    b. Can the students and the instructor complete all of the instructional activities within the allotted time frame for the lesson?

Method

We employed a randomized-control trial to examine the effectiveness of the *Structures Writing* intervention as compared to a *personal narrative writing* control condition, with participants randomly assigned to condition. Both conditions are described later in the method. The study was conducted at an elementary school in Nebraska four days per week during a 60-minute writing block at the end of the school day. The design included two 30-minute lessons per day, over a period of two weeks, for 20 total intervention sessions for the experiment. Following the experimental period and posttest assessments, we provided the intervention to the control group (although this is not included in the experimental results).

Participants

Participants were forty-one 4th grade students in two classrooms in a midwestern school. We sent home consent forms to all students in the classroom and had no exclusion criteria. All

students from the classrooms participated in the instruction ($N = 43$), but we conducted random assignment and collected data from only students for whom we received parent consent.

Forty-one students participated in the study. There were 18 girls and 23 boys, 100% of the students were white, 20.5% were on free-reduced lunch, 13% of students were on IEPs, and 0% were English Language Learners. The first and second authors randomly assigned participants (within classrooms) to one of two conditions: 1) *Structures Writing* (treatment; $n = 21$), or 2) *BAU personal narrative writing* (control; $n = 20$). There were no differences between the treatment and control groups on the Test of Silent Reading Efficiency and Comprehension ($t = 0.58$, $p = .564$) or the Wechsler Individualized Achievement Test-III (WIAT-III) Essay Composition subtest ($t = 0.28$, $p = .775$). For further context on student writing ability as assessed by the WIAT-III, scores in the classroom ranged from a standard score of 76 to a standard score of 147; two students in the treatment condition received standard score below 90 (76 and 81) and two students in the control condition also scored below a standard score of 90 (88 and 89). See Table 1 for descriptive statistics for each condition. Each day of the study, students switched into the classroom for the appropriate treatment group and received instruction in a "whole-class" format. There was no attrition in the sample.

Measures

The study included two categories of measures: 1) Descriptive measures of student reading and writing skills, and 2) Dependent measures that included proximal measures of text structure writing, and distal measures of reading performance. Prior to random assignment, the authors administered the measures to entire classrooms of students in both conditions. Only authors who were not involved in delivering the *Structures Writing Intervention* administered the posttest assessments to students in their original classrooms. This ensured that the assessments

were administered to students both conditions in the same way, and that the assessment administrators were blind to the individual treatment groups of individual students. The first author trained the RAs to administer all measures. Because the researchers created several of the measures, we correlated the measures with standardized, norm-referenced measures included in the study for validity purposes (see Results).

Descriptive Measures of Participants' Skills

Descriptive measures were administered prior to the intervention and included subtests of the Wechsler Individualized Achievement Test-3rd edition, and the Test of Silent Reading Efficiency and Comprehension (TOSREC).

Wechsler Individualized Achievement Test, 3rd edition (WIAT-III) Essay Composition Subtest (Pretest only). The WIAT-III Essay Composition subtest, a norm-referenced writing measure, was administered at pretest to examine potential differences in writing skill between the treatment groups. We chose this assessment because the content and organization required in the responses seem more closely aligned to the nonfiction responses taught in the *Structures Writing Intervention* than norm-referenced story writing measures.

The examiner read the prompt aloud, and gave students 10 min to write about their favorite game and provide at least three reasons why. Using the scoring guide provided by the WIAT-III, we scored Essay Composition for (a) theme development and text organization and (b) total number of words. For theme development and text organization, Essays received scores of 0-2 points for a thesis statement in the introduction (1 point for stating that they liked or love a specific game, and an additional point for previewing the reasons in the introduction), 0-2 points for a conclusion statement (similar to the criteria for the introduction), and 0-5 points for the number of paragraphs (a paragraph was required to include text with at least two punctuation

marks separated using line spacing or indentation from other text). Essays also received scores one point for each novel transition word (up to 5 points) following punctuation (e.g., another, second, finally), one point for each reason included about why the student liked the game (up to 3 points), and one point for an elaboration of each reason (up to 3 points). Maximum score for theme development and text organization was 20. Authors derived an overall standard score from separate standard scores for theme development and organization and total words written. Internal consistency reliability is .86 for grade four (see Breaux, 2010).

Test of Silent Reading Efficiency and Comprehension (Pretest only). We used the TOSREC as a measure to examine potential reading differences between groups at pretest, as the *Structures Writing* intervention required some reading (albeit limited). Test administrators asked students to read sentences and determine whether each sentence was true or not true by circling yes or no. Students had 3-minutes to read silently and complete as many examples as possible. The overall raw score was obtained by subtracting the total number of incorrect answers from the total number of correct answers, which provides a control for guessing. The publishers report the alternate form reliability of the assessment for grade four as .86 (Wagner et al., 2010).

Dependent Measures

Dependent measures included researcher-developed proximal measures that aligned with the treatment (i.e., Structures Passage Writing measures), and researcher-developed distal measures of the intervention (i.e., Text structure identification, and Informational text reading comprehension).

Structures Passage Writing assessments (Proximal measure). Students wrote five informational passages at pretest and posttest. The authors designed these proximal measures of the impacts of the *Structures Writing* intervention to match the five structures taught in the

intervention (i.e., simple description, compare/contrast, sequence, problem-solution, and compare-contrast). The authors developed two prompts for each text structure, for a total of 10 prompts. Five prompts (one for each text structure) were used in Form A of the assessment, and five prompts were used in form B of the assessment. The authors counterbalanced the two forms of the *Structures Writing* assessment across pretest and posttest conditions, randomly assigning either Form A or Form B to students, so that an approximately equal number of students received each form at pretest. Students completed the alternate form at posttest. The topics for each form of the test are located in Table 2.

The prompt for each text structure included a frame with information for students to include in their writing passage. Because the forms were counterbalanced and student received different prompts, the authors provided general instructions for the assessment using the following script:

> ***Please open your booklet. Find the directions at the top of the page. Read the directions to yourself."***
>
> *Give students a few seconds to read the directions. Say,* ***"You will have 10 minutes to read the information and write a passage. When the time is over, you will turn the page and write a second passage about a new topic. There are 5 passages in all. You will have 10 minutes for each passage. Do not begin a new passage until I tell you. Do you have any questions?"***

The students read the individual prompt to themselves. The instructions prompted students to use the information in the frame to write a passage using a specific text structure. For example:

> *"Use the information below to write a passage explaining the causes and effects of the American Revolutionary War."*

The authors also instructed students that they could use the blank space below the frame to plan their writing, showed them the lined paper for writing their passage, and answered

clarification questions. Example prompts and rubrics can be obtained by contacting the first author.

The research team scored all five of the measures using a holistic scoring rubric designed for each structure, as well as anchor papers that provided an example that represented each of the odd scores on the rubric. Each structure was scored on a 0-7 scale, but included slightly different criteria, based on the text structure. Because the assessments provided content for the students, the rubrics were designed to emphasize the structure, organization, and completeness of the writing. For example, the compare contrast rubric reminded scorers to provide higher scores if the writers logically grouped similarities and differences, which are components not often used for the other text structures. Alternatively, the rubric for the sequence text structure reminded scorers to consider the order of events.

To develop the rubrics, the authors examine student writing from prior study (see Hebert, Bohaty, Nelson, & Roehling, 2018). We started with the writing extreme scores (i.e., 0 – students wrote nothing or wrote something unrelated to the prompt, and 7 students included all of the information using the appropriate organizational structure and using complete sentences with appropriate transition and signal words for the text structure). We then identified features of the writing that indicated incremental steps from less advanced stages of writing to more advanced stages of writing (0-7), including writing a few words related to the topic, development of 1-2 facts, copying disjointed facts (no sentences, organization, or paragraphing), using their own words and complete sentences, some development of a paragraph, and some inclusion of transition or signal words. Rubrics for each text structure are available from the corresponding author upon request.

The first author scored all of the passages, and all other authors shared the responsibility for scoring the passages a second time for inter-rater reliability purposes. The first author trained other project personnel to score the passage. During training, each scorer was trained using 10 passages (two passages per text structure) together during training and used a rubric as a guide and anchor papers to assist in scoring. After scoring the 10 sample passages, raters then scored two additional passages on their own. If the scores exactly matched the first author's scores or were within one-point, the raters' training was completed. All raters met this criterion.

Following training, researchers scored assessments in a random order, blind to condition, using rubrics and accompanying anchor texts. Interrater reliability was calculated using the consistency approach (see Graham, Harris, & Hebert, 2011), correlating scores between the two raters. Reliability of .80 or higher is considered acceptable (Shavelson & Webb, 1991), whereas a coefficient between .90 and .95 is desirable when making decisions about individual students (Graham et al., 2011). For this study, correlations were .91 for simple description, .97 for compare/contrast, .91 for sequence texts, .88 for problem/solution, and .91 for cause/effect. Disagreements were resolved through discussion.

Structure Identification measure (Distal outcome). Students' ability to identify expository text structures was assessed with a researcher-created distal measure. The *Structure Identification* measure was an untimed, group-administered, multiple-choice measure designed to assess the ability of students to identify the five expository text structures taught in the program when reading. The measure was composed of 20 passages (i.e., four passages for each text structure). The order of passages was distributed randomly across the assessment. The length of passages ranged from 46 to 88 words, with a Lexile level range of 410L to 940L. Students

read a passage and chose the text structure that best fit the passage. Items were scored as correct or incorrect. The total score ranged from 0 to 20.

We used a standard administration for the Structure Identification measure. Research assistants read the directions and provided students an opportunity to ask questions. Students then completed the assessment without help. Time to complete the measure ranged from 10-15 min. Two alternative forms of the Structure Identification measure were developed for administration at the pre- and posttest periods (Forms A and B). We counterbalanced the forms across pre- and posttest periods. Pretest occurred one week prior to the intervention and posttest occurred one day following the intervention. Cronbach's alpha calculations indicated internal consistency of .80, which was similar to the internal consistency of this measure in a previous study (i.e., Hebert, Bohaty, Nelson, & Roehling, 2018).

Reading comprehension measures (Distal outcomes). Expository text comprehension was assessed using one form of a researcher-created, multiple-choice reading comprehension measure developed for a previous study (i.e., Hebert, Bohaty, Nelson, & Roehling, 2018). The purpose was to determine whether increases in informational text writing transferred to reading comprehension. Students read a passage and answered multiple-choice questions that followed.

The RAs individually-administered the untimed measures, which comprised two 3-paragraph passages and two 2-paragraph passages, with each paragraph representing a different text structure. This format is similar to authentic informational text, in which authors fluidly use different text structures, depending on the type of information they are presenting. Hebert, Bohaty, Nelson, & Roehling (2018) constructed the passages to ensure that (a) each paragraph represented a single text structure, (b) each form of the assessment included all five text structures twice, and (c) content included a mixture of science and social studies topics. The

passages fell within the target Lexile range of 410L to 940L. Table 3 shows the features of the assessment passages.

Each assessment question related to information about the content and text structure of a paragraph in the passage. For example, questions about compare/contrast paragraphs asked about similarities or differences. Items were scored as correct or incorrect. The total score ranged from 0 to 20. Cronbach's alpha was .76. Time to complete the measures ranged from 10-15 min.

Materials

The intervention instructor used interactive PowerPoint lessons, a Program Manual, and a Student Response Book to provide instruction (examples can be obtained by contacting the first author). The authors developed the materials using an explicit instruction framework and specifically linked the materials to provide instructors self-contained content and support.

The PowerPoint lessons included a step-by-step framework for modeling the writing procedures. The steps occurred in a clickable format, allowing the instructor to adjust the pace of instruction according to students' needs. The Program Manual was designed with text boxes corresponding to each slide (or click) to provide the instructors with a soft script and tips for instruction. As the instructor clicked through the slides, the steps of the writing strategy were checked off, and writing that appeared to be written on paper was shown on the screen. Having the writing mimicked on the screen allowed the instructor to spend more time providing think-alouds and engaging students in the modeling and guided practice exercises, rather than having their attention divided by producing the written text during modeling.

The Student Response Book was also linked with the PowerPoint lessons and Program Manual. The Student Workbook included pages with definitions and examples of each text structure, cloze exercises to be used during modeling exercises, and guided and independent

writing exercises to be used flexibly by the instructor.

The lessons included science and social studies passages across a variety of topics to intentionally emphasize that informational text structures and strategies are used across a range of content. Content was presented in "information frames," which provided information on the topic, text structure, and information related to the features of the text structure. By providing content for the writing passages, the program allowed the instructor and students to focus on the organization, structure, and features of informational text writing, rather than on idea generation.

Procedures

Following pretests, researchers randomly assigned participants to conditions. Each day, the teachers sent students to the classroom that corresponded to their assigned condition. In both conditions, students participated in a whole-class format, and received instruction during 10, 60-min session. Students in the treatment condition received two, 30-min *Structures Writing* lessons during each session (for a total of 20 sessions). We employed two lessons per session because the lessons were designed to be conducted in 30 min, but our partner school employed a 60-min writing block. Therefore, the teachers requested that we use the full writing block. The instruction in the control group was not organized into discrete lessons, and instead focused on the process approach for narrative writing for the full 60 min, with activities broken up across days.

Structures Writing treatment

Students assigned to the *Structures Writing* condition learned to write informational text using five text structures: 1) Simple description, 2) Compare/Contrast, 3) Sequence of events, 4) Problem-Solution, and 5) Compare-Contrast. Table 4 shows the lesson sequence. The second author provided instruction in the lesson, and the fourth author provided support to students with

IEPs and lower performing writers, similar to how a paraprofessional might support classroom instruction.

In lesson 1, instructors provided an overview of the five text structures, including a definition for each structure and example passages. In lesson 2, students learned a variation of the POW writing strategy (e.g., Harris, Graham, & Mason, 2006) designed specifically for this intervention. Each letter of the mnemonic POW represented a step in the writing procedure:

P – Pick your idea (Pick the topic, Pick the structure)

O – Organize your notes (Choose an order for the information based on the text structure)

W – Write and Review (Write the topic sentence, Write the information in the order you chose, and Review to make sure your passage includes all of the information and makes sense)

After introducing the mnemonic, the instructor modeled writing a Simple Description passage (i.e., Pill Bugs) using the POW strategy. The instructor provided a think-aloud to show students how to combine the topic with an important fact in a topic sentence, use transition words to introduce new facts, combine related facts into a single sentence, and cross off information used. To maintain engagement, students (a) followed along by checking off parts of the strategy checklist in their workbook when the instructor did, (b) filled in a cloze passage as the instructor showed how to write the sentences, and (c) read the completed passage with the instructor. In lessons 3-5, the instructor transitioned from modeling to guided practice, gradually fading support to move students toward independent performance.

Lessons also included self-monitoring checklists for students, where students earned "bricks" to color in and build their structures tower. Students earned bricks for incorporating writing tips that were infused into the lessons, including: pairing the topic with an interesting fact

in the topic sentence, alternating nouns and pronouns when referring to the topic, combining two facts into a single sentence, using transition words, including capital letters and punctuation for each sentence, and making sure all sentence make sense. As they earned bricks for each passage and completed enough passages for a floor of the tower (represented by a text structure), our "builder" came out on the slide to reveal a new way to celebrate (e.g., "Let's Dance," "Let's Party!"), and this anecdotally ended up being very motivating for the students.

Similar instructional sequences were used to teach students to write about information using compare and contrast, sequence, problem-solution, and cause-effect structures. The students always completed the steps with the instructor during modeling by filling in cloze passages in their workbooks when writing was shown on the screen. During guided and independent practice exercises, the students completed all steps, including writing full passages (with appropriate support when necessary). The program included a total of 30 passage writing exercises (6 passage writing exercises for each text structure).

Narrative writing control group.

The control group participated in a business-as-usual narrative writing unit taught each year in the fourth-grade classrooms. The instructor was one of the students' regular classroom teachers. The teacher used a writer's workshop format, with minilessons for students followed by writing time that included planning, drafting, conferencing, editing and revising, and publishing. Students often worked on a piece of writing for multiple days, and conferenced with peers and the teacher to get feedback. Paraprofessionals assisted students with IEPs and students with writing difficulties flexibly when needed. The narrative writing condition received the same amount of writing instructional time as the treatment condition. The control condition teacher did

not require training, as the teacher taught narrative writing using their typical BAU narrative writing practices.

Treatment Instructor Training.

The second author (a graduate research assistant with 28 years of teaching experience), taught the *Structures Writing Intervention*, and the fourth author (also a graduate research assistant) provided instructional support. As the developers of *Structures Writing*, the first and third authors trained the second and fourth authors to teach the intervention group during a two-hour training session prior to the study, with a one-hour booster session just before instruction began. The instructors also reviewed the lesson materials for specific lessons prior to teaching each day.

Fidelity of Implementation and Dosage

We made a distinction between fidelity and dosage in our analyses of the usability and feasibility of the intervention, in order to provide a complete picture of (a) how well the lesson elements were implemented by the instructor in the amount of time provided (fidelity), and (b) the proportion of total elements completed by students (dosage).

To examine fidelity, we measured adherence to the procedures and steps of the lesson only until time ran out for the lesson. In other words, if time ran out before the instructor could complete the lesson, we did not examine fidelity of the lesson elements that the instructor did not have the opportunity to attempt. Lesson-specific checklists were used to assess the percent of primary instructional activities implemented correctly. The third author observed 55% of lessons and measured fidelity of the lessons in-person using the checklists as the second author delivered instruction.

To examine dosage, we compared the number of elements completed to the total number of elements built into the lessons. Dosage was calculated for each student, across activity types and overall number of activities, by dividing the average number of activities completed by the total number of the activities across the lessons. To obtain the average, we examined each of the student workbooks and identified the activities completed for each lesson, as well as activities partially completed. We then calculated totals for each activity type (e.g., checklists, step-up activity, written passage), and averaged the number of activities across students for descriptive purposes. We included all missed activities for any reason, including those missed because the student was absent, pulled from the beginning or end of the lesson for some reason, or just did not complete the activity due to time (i.e., some students worked faster than others on some activities). For example, if a student was absent for a lesson, the student received no credit for the activities for that lesson in the numerator, but the activities missed were included in the denominator.

Data Analysis

We evaluated differences between the conditions on posttest outcomes using a regression-based approach. For outcomes involving both a pretest and posttest, we entered the pretest score as a control variable in the multiple regression model to account for any pre-existing differences between the groups. Additionally, we included students writing scores from the WIAT-III Essay Composition subtest and TOSREC scores in the models, to account for any differences in general writing skills, as well as general reading skills that might have impacted students' ability to read words in the information frames.

In the models, the pretest covariates were mean-centered so that the intercept (B_0) can be interpreted as the mean for the narrative-writing control group when the pretest covariate scores

were average. Cohen's *d* effect sizes (1988) were computed based on the unstandardized regression coefficient for condition and the standard deviation of the outcome variable. In other words, we essentially divided *B* by the pooled standard deviation of the posttest, resulting in an effect size representing the conditional effect when controlling for the covariates used in the model (see Lipsey & Wilson, 2001). Because the standardized mean difference effect size (*d*) is upwardly biased in small samples, we applied a small sample correction to the effect size, resulting in Hedge's *g* (Hedges, 1981).

Results

Correlations Among Measures

Descriptive statistics for the outcome measures can be found in Table 5. A correlation matrix showing the relationships between the measures is provided in Table 6. All of the Structures Writing measures were strongly correlated, with correlations ranging from .54 (between Sequence and Cause-Effect) to .85 (Simple Description and Compare/Contrast). Additionally, all of the *Structures Writing* measures were statistically significantly correlated with TOSREC standardized reading measure, indicating that reading may play a role in the structures' writing measures with correlations ranging from .41-.64. However, only two of five *Structures Writing* measures were statistically significantly correlated with the WIAT-III Essay Composition Subtest, with correlations ranging from .24-.40. These small, moderate correlations provide mixed evidence for the validity of the researcher developed writing measures.

The Structures Identification and Multiple-choice reading comprehension measures were not correlated with the WIAT-III Essay Composition subtest. However, they were moderately correlated with the TOSREC (r = .51 and .54, respectively), providing some evidence of validity of these tests for measuring reading.

Research Q1: Proximal Outcomes (Structures Writing)

The regression analyses indicated statistically significant effects for all five *Structures Writing* measures. See Table 7 for the regression results for each of the proximal measures. However, some effect sizes had confidence intervals that crossed zero after applying the small sample correction. Therefore, the findings were somewhat inconsistent.

For the Simple Description Writing outcome, the intercept of 3.50 represented the score (out of 7) for students in the control group with average scores on the pretest, WIAT-III Essay Composition subtest, and the TOSREC. Students in the experimental condition scored, on average, 0.72 points higher than students in the narrative-writing control condition (p = .028). The WIAT-III Essay Composition subtest score was a significant predictor of the outcome and suggested that an increase (or decrease) of 1 in the standard score predicted a corresponding increase or decrease of .34 points on the outcome measure. The resulting conditional effect when controlling for covariates was g = 0.54 [95% CI = -0.08, 1.16].

For the Compare/Contrast Writing outcome, the intercept of 3.04 represented the score (out of 7) for students in the control group with average scores on the pretest, WIAT-III Essay Composition subtest, and the TOSREC. Students in the experimental condition scored, on average, 1.16 points higher than students in the narrative-writing control condition (p = .014). The compare/contrast pretest score was a significant predictor of the outcome and suggested that an increase (or decrease) of 1 in the standard score predicted a corresponding increase or decrease of .39 points on the outcome measure. The resulting conditional effect when controlling for covariates was g = 0.60 [95% CI = -0.03, 1.22].

For the Sequence Writing outcome, the intercept of 3.02 represented the score (out of 7) for students in the control group with average scores on the pretest, WIAT-III Essay

Composition subtest, and the TOSREC. Students in the experimental condition scored, on average, 1.25 points higher than students in the narrative-writing control condition (p = .002). The pretest was the only other significant predictor of the posttest outcome in the model, indicating that an increase (or decrease) of 1 point on the pretest measure predicted a corresponding increase of .48 on the posttest outcome. The resulting conditional effect when controlling for covariates was g = 0.76 [95% CI = 0.13, 1.38].

On the Problem/Solution outcome measure, the intercept of 3.07 represented the score (out of 7) for students in the control group with average scores on the pretest, WIAT-III Essay Composition subtest, and the TOSREC. Students in the experimental condition scored, on average, 0.92 points higher than students in the narrative-writing control condition (p = .015). The pretest was the only other significant predictor of the posttest outcome in the model, indicating that an increase (or decrease) of 1 point on the pretest measure predicted a corresponding increase of .50 on the posttest outcome. The resulting conditional effect when controlling for covariates was g = 0.57 [95% CI = -0.05, 1.19].

On the Cause/Effect Writing outcome, the intercept of 2.80 represented the score (out of 7) for students in the control group with average scores on the pretest, WIAT-III Essay Composition subtest, and the TOSREC. Students in the experimental condition scored, on average, 1.43 points higher than students in the narrative writing control condition (p < .001). The pretest was the only other significant predictor of the posttest outcome in the model, indicating that an increase (or decrease) of 1 point on the pretest measure predicted a corresponding increase of .48 on the posttest outcome. The resulting conditional effect when controlling for covariates was g = 0.93 [95% CI = 0.29, 1.58].

Research Q2: Distal Outcomes

Table 8 includes the results of the regression models for each of the distal outcomes. Scores on the Structures Identification and Multiple-choice reading comprehension measures did not significantly differ between the two groups at posttest. Due to the small sample, we calculated underpowered *ES*s to determine whether there was promise for the intervention to improve reading outcomes that should be explored in future studies. The *ES* for Structures Identification was $g = 0.25$ [95% *CI* = -0.35, 0.86], and the *ES* for the Multiple-choice Comprehension Test was $g = -0.28$ [95% *CI* = -0.88, 0.32].

Research Q3: Usability and Feasibility

The second author implemented the treatment group lessons with a high degree of fidelity, with 97% of the lesson components implement correctly. This provided some evidence for the usability of the program. The instructor completed the instructional steps in order, using the correct language and materials for each component of the lesson. However, we intentionally computed the fidelity score using only on lesson elements attempted, and ignored the lesson elements that the instructor did not have time to complete. We did this to ensure that we were evaluating the instructor's ability to follow the instructional steps and complete the instructional activities correctly (i.e., usability), without confounding for time.

Feasibility was examined through dosage of the intervention, as higher amounts of dosage were used as a proxy for examining the ability to implement all components of the intervention in the time frame, class size, and classroom contexts. Dosage was calculated as a proportion of lesson activities completed by the student divided by the total number of activities intended to be completed in the program. Dosage information can be found in Table 9. The total number of activities that students were intended to complete was 188, and students completed an average of 107.14, with a range of 59 – 139. In other words, the instructor and students were

only able to fully complete 57% of lesson activities, although most of the incomplete activities were at-least partially completed. Additionally, no students completed all of the activities, despite many students being present for all of the lessons. This indicated that absences were not the primary factor for incomplete lessons, and that the 30-min allotted for each lesson was not enough time to complete all of the lesson activities.

Discussion

The purpose of this study was to investigate the effects of the *Structures Writing* intervention, as compared to BAU narrative writing instruction, on the informational writing skills of fourth-grade students across a range of writing abilities in a whole group setting (standard scores on the WIAT-III ranged from 76 to 147). The study also examined usability and feasibility of the intervention, as well as the reliability and validity of the outcome measures.

The regression analyses indicated that the intervention was statistically significantly related to improvements on the writing outcomes, although only two of the *ESs* were statistically significant after correcting for small sample bias. These conflicting results indicate that the pilot study results should be interpreted cautiously. Despite being somewhat underpowered to detect the effects, the intervention had moderate to large effects on researcher-designed proximal measures of students' ability to write informational text using simple description (*ES* = 0.54 *ns*), compare/contrast (*ES* = 0.60 *ns*), sequence (*ES* = 0.76), problem/solution (*ES* = 0.57 *ns*), and cause/effect (*ES* = 0.93) text structures. These effects are similar to effect sizes found in a previous pilot study of the intervention conducted with students with writing difficulties taught in a small group setting on measures of simple description (*ES* = 0.66), compare/contrast (*ES* = 0.61), and a sequence (*ES* = 0.94) text structures (problem solution and cause/effect were not taught previously; see Hebert, Bohaty, Nelson, & Roehling, 2018). Because the ESs are

conditional on the covariates, they are larger than if they were to be calculated using simple means in some cases, suggesting there were potential suppression effects. However, these impacts are relatively large considering the brevity of the intervention (i.e., 20 total lessons including introductory lessons and fewer than five lessons per text structure with an average of only eight passage writing exercises per text structure). Moreover, these results were obtained while comparing Structures Writing to a control group that also received writing instruction (i.e., typical BAU narrative writing instruction conducted by the school), suggesting that the specificity of the writing instruction is what made the difference, rather than general writing skill improvement. This is important, as it reinforces the notion that writing skill in one genre does not necessarily predict writing skill in another genre for students at this age (Graham, Hebert, Sandbank, & Harris, 2016; Kim et al., 2017).

Although the posttest scores show there is potentially still some room for improvement, the results of this study suggest that the *Structures Writing* intervention shows promise for impacting the overall quality of students' informational text writing. Considering the short total intervention time (10 hours), limited instructor training needed (2 hours), and use of whole-group instruction, the intervention seems to be cost-effective. Thus, the intervention warrants further development and study on a larger scale, in both small and/or large group instructional settings.

We were also interested in the potential impacts of the Structures Writing intervention on distal outcomes. Unfortunately, there were no statistically significant differences found on our researcher created reading outcome measures. This is consistent with prior findings that the intervention did not have impacts on reading comprehension outcomes (see Hebert, Bohaty, Nelson, & Roehling, 2018). However, it is inconsistent with findings that the intervention had impacts in students' ability to identify text structures when reading (i.e., Hebert, Bohaty, Nelson,

& Lambert, 2018; Hebert, Bohaty, Nelson, Roehling, & Christensen, 2018). The underpowered *ES* for the Structures ID measure was in the correct direction, and potentially practically significant at 0.25, but this is much smaller than the ES found in prior research. One possible reason for the difference in findings are the shift in populations for this study as opposed to prior studies (i.e., all students in the classroom as opposed to only students with LD or reading and writing difficulties in prior studies). That is, students without LD may already have some skills in text structure identification and therefore benefit less from instruction (leading to smaller effects). Another potential reason for the smaller effect that the shift to whole group instruction did not allow for enough emphasis or individualized feedback to improve this outcome. Regardless, the study shows that the intervention was not sufficient for improving the reading outcomes examined in this study, despite a more complete evaluation of the intervention than has previously been conducted (as had been suggested in prior research). Therefore, improvements in reading outcomes should not be expected from this intervention in its current form. Attention to reading comprehension activities should be considered in a revision of *Structures Writing* if reading outcomes are desired to be a part of the intervention. Specifically, examination of studies that show the reciprocal benefits of intervention that involve balanced reading and writing instruction could be examined as it related to the activities in the current study (Graham et al., 2018). For example, Graham and colleagues found that interventions that involved content-based literacy led to an ES = .56 on reading performance. Therefore, it may be beneficial to restructure the Structures Writing intervention to focus on specific content material, which, in turn, may be more likely to have impacts on background knowledge, vocabulary, and reading comprehension for specific topics/content. As the development team, we will need to consider whether this is an important focus of the intervention going forward.

The study provided mixed results on the usability and feasibility of the intervention. The dosage information suggests that not all of the activities could be completed by students within the allotted time frame for the study (30-min lessons). In a prior study (see Hebert, Bohaty, Nelson, & Roehling, 2018) we were able to complete all of the lesson activities within the allotted time frame. However, new "step-up" activities were included in the latest revision and the lessons were delivered to large groups instead of small groups in this study, which may have contributed to the inability to complete all of the components. Some of this may also be due to the back-to-back nature of the lesson implementation for the study. That is, if the first lesson went over time for any reason, it subsequently reduced the amount of time available for the second lesson. Although the study was designed intentionally to fit two 30-min sessions within a 1-hr writing block for the classrooms, there was clearly not enough time to do so. That said, the fidelity data suggest that all of the components of the intervention that the instructor had time to complete were completed correctly, indicating that the instructor found the materials usable. Taken together, these results suggest that the intervention activities could be revised to reduce lesson duration, but the overall organization and presentation of the materials may not need to be revised. On the other hand, the school allotted 60-minutes for writing instruction each day, so it may not be necessary to fit lessons within a 30-minute time frame. An alternative may be to expand the lesson time-frame for use within large group or whole class settings.

Reliability and validity of the measures was also examined in this study. The correlations between the pretest *Structures Writing* measures and the WIAT-III Essay Composition subtest were small and some were non-significant. This may suggest that the *Structures Writing* measures is not quite measuring the construct of writing. On the other hand, there is some evidence from prior research that suggests student writing performance in one genre of writing is

not strongly correlated with writing in other genres (e.g., Graham et al., 2016). Moreover, the *Structures Writing* measures were moderately correlated with the TOSREC and with each other, providing some evidence of validity. Still, the results suggest the measure should be more fully explored in future studies to examine how well it measures students' writing ability. On the other hand, the Structures ID and Multiple-Choice comprehension measures had moderate correlations with the TOSREC measures, indicating some overlap among the reading constructs measured.

Limitations

Several factors limit the conclusions that can be drawn from this study. First, the dosage information from the study suggests that the students only completed 57% of the intervention activities. This is problematic because we don't know which activities are most critical to improving students' writing. Additionally, we noted that most of the activities were partially completed, but this suggests that the end of the lessons may have been rushed. Due to these problems, we may not have a full understanding of the potential of this intervention.

Second, the intervention was conducted with just a single instructor with 28 years of prior teaching experience. Therefore, there is a potential confound between the instructor and the intervention. The usability, feasibility, and effects of the intervention may have been influenced by the GRA instructor. This is somewhat mitigated by similar impacts of the *Structures Writing* intervention in a prior study. However, it should also be noted that if a well-experienced instructor with prior knowledge of the intervention had difficulty fully implementing all of the activities, less experienced instructors may have had similar difficulties. Therefore, suggested revisions to the length of the program are warranted and should be completed prior to additional study of the intervention in whole-group settings.

Third, this pilot study had low power, and therefore did not allow for a separate analysis of effects for students who may be lower performing writers. *Structures Writing* was initially designed as an intervention for lower performing writers, and it has been demonstrated to have promise with that population in small group settings. It was important to examine whether the intervention could be applied in a whole-class type setting for efficiency. However, the study did not provide information about the impacts of the "whole class" intervention for the lower performing students. Therefore, a larger study to determine how effective the intervention is effective for lower performing writers in a large group setting is still needed.

Finally, the pilot test of this intervention included only 20 lessons (completed in ten 60-min sessions), and included only one instructional component of the complete intervention. Other components include lessons for discrimination of text structures and note-taking based on the text structure, which may have strengthened the effects, or led to transfer effects on reading outcomes. The study also did not include maintenance measures, so we do not know whether, or how long, the effects of the intervention might last.

Conclusion

In this study, *Structures Writing* showed promise for impacting the informational text writing of fourth grade students in a whole-class setting. Treatment group students wrote higher-quality simple description, compare/contrast, sequence, problems/solution, and compare/contrast passages than control group students, despite the control group also receiving alternative writing instruction. Yet, there were no results on distal reading outcomes. Due to mixed statistical significance of the regression models and corrected *ESs*, it may be too early to make strong recommendations for using this intervention in practice. However, the promising results warrant further development and testing of the intervention, with attention paid to lengthening the

expected time frame for the intervention, or reducing the number of instructional activities within a lesson to ensure it can be completed within a 30-min time frame. The usability, feasibility, and potential impacts of intervention should be studied with multiple instructors. Future studies should also examine the impacts of the full intervention, maintenance effects, and potentially longer versions of the intervention to get a more complete picture of the potential effects.

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Table 1

Descriptive Information on the Participant Sample for Each Condition

	Female	Caucasian	WIAT-III	TOSREC
Treatment (*n* = 21)	33%	100%	114.24 (20.00)	96.10 (14.62)
Control (*n* = 21)	55%	100%	112.70 (13.41)	93.85 (9.37)

Table 2

Topics by Text Structure for the Structures Writing Measure

	Form A	**Form B**
Simple Description	*Hubble Space Telescope*	*Sally Ride*
Compare/Contrast	*Seeds and Spores*	*Scientific Investigations*
Sequence	*Tsunamis*	*Weather vs. Climate*
Problem Solution	*Women's Suffrage*	*Erie Canal*
Cause/Effect	*American Revolution*	*Changes in Transportation*

Table 3

Descriptive Features of the Reading Passages used in the Reading Comprehension Assessments

Passage	Topic	Structures Represented	Words	Total Idea Units	Lexile Level
A1 2-paragraph	Beavers and Woodchucks	CC, CE	124	23	740
A1 3-paragraph	Sea Turtles	SD, SQ, PS	195	30	780
A2 2-paragraph	Properties of Matter	SD, CE	122	25	740
A2 2-paragraph	Lewis and Clark	PS, CC, SQ	193	35	740

Note. CC = compare/contrast, CE = cause/effect, SD = simple description, SQ = sequence, PS = problem/solution

Table 4

Structures Lesson Sequence

Lesson	Structure	Instructional Method	Step-Up Lesson	Instruction
1	SD, CC	Introduce Structures	Not included	Show examples and explain program objective
2	SQ	Introduce Structure	Not included	Show multiple examples of SQ
3	PS, CE	Introduce Structures	Not included	Show examples
4	SD	Model	Not included	Introduce POW, frames, and write 1 passage
5	SD	Guided Practice	Write SD topic sentences	Write 2 passages with facts in different orders
6	SD	Guided Practice	Sentence combining	Write 2 passages
7	SD	Fade Support	Write complete sentences	Write 2 passages
8	CC	Model	Using given information	Model POW (2 passages); choose an order for facts
9	CC	Guided Practice	Write CC topic sentences	Write 2 passages
10	CC	Fade Support	Organize & transitions	Write 2 passages
11	SQ	Model	Write transition words	Model using POW; events must be in correct order
12	SQ	Guided Practice	Writing dates in sentences	Write 2 passages
13	SQ	Fade Support	Write SQ topic sentence	Write 2 passages

14	PS	Model	Choosing transition words	Model using POW; events must be in correct order
15	PS	Guided Practice	Writing PS topic sentence	Write 2 passages
16	PS	Fade Support	Write transition sentences	Write 2 passages
17	CE	Model	Identify signal words	Model using POW; beginning with cause or effect
18	CE	Guided Practice	Write CE topic sentence	Write 2 passages
19	CE	Fade Support	Not included	Write 2 passages
20	SD, CC, SQ	Independent Practice	Not included	Write 3 passages with prompts, peer check

Table 5

Means and Standard Deviations for Pretest and Posttest Measures

	Proximal Writing Outcomes					Distal Outcomes	
	SD Writing	CC Writing	SQ Writing	PS Writing	CE Writing	Structures ID	Structures MC
Treatment (n = 21)							
Pretest	3.24	3.47	3.19	3.47	2.86	--	--
	(1.48)	(2.04)	(2.04)	(1.75)	(1.68)		
Posttest	4.47	4.33	4.42	4.09	4.19	10.76	13.04
	(1.17)	(1.59)	(1.16)	(1.09)	(1.12)	(4.40)	(4.30)
Control (n = 20)							
Pretest	2.70	3.00	2.45	3.05	2.90	--	--
	(1.89)	(1.31)	(1.88)	(2.01)	(1.68)		
Posttest	3.60	2.90	2.85	2.95	2.85	9.20	13.75
	(1.31)	(1.97)	(1.66)	(1.82)	(1.57)	(4.46)	(3.04)

Table 6

Correlation Matrix

	1	2	3	4	5	6	7	8	9
1) WIAT-III Essay Composition	1.00								
2) TOSREC	.15	1.00							
3) Simple Description Writing	.30	.28	1.00						
4) Sequence Writing	.29	.35*	.64***	1.00					
5) Compare/Contrast Writing	.40**	.39*	.85***	.76***	1.00				
6) Problem Solution Writing	.33*	.35*	.72***	.69***	.81***	1.00			
7) Cause/Effect Writing	.24	.37*	.65***	.54***	.76***	.81***	1.00		
8) Structures Identification	.19	.51***	.41**	.60***	.62***	.63***	.64***	1.00	
9) Structures Multiple Choice	.10	.54***	.30	.46**	.43**	.45**	.46**	.56***	1.00

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

Table 7

Regression Models for the Structures Writing Outcomes

Model/Parameter	R^2	Unstandard Coefficient (B)	S.E.	*t-test*	*p*-value
Simple Description Writing	.48				
Intercept		3.50	.355	9.88	<.001
Treatment (1 = yes, 0 = no)		0.72	.312	2.30	.028
SD Pre-Test (centered)		0.06	.100	0.60	.554
WIAT-Essay Comp (centered)		0.34	.010	3.56	<.001
TOSREC_SS (centered)		0.03	.013	2.41	.021
Compare/Contrast Writing	.50				
Intercept		3.04	.320	9.49	<.001
Treatment		1.16	.449	2.58	.014
CC Pre-Test (centered)		0.39	.118	3.29	.002
WIAT-Essay Comp (centered)		0.02	.014	1.55	.129
TOSREC_SS (centered)		0.03	.020	1.30	.201
Sequence Writing	.52				
Intercept		3.02	.267	11.32	<.001
Treatment		1.25	.376	3.32	.002
SQ Pre-Test (centered)		0.48	.113	4.25	<.001
WIAT-Essay Comp (centered)		-0.02	.012	-1.56	.128
TOSREC_SS (centered)		0.00	.017	0.10	.919
Problem/Solution Writing	.53				
Intercept		3.07	.257	11.94	<.001
Treatment		0.92	.360	2.55	.015
PS Pre-Test (centered)		0.50	.109	4.61	<.001
WIAT-Essay Comp (centered)		0.01	.011	0.89	.377

TOSREC_SS (centered)		-0.00	.016	-0.11	.914
Cause/Effect Writing	.64				
Intercept		2.80	.213	13.14	<.001
Treatment		1.43	.299	4.76	<.001
CE Pre-Test (centered)		0.48	.113	6.35	<.001
WIAT-Essay Comp (centered)		0.00	.009	0.33	.742
TOSREC_SS (centered)		-0.03	.013	-2.10	.042

Note. SD = Simple Description, SQ = Sequence, CC = Compare/Contrast, PS = Problem/Solution, CE = Cause/Effect.

Table 8

Regression Models for Distal Reading Outcomes

Model/Parameter	R^2	Unstandard Coefficient (B)	S.E.	*t-test*	*p*-value
Structures Identification	.28				
Intercept		9.41	0.87	10.86	<.001
Treatment (1 = yes, 0 = no)		1.15	1.21	0.95	.348
TOSREC_SS (centered)		0.18	0.05	3.63	.001
Multiple-Choice Comprehension	.31				
Intercept		13.94	0.71	19.66	<.001
Treatment		-1.08	0.99	-1.08	.285
TOSREC_SS (centered)		0.17	0.71	4.05	<.001

Table 9

Dosage of Activity Types Across All Lessons in the Structures Writing Program

	ID Passages	Step-up Activities	POW Checklists	Information Frames	Modeled Passages	Student Written Passages	Review Checklists	Review Activities
Total Possible	**13**	**30**	**34**	**34**	**9**	**25**	**34**	**9**
Completed								
Mean	11.62	24.62	14.81	11.19	7.62	10.52	18.90	7.86
(Range)	(4 – 13)	(16 – 28)	(6 – 22)	(3 – 23)	(6 – 8)	(8 – 14)	(9 – 24)	(3 – 9)
Partial								
Mean		5.38	19.19	22.81	1.38	14.48	15.10	1.14
(Range)		(2 – 14)	(11 – 28)	(11 – 31)	(1 – 3)	(9 – 18)	(10 – 25)	(0 – 6)

Figure 1.

A "simple description" information frame indicating the structure, topic, and information students should use in their informational passage.

Structure: SD Topic: Pill Bugs
Characteristics/Facts▼
They are arthropods
Have seven pairs of jointed legs
Dark brown head
Outer skeleton
Can roll up and squeeze under things
Stripe down their back