Identifying and Discriminating Expository Text Structures: An Experiment with 4th and 5th Grade Struggling Readers

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Abstract

Students who struggle with reading have particular trouble with expository text. Instruction in text structures has been shown to be effective for improving expository reading comprehension. However, few studies have been conducted specifically with upper elementary aged struggling readers. To address these issues, we developed a new intervention, *Structures,* to improve the expository text comprehension of 4th and 5th grade struggling readers. In this study, we conducted a randomized control trial to assess the promise, usability, and feasibility of one component of the intervention designed to teach students to identify and discriminate the five text structures. Forty-five 4th and 5th grade struggling readers were randomly assigned to intervention or business-as-usual conditions. Students in the *Structures* condition were taught to identify and discriminate among the five text structures used by authors of expository text: description, sequence, cause/effect, compare/contrast, and problem/solution. At post-test, experimental students (n = 24) statistically significantly outperformed control students (n = 21) on a structures identification measure (d = 0.94). No other statistically significant differences were found. However, a practically (but not statistically) significant effect size was found on an oral retell measure (d = 0.29). Results also indicate the materials were usable for teachers and it was feasible to implement the intervention in a school setting. The implications and future directions of the development of remaining components in the *Structures* intervention are discussed.

Keywords: Text Structures, Expository Text, Informational Text, Reading, Fourth Grade, Fifth Grade

Students who struggle with reading comprehension have particular trouble when reading expository (or informational) text (Duke, Pearson, Strachan, & Billman, 2011; Sáenz & Fuchs, 2002; Taylor & Williams, 1983). Many children come to school with almost no experience reading expository text (Williams & Pao, 2011) and, unlike narrative text, they have very little exposure to expository text reading in the primary grades (Duke, 2000).

The skills needed to read and comprehend expository text are different than those needed to read and comprehend narrative text (Meyer, 1975). Expository text often includes abstract concepts, difficult vocabulary, and unfamiliar content (Anderson & Nagy, 1991; Snow, 2002). Comprehending expository text also requires students to create inferences, use prior knowledge, and reasoning, all of which increase cognitive load (Armbruster, 1988; Best, Floyd, & Mcnamara, 2008; Ray & Meyer, 2011; van Dijk & Kintsch, 1983). Ideas presented in expository text are not always clearly connected, increasing the difficulty level of the passage and lowering student engagement (Beck, McKeown, & Worthy, 1995; Loxterman, Beck, & McKeown, 1994). While authors of narrative text use a familiar structure involving characters, a setting, a problem and resolution of the problem (Ray & Meyer, 2011), authors of expository text use multiple text structures to organize information, depending on their purpose. Futhermore, authors often switch abruptly from one text structure to the next, or even embed one text structure within another text structure, increasing the complexity of the text (Englert & Hiebert, 1984).

Meyer (1975, 1985) identified and described five primary text structures that occur in expository text: description, sequence, compare/contrast, cause/effect, and problem/solution. Authors of expository text use *description* to provide details about the characteristics of something, *sequence* to communicate the order things occur, *compare/contrast* to make

connections between two things by identifying similarities and differences, *cause/effect* to explain how an event leads to an outcome, and *problem/solution* to convey how a problem might be solved. Although other structures have been identified, teachers and researchers commonly focus on these five text structures to improve students' comprehension of expository text (e.g., Englert, Raphael, Anthony, Anderson, & Stevens, 1991; Hall, Sabey, & McClellan, 2005; Meyer et al., 2002; Wijekumar et al., 2014; Williams et al., 2014).

Teaching text structures to students experiencing reading difficulties, particularly younger readers, may improve expository reading comprehension (Englert & Hiebert, 1984; McGee, 1982; Meyer, Brandt, & Bluth, 1980; Ray & Meyer, 2011; Taylor, 1980). Researchers suggest three potential reasons for this. One, knowing the text structure used by an author can provide insight into how the information is presented and organized, which may help the reader understand the relationships among ideas (Meyer, 1985). Two, students who approach text with an awareness of these structures are more likely to recognize and recall important information (Meyer et al., 1980; Snow, 2002). Three, recognizing and understanding text structures help the reader mentally organize and comprehend the information presented by the author (Meyer, 1987; Spires, Gallini, & Riggsbee, 1992; Wijekumar, Meyer, & Lei, 2012; Williams et al., 2005).

Results of Recent Meta-Analysis

A recent meta-analysis of expository text structure efficacy studies conducted with students in grades 1 through 12 (Authors, 2016) revealed text structure instruction was effective for improving reading comprehension, with an effect size (g) of .57, 95% *CI* [0.39, 0.76]. Moreover, the effects of text structure instruction were maintained over time (*ES* = 0.51, 95% *CI* [0.23, 0.79]), transferred to untaught text structures (*ES* = 0.62, 95% *CI* [0.01, 1.23]), and led to small, but significant, improvements on norm-referenced measures of general reading

comprehension (*ES* = 0.15, 95% *CI* [0.05, 0.25]). Struggling readers also benefit from text structure instruction (*ES* = 0.96, *CI* [0.44, 1.47]), although there were only six studies with this population (i.e., Bakken, Mastropieri, & Scruggs, 1997; McLaughlin, 1990; Ocasio, 2006; Russell, 2005; Smith & Friend, 1986; Wilkins, 2007), with a great deal of variability among them. Surprisingly, only two text structure studies were conducted with elementary-aged struggling readers (McLaughlin, 1990; Ocasio, 2006). This was unexpected, as it has been suggested that expository text structure instruction may be more beneficial to students if taught in elementary school to help prepare them for the increasing need to comprehend informational text (Meyer et al., 1980; Snow, Burns, & Griffin, 1998). Finally, there is evidence that instruction in multiple text structures leads to increases in the strengths of the effects. The results from a meta-regression conducted by Authors (2016) indicated an expected 0.13 standard deviation increase in performance of reading comprehension for each text structure taught after the first one, suggesting that students may benefit from a more comprehensive instructional approach involving all five expository text structures.

Although there is a considerable amount of evidence that text structure instruction is effective, additional research in effective strategies for elementary-aged students is needed. Specifically, a comprehensive text structure intervention needs to be designed for upper elementary students with and at-risk for disabilities.

Development of a Comprehensive Text Structure Intervention

Given the need for additional research on comprehensive text structure instruction for upper elementary aged struggling readers, the authors of this manuscript have initiated the development of a comprehensive text structure program: *Structures*. Based on the results of the meta-analysis conducted by Authors (2016) and examination of the instructional practices used

in some of the more effective studies (Authors, in press), the *Structures* intervention is being designed to include multiple components shown to be effective for increasing expository reading comprehension, including identification and discrimination of the five most common text structures, the use of graphic organizers, note taking, and writing.

While building this intervention, we believe it is important to know the impact, usability, and feasibility of each of the intervention components. That is, if a particular component is ineffective, unnecessary, difficult to use, or not feasible to implement in a school setting or with upper elementary grade struggling readers, it should not be included in the complete intervention. To explore the effectiveness of each single component as the intervention was under construction, we planned exploratory studies. The current study examines the first component of the intervention, aimed at teaching students to identify and discriminate the five most common text structures.

Prior research on identification and discrimination of text structures has been shown to positively impact students' ability to identify text structures (Bakken et al., 1997; León & Carretero, 1995; Meyer et.al., 2002; Smith & Friend, 1986; Wijekumar et al., 2012; Williams et al., 2014; Williams, Stafford, Lauer, Hall & Pollini, 2009). Specifically, researchers have examined students' ability to read a passage and distinguish the main ideas and details using the same structure (McGee, 1982; Richgels, McGee, Lomax & Sheard, 1987), match passages written in similar structures (Richgels et al., 1987), read a passage and recall idea units using the same structure (Meyer et al., 1980; Taylor, 1980), organize written information using a particular structure (Raphael & Kirschner, 1985), and match sentences to a clearly stated topic and signaled text structure (Englert & Hiebert, 1984; Englert & Thomas, 1987) were studied. Results reveal that simply being able to identify expository text structures impacts informational reading

comprehension. However, struggling readers are less likely than proficient readers to be aware of text structures (Englert & Hiebert, 1984; Englert & Thomas,1987; McGee, 1982; Meyer et al., 1980; Taylor, 1980), which may limit their ability to learn from informational text. Therefore, these children may benefit from an intervention aimed at discriminating among the five text structures and determining when a passage shifts from one structure to another.

Additionally, examination of previous studies of text structure instruction showed that a few studies have attempted to examine the impacts of individual intervention components. This type of work is important for determining the effective elements that should be included or emphasized as components of a more comprehensive approach to instruction. In one example, Meyer and colleagues (2010) examined the impacts of two components of their intervention, types of feedback given and choice/no choice in reading topic. This led to important findings suggesting that elaborated feedback is more important than providing simple feedback, but that choice in reading tasks may not lead to increases in the effectiveness of the intervention. In another study, Meyer, Wijekumar, and Lin (2011) examined the impact of differentiating instruction by individualizing instruction with remediation or enrichment lessons based on student performance, as compared to similar tutoring without individualized lessons. The findings suggested that individualizing instruction led to greater improvements in reading comprehension. Although these studies led to important understandings about the effectiveness of different intervention features, both still occurred within the context of a multi-component intervention, so it there is still question about the effectiveness of individual instructional components within the intervention.

In a study somewhat similar to the current study, Meyer, Young, and Bartlett (1989) approached a more targeted examination of a specific intervention component. In their study,

participants were taught to identify and discriminate text structures before writing a main idea statement by providing definitions for the text structures, examples of the text structures, and signaling words. The findings suggested that the effects were minimal with this type of instruction. However, the instruction was conducted with adults and more complex texts, and participants were also required to write main idea statements that might have complicated the task. Thus, isolating the identification and discrimination skills and examining the skills in the context of school-aged students is warranted. The current study seeks to isolate the identification and discrimination task even further, with elementary aged children and less complex text. It is important to examine this component in isolation to determine whether instruction in identification and discrimination may be an effective and useful component to include within a more comprehensive intervention, or whether it does not add anything above and beyond other components.

The Current Study

The purposes of this study were to: a) test the promise of an intervention to improve the reading skills of 4th and 5th grade struggling readers in an randomized-control trial, b) test whether the lessons for one component (i.e., identification and discrimination of five expository text structures) of a standard protocol intervention (i.e., *Structures*) for elementary-aged students experiencing reading difficulties were usable, feasible, and can be implemented with fidelity. Although many terms are used for this population of students (e.g., struggling readers, low-performing readers, students at-risk for disabilities), we use the term struggling readers in the context of this study.

Students learned to identify and discriminate among five expository text structures (i.e., simple description, compare/contrast, sequence, cause/effect, and problem/solution). Materials

included interactive PowerPoint presentations, a Program Manual, and student workbooks (i.e., Student Response Books). Teachers were trained to use the program and materials, and interviewed about the usability and feasibility of the intervention.

The three research questions were:

1. What are the effects of text structure identification and discrimination instruction on a proximal measure (i.e., text structure discrimination) compared to business-as-usual?
2. What are the effects of text structure identification and discrimination on a distal measure (i.e., oral retell) compared to business-as-usual?
3. To what extent is the identification and discrimination component of the *Structures* intervention usable, and is it feasible for resource teachers to implement in a school setting with fidelity?
    a. Are the materials usable? Do the teachers find the materials (teacher guide, presentation, student workbooks) easy to understand and use? Is the training sufficient? Is the content appropriate for their students?
    b. Can the intervention be implemented within a 30-minute time frame?
    c. Do the students receive enough modeling and complete enough practice opportunities for the instruction to be successful?
    d. Can the teachers implement the intervention with fidelity?

We hypothesized that the intervention would show promise for impacting students' ability to discriminate text structures, because the intervention was designed based on practices found to be effective in previous research.

Method

The purpose of this study was to investigate the promise of an identification and discrimination component of a standard protocol intervention (i.e., *Structures*) for improving the expository reading skills of upper elementary grade students with reading difficulties, and whether it was usable and feasible for resource teachers to implement. To answer our research questions, we conducted a student-level randomized control trial with resource teachers as the primary instructors.

Participants

Participants were 4th and 5th grade struggling readers in six K-8 parochial schools located in a small mid-western city. We used two inclusion criteria to ensure a strict selection of participants for determining whether the intervention was effective for the intended population of students:

a. Students scored at or below the 30th percentile on the Test of Silent Reading Efficiency and Comprehension (TOSREC; Wagner, Torgesen, Rashotte, & Pearson, 2009); the 30th percentile is commonly used by researchers to identify participant samples of struggling readers (Simmons et al., 2008; Torgesen et al., 2006).
b. Students scored at or above the 2.0 grade equivalent on the Word Attack subtest of the Woodcock Reading Mastery Test-Revised (WRMT-R; Woodcock, 1998); this minimum level was required to ensure students had sufficient decoding skills to read the program passages.

A two-step process was used to identify students. First, we screened 352 of 377 4th and 5th grade students for eligibility using the TOSREC (25 parents opted their child out). Publishers of the TOSREC reported the average alternate form reliability for grade four (r = .86) and for

grade five (r = .89). Eighty-four (24%) students met the eligibility criteria for the first screener. Parents of 52 of the 84 students (62%) provided consent for their child to participate in the study.

Second, we administered the Word Attack subtest of the WRMT-R, which measured decoding skills of these students. All 52 students met the eligibility criteria for the second screener. However, seven (13%) students dropped out of the study after randomization but prior to the intervention period (3 did not assent, 4 withdrew due to scheduling concerns).

Forty-five students participated in this study (17 fourth and 28 fifth grade students). Student demographics are listed in Table 1. There were no statistically significant differences between students in the two conditions on gender ($\chi^2_{(1)} = 2.81$, p = .09), free/reduced lunch status ($\chi^2_{(1)} = 0.73$, p = .39), or IEP status ($\chi^2_{(1)} = 0.23$, p = .63).

Materials

The interactive PowerPoint presentations contained all of the instructional stimuli needed to teach Structures lessons. An excerpt of Lesson two is provided as an example in Appendix A1. Each presentation was divided into slides with a clickable format controlled by the teacher. The presentations included all review exercises, definitions, icons, modeling passages, and student exercises that corresponded to the Student Response Book.

The Program Manual was divided into two parts: a Program Overview and a Quick Start Teaching Guide. The Program Overview provided teachers background information about the theory and rationale for teaching expository text structures, as well as student-friendly definitions for each text structure. In addition, the Program Overview presented the icons and a description of how the icons represented each text structure. Finally, information was provided about the content (i.e., science, social studies, history), passage reading levels (i.e., Lexile levels), instructional phases (i.e., modeling, guided practice, independent practice), and instructional

tools (i.e., interactive PowerPoint presentations, Program Manual, Student Response Books).

The Quick-Start Teaching Guide was organized by lessons and provided a short description of how to teach each activity represented in a lesson (see Appendix A2 to see lesson 2 as an example). The information to be covered was provided in clearly identifiable boxes that corresponded to each slide in the interactive PowerPoint presentations. Additionally, steps in the gradual release instructional model (i.e., teacher modeling, guided practice, independent practice) were included. The Quick Start Teaching Guide could be used by teachers to preview before teaching a lesson, guide the teacher during a lesson, or review a lesson with an absent student upon their return. During initial instruction or when complex concepts were taught, teachers were provided examples of think alouds to facilitate their presentation and student understanding. During review lessons, teachers were provided bullet-pointed cues to complete all the steps in each activity.

The Student Response Books contained all necessary response materials required for the guided and independent practice activities for each lesson (see Appendix A3 for lesson 2). The guided and independent activities were organized by lesson to facilitate ease of use. Student activities consisted of reviewing the Descriptive and Relationship text structures (i.e., lesson 1) and identifying and discriminating among the text structures (i.e., lessons 2 through 8).

In addition to the instructional stimuli, the interactive PowerPoint presentations included a number of teaching cues and learning supports to assist teachers and students. The teaching cues included background changes from color to a white-page background when the activity represented a student response in the Student Response Books. Clearly marked page numbers were provided in the lower corner of each slide to enable teachers to quickly access matching activity descriptions in the Quick Start Teaching Guide. Page numbers were also provided in the

white-page background when the activity required a student response. The page numbers on the white-page background alerted students to open their Student Response Books to the page noted on the slide.

Learning supports for students included icons as well as child-friendly definitions (see Figure 1). The icons provided visual representations of each text structure. They were used to support student learning of the author's intent during instruction. Child-friendly definitions were created to explain the text structures. Explanations were then developed to describe how the icons represented each text structure (see Figure 2).

The Lexile levels of the passages in the interactive PowerPoint presentations and Student Response Book ranged from 445L to 810L. Lexiles indicate a passages difficulty based on an algorithm considering factors such as lexical diversity and sentence complexity, among other factors. The range of Lexiles used for this intervention represented the Lexile levels used at the 25th and 75th percentiles at the fourth-grade level, respectively (MetaMetrics, 2009). Lower-level passages were used for all student exercises (i.e., Lexile levels between 400 and 600); whereas, higher-level passages were used for teacher modeling and scaffolding (i.e. Lexile levels > 600).

Procedures

Participants were randomly assigned to conditions within classrooms. A total of 24 students were assigned to intervention groups. Group size for the intervention group varied from 2-7 students due to numbers of participants in each school, as well as teacher schedules. Twenty-one students were assigned to the business-as-usual control condition and received instruction from their regular classroom teachers.

Students in the experimental (Structures) condition were taught to identify and

discriminate among five expository text structures: simple description, compare/contrast, sequence, cause/effect, and problem/solution using the Structures program. The five text structures were organized into two categories to facilitate learning: *Descriptive* and *Relationship*.

The three *Descriptive* text structures and associated child-friendly definitions taught to students in Structures included:

- Simple Description (SD): The author's intent is to tell us about something. They use characteristics or facts to describe it.
- Compare/contrast (CC): The author's intent is to describe a connection between two things. They make connections by telling us similarities or differences.
- Sequence (SQ): The author's intent is to describe the order in which things happen. There are three types of Sequence: steps, timeline, and cycle. Regardless of the type, the author is putting information in an order.

The two *Relationship* text structures and associated child-friendly definitions taught to students in Structures included:

- Cause/effect (CE): The author's intent is to tell us how an event always leads to an outcome. The event is the cause and the outcome is the result. The relationship is between the cause and the effect.
- Problem/solution (PS): The author's intent is to tell us how a problem might be solved. The relationship is between the problem and potential solution.

Students participated in eight 25-30 minute Structures lessons. Instruction was provided 4 days per week over a two-week period. Each school chose the time of the school day that worked best for the students' schedules and with the classroom teacher's approval. The intervention was designed to follow a sequence of modeling, guided practice, and independent practice. During

modeling and guided practice, students read passages then chose the correct text structure from a list of text structures following each passage.

Instructional activities alternated between teacher modeling with guided practice and guided/independent practice. The goal and associated instructional activities for each lesson are presented in Table 2. In lesson 1, teachers used the interactive PowerPoint presentations and Program Manual to teach students authors of fictional stories use a general text structure; whereas authors of expository text use a number of structures to tell about their topics. This was followed by an overview of the three Descriptive and two Relationship text structures including a definition of each text structure and a description of how each text structure was represented by its associated icon. Students responded to instruction by labeling the five text structure icons in their Student Response Books. Every lesson except the first and last began with a review of previous learning.

In lessons 2, 3, and 5 teachers used the interactive PowerPoint presentations to model how to identify and discriminate among the expository text structures used by authors. First, teachers reviewed text structure definitions and icons for the structures introduced in the lesson (i.e., lesson 2 – SD and CC; lesson 3 - SQ, lesson 5 PS and CE). The teacher then modeled discriminating among the structures in two to three examples. Students then practiced discriminating among text structures with the teacher's guidance; the lessons included two to three guided practice passages each.

In lessons 4, 6, 7, and 8 students read passages in their Student Response Books and practiced discriminating among the text structures (i.e., lesson 4 - discriminate among SD, CC, and SQ; lesson 6 - discriminate between PS and CE; lessons 7 and 8 - discriminate among all 5 structures). Students practiced discriminating independently or with teacher guidance as needed.

Teachers used the interactive PowerPoint presentations to present and discuss answers. Every lesson ended with a check of student responses. The number of practice passages ranged from five to nine across these lessons.

Teacher Training

Seven teachers (i.e., 4 general education, 3 special education) provided instruction. We trained intervention teachers to implement Structures during a two-hour training session. First, we provided teachers an overview of the theory, research base, and rationale for teaching expository text structures. We also reviewed definitions of the expository text structures detailed above and in the Program Manual. Second, we reviewed Structures' interactive PowerPoint presentations, Student Response Books, and the Quick Start Teaching Guide. This review included describing use of the teaching and learning scaffolds embedded in the interactive PowerPoint presentations. Third, we modeled and practiced the implementation of activities with teachers using all program materials. We provided structured feedback to teachers on their proficiency during the practice activities. Fourth, we asked teachers to use the Quick Start Teaching Guide to preview lessons prior to instruction as well as during instruction.

Business-As-Usual (BAU) Control Condition

Students in the BAU control condition participated in the daily activities or instruction provided by their classroom teachers. No attempt was made to alter the instruction provided to students by teachers in the control condition, nor was instructional time measured for the control students. The BAU condition was different for each school and treatment group, as students in the treatment condition were pulled from classes at times in the day that were arranged between the intervention and classroom teachers (e.g., intervention block, regular reading instruction, social studies or science instruction). Classroom teachers did not have access to any of the

intervention materials and were not provided an overview of the program or training until after the study was completed, making treatment diffusion unlikely.

Measures

We have two categories of measures that relate to our research questions. To answer research questions one (proximal student outcomes) and two (distal student outcomes), we included *text structure discrimination* and *oral retell* measures of student reading performance, respectively. Trained graduate students, who were blind to condition and study purposes, administered the measures to students in the experimental and business-as-usual control conditions.

To answer research question three (usability, feasibility, and fidelity of the intervention), we included teacher interviews, time and exercise completion measures, and checklists. Given that the *Structures* program is being iteratively developed as an intervention, it is important to examine whether the program is likely to be implemented by teachers. We utilized teacher interviews for this. Feasibility was assessed by measuring average length of lessons and dosage. Fidelity was assessed with lesson-specific fidelity checklists.

Structure Identification Measure (Pre-post proximal measure). Students' ability to identify expository text structures was assessed with a researcher-created proximal measure (i.e., Structure Identification). 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. The Structure Identification measure was composed of 15 passages (i.e., three passages representing each of the five text structures). The sequence of passages was distributed randomly across the five types of text structures. The passages ranged in length from 46 to 88 words and Lexile levels from 410L to 940L. The Lexile

range on the assessment was slightly higher than that of the range used during the intervention to avoid potential ceiling effects. A list of the five expository text structures followed each passage. Students read a passage then chose the text structure that best fit the passage from a list of five text structures following each passage. Items were scored as correct or incorrect. Thus, the total score ranged from 0 to 15.

We used a standard administration for the Structure Identification measure. First, the research assistants asked students to read and review child-friendly definitions for the structures. Second, the research assistants read the directions for completing the assessment and provided students an opportunity to ask questions regarding how to complete the Structure Identification measure. Students then completed the assessment with no help from the test administrators. Time for students to complete the Structure Identification ranged from approximately ten to twenty minutes.

Two alternative forms of the Structure Identification measure were developed for administration at the pre- and post-test periods (Forms A and B). The forms were counterbalanced across experimental groups and pre- and post-test periods. Pretest occurred one week prior to the intervention. Posttest occurred within five days following the intervention. Alternate form reliability was $r = 0.68$. Because instruction was provided to the experimental group, the alternate form reliability was based only on students in the control condition.

The Structure Identification measures were scanned and scored electronically. Scanned protocols were reviewed and compared with original protocols. Twenty percent of protocols were checked with scanned data. One hundred percent of the scanned data checked matched the original protocols.

Oral Retell (Distal measure). Expository text comprehension was assessed with a researcher-created distal measure (i.e., Oral Retell). Oral retell has been previously used as a measure of reading comprehension in studies of text structure interventions (Broer, Aarnoutse & Kieviet, 2002; McGee, 1982; Russell, 2005 Smith & Friend, 1986). A retell measure is relevant for text structure studies in particular, as text structure of a passage may help the reader remember more information related to the structure. For example, if a reader identified that a passage has a compare/contrast text structure, it may prompt them to recall information about the two things being compared, the similarities, or the differences. Similarly, knowing a passage has a sequence structure may help a reader recall the order of events.

We elected to include this measure only at the posttest due to constraints of time and resources. Because random assignment to treatment was conducted at the student level, a pretest was not necessary to make inferences, as random assignment was expected to lead to similar reading ability levels across groups. Indeed, there were no group differences on any measures of reading performance at the pretest (see Results section).

Students were assessed within five days following the intervention. The Oral Retell was an untimed, individually-administered measure comprised of a single, 3-paragraph passage. Each paragraph of the passage represented a single text structure (i.e., SD, SQ, PS). Students read the passage then retold all they could recall without referencing the passage. The retells were audio-recorded.

The overall Lexile level for the Oral Retell passage (193 words) was 740L (individual paragraphs of the passage varied within the 410L to 940L range previously discussed). Similar to written retell procedures used by Hammann & Stevens, (2003), student responses to the Oral Retell were scored according to the total number of idea units recalled in their responses. An idea

unit consisted of a single fact represented in the passage (e.g., automakers make cars). The first and second authors agreed upon the facts represented in each passage and created the Idea Units score sheets. The passage included 28 idea units.

Research assistants followed a standard procedure for administering the Oral Retell assessment. First, they read the directions and provided students an opportunity to ask questions. Second, students read the passage silently. Third, students turned the passage over research assistants asked them to retell everything they could remember. The research assistants' audio-recorded students' retells. Time for students to complete the Oral Retell ranged from approximately five to ten minutes.

Two trained graduate research students independently scored the Oral Retells; 20% of the Oral Retells were double scored. Point-by-point agreement for each idea unit was used to analyze the inter-scorer agreement. The number of agreements was divided by the total number of possible agreements and multiplied by 100. Inter-scorer agreement for the Oral Retell was 97%.

Teacher Interviews (Usability). Program usability was assessed through formal and informal teacher interviews. We collected information during teacher training, from post-instruction interviews (after the entire intervention was taught), and informal discussions. The first author met with individual instructors to conduct interviews after the study was complete (see Appendix B1 for the teacher interview questions). The first author took notes during the interview, but the interviews were not audio recorded.

Time and Dosage (Feasibility). Feasibility was assessed by measuring average length of lessons and dosage. We examined feasibility by timing all of the lessons to determine how the actual length of the lesson compared to the allotted time frame (25-30 minutes). Every lesson

was audio recorded. Research assistants listened to the recording to ensure the entire lesson was captured and recorded the digital time stamp from the audio recorder. Due to expected variation in the implementation from teacher to teacher, the actual implementation times were averaged across teacher for each lesson.

Dosage was assessed by collecting information on student attendance and how many workbook items were completed. This was an important measure of dosage because students may not have completed all of the workbook practice items, even when all components of the lesson were implemented by the teacher. All of the workbooks were collected by the teachers at the end of the intervention. Research assistants counted the number of workbook items completed by each participant, and the total was averaged across all participants.

Lesson checklists (Fidelity). Lesson-specific fidelity checklists were used to assess the percent of primary instructional activities implemented by intervention teachers. See Appendix B2 for the lesson 2 Structures Treatment Fidelity Form. The first and second authors observed and audio-recorded all eight lessons for every teacher as they delivered instruction to their groups and measured fidelity of the lessons in-person using the checklists. Trained graduate students then listened to 30% of the lesson recordings using the checklists. To establish inter-observer agreement, the checklists from the in-person and audio-recorded fidelity checks were compared using point-by-point agreement.

Data Analysis

Differences between the experimental and business-as-usual control conditions on post-test outcomes were evaluated using a regression-based approach. In the case where both a pretest and posttest measure was collected, the pretest measure was entered as a control variable in the multiple regression model, which helps account for individual differences at pretest. In the

multiple regression model, B_0 is the mean for the business-as-usual control condition students, B_1 is the increase or decrease in the mean for experimental condition students, and B_2 is the additive effect of the pre-test covariate. In this model, the pretest covariate was mean-centered so that the intercept (B_0) is interpreted as the mean for the business-as-usual control group when the pre-test score is average. In the case where only a posttest measure was collected, a simple regression model was used. Simple regression of a continuous outcome onto a binary predictor (i.e., experimental dummy variable) is mathematically equivalent to an independent samples t-test. Cohen's *d* effect sizes (1988) were computed based on the regression coefficient for condition and the standard deviation of the outcome variable.

Data from usability, feasibility, and fidelity measures was described using descriptive statistics, when possible. Data from interviews, including comments from teachers was used to provide some context around the data for usability, with an emphasis on more salient and relevant comments that might provide insight for potential revision of the intervention components or reasons for good/poor implementation.

Results

Independent-samples *t*-tests were used to examine pre-intervention differences between students assigned to the experimental condition and students assigned to the business-as-usual control condition. There were no statistically significant differences between students in the two conditions on the TOSREC (t (43) = 0.10, p = .91), Woodcock Reading Mastery Test (t (43) = -1.06, p = .30), or Structure Identification pretest (t (43) = -0.98, p = .34) measures. Means and standard deviations for the pretest and posttest scores are listed in Table 3.

Research Q1: Proximal effects on identification of expository text structures (Structures Identification)

The regression analysis indicated a statistically significant effect of treatment on the Structure Identification measure when controlling for the pretest measure ($B_1 = 2.46$, $\beta = 0.53$, $p < .001$). Students in the experimental condition scored, on average, 2.46 points higher than students in the BAU control condition (see Table 4). The resulting standardized mean difference between groups was $d = 0.94$ [95% $CI = 0.32, 1.56$]. Pre-test scores were included in the model to account for any pre-existing differences between the students in the different conditions. Therefore, the slope parameter is conditional on the covariate (i.e., mean difference at post-test accounting for pre-existing differences).

Research Q2: Researcher-created distal effects on comprehension of expository text (Oral Retell)

Scores on the Oral Retell measure did not significantly differ between the two groups at post-test (see Table 4). Students in the experimental condition performed slightly (but not statistically significantly) better on Oral Retell compared to students in the BAU control condition ($B_1 = 1.01$, $\beta = 0.14$, $d = 0.29$ [-0.30, 0.88]). This model did not include any covariates.

Research Q3: Usability, feasibility, and fidelity

Program usability was assessed through informal teacher interviews. Feasibility was assessed by measuring average length of lessons and dosage. Fidelity was assessed using lesson-specific fidelity checklists.

Teacher Interviews (Usability). Teachers provided feedback on the relevance and effectiveness of the program content for the students, the program materials, and ideas for program improvement. All of the teachers reported that the program seemed to be effective for their students. One teacher mentioned that her students “enjoyed it and looked forward to

coming." Another suggested it was "a little boring" and the teacher needed to try to entertain and engage a little.

The teachers agreed the visuals worked well and the icons were "simple and obvious" for helping build students' conceptual understanding of the structures. However, there was mixed feedback on the content. Some teachers reported that the content was appropriate for the students and their reading abilities, with one teacher reporting that the students were familiar with most of the concepts. One teacher suggested that the "kids could handle more." Other teachers indicated that some of the language and vocabulary was a little difficult for their students. Several of the teachers reported that some of the passages were ambiguous, meaning that the teachers and students had some difficulty identifying the text structure; one teacher suggested that we could allocate more time for those types of passages in the intervention. Another teacher suggested that the ambiguous passages were helpful because it provided students an opportunity to think through and defend their answers. A couple of the teachers noted that the cause/effect and problem/solution text structures were a little more difficult for students to learn, and that more time might be spent on them.

Teachers generally liked the program materials, especially the manual, with one teacher stating that the "teacher guide was great!" They generally agreed that the power point presentation materials were easy to use, with at least one teacher suggesting that it was not always necessary to use it because she could manage by using the workbooks with her small group. All teachers agreed the two-hour training period was enough.

The teachers gave several ideas for improvement of the intervention. Several of the ideas were related to technology. For example, one teacher suggested that an interactive touch screen might be helpful for teachers to highlight content for students (another teacher mentioned using a

white board for this). Another suggested including supplemental materials, such as pictures or videos. Other ideas included linking the program more closely to their reading series, or helping students with transfer the skills to reading in authentic texts and explaining to them how it can help with comprehension.

Time and Dosage (feasibility). On average, teachers were able to successfully complete the lessons within the desired time frame. The average time to complete the lessons was 25 min. The average length of time to complete each lesson is presented in Table 5. The average length for individual lessons ranged from 22 min (lesson 7) to 31 min (lesson 3).

Teachers were able to implement the text structure identification and discrimination component of *Structures* within the maximum limit (30 minutes) of the desired time frame except for one lesson (lesson 3). Students were able to successfully complete the practice items within the desired time frame except for one lesson (lesson 3). During lesson 3, teachers taught all components of the lesson and students completed all practice items; however, the teachers continued with the lesson even though it went over the maximum desired time.

Of the three lessons requiring modeling (2, 3, & 5), one lesson averaged a shorter duration than our goal of 25-30 mins per lesson (lesson 5 – 23 minutes), one averaged a longer duration (lesson 3 – 31 minutes), and one averaged within the desired time (lesson 2). This is likely due to the amount of modeling occurring in each lesson (lesson 2 required less modeling time than lesson 3), or familiarity with the lesson procedures (teachers and students were likely to understand the procedures by lesson 5).

The average length of time to complete lessons that involved only guided and independent practice (i.e., lessons 4, 6, 7, 8) also varied. Lessons 4 and 6 fell within the desired time frame, and lessons 7 and 8 were quicker than the desired time frame. Lesson 4 included 9

practice items, lesson 6 included 7 practice items and lessons 7 and 8 each included 5 practice items.

As a measure of dosage, students were able to successfully complete nearly all of the practice exercises. The average number of practice exercises completed per lesson ranged from 93% (lesson 2) to 100% (lesson 8). However, examination of the data revealed that lessons for which less than 100% of items were completed, it was due to absences. All students completed 100% of the exercises when they attended the lessons. The average number of practice exercises completed per lesson is presented in Table 6.

Lesson checklists (fidelity). Teachers implemented the lessons with a high degree of fidelity (97.28%). The percent of instructional activities completed per lesson for individual intervention teachers is presented in Table 7. Inter-observer agreement was 95% (calculated using point-by-point agreement).

Discussion

The purpose of this study was to investigate the effects of an identification and discrimination component of a standard protocol intervention (i.e., *Structures*) on elementary-aged students experiencing reading difficulties. Additionally, the researchers examined the usability, and feasibility of this text structure identification and discrimination component in a school-based setting, as well as teachers' implementation of the program with fidelity. This research builds on previous studies that suggest text structure identification and discrimination skills positively impact students' expository reading skills (Bakken et al., 1997; León & Carretero, 1995; McGee, 1982; Meyer et.al., 2002; Smith & Friend, 1986; Wijekumar et al., 2012; Williams et al., 2014; Williams et al., 2009) by extending these findings to upper elementary students.

Specifically, the analysis indicated the treatment had a large effect (d = 0.94) on the ability of students to identify expository text structures (proximal intervention effects) after only a brief intervention period (eight lessons). Moreover, students in the treatment group did not reach ceiling on the measure, indicating there is still room to improve. This suggests additional instructional time in the intervention could be beneficial. This finding has a practical implication for reading comprehension, as students' ability to identify and discriminate text structures may allow them to comprehend information related to the text structure of the text. Because strict selection criteria were used, the findings give us additional confidence that the intervention is effective for struggling readers, aligning with previous research showing that elementary-aged struggling readers benefit from expository text structure instruction (Authors, 2015).

Despite the positive result for structure identification, the treatment did not produce a statistically significant distal effect on the reading comprehension of students as measured by an Oral Retell. However, oral retell was a distal measure requiring generalization of the identification skill, and the short duration of the intervention may have been insufficient for this transfer of skills. Additionally, his study was underpowered, and the effect size was large enough (ES = 0.29) to be practically significant if we had the power to detect it. Therefore, oral retell measure should be included in larger studies of this intervention to determine whether this component can lead to better comprehension or provide a foundation for additional comprehension instruction related to text structures. Indeed, subsequent program components are designed to build on the identification and discrimination component and target comprehension more directly. Thus, we plan to include oral retell as a measure of comprehension in future studies.

The teachers indicated that the materials were generally easy to use and appropriate for

the students. Many of the teachers indicated that the passages were a little ambiguous for the students. This was intentional, as we wanted to approximate more authentic texts. Some teachers thought the ambiguous passages led to more critical thinking and requires students to define their answers, which may lead to better transfer skills. Therefore, it may be important to keep some of those examples intact in this type of instruction. However, we may want to consider including more obvious examples at first, and then helping students transition to more ambiguous texts after they develop skills with more obvious passages.

The average length of time to complete lessons that included modeling (i.e., lessons 2, 3, 5) and lessons that included guided and independent practice (i.e., lessons 4, 6, 7, 8) varied. Some lessons took longer or shorter than the desired time frame and some were within the desired time frame. It appears that the amount of modeling and number of practice passages provided in lessons 2, 4, and 6 is appropriate, additional practice items could be included for lessons 5, 7, and 8, and some modeling or practice items may need to be removed from lesson 3.

Students were able to successfully complete the practice items. The percent of practice items completed per lesson ranged from 93% (lesson 2) to 100% (lesson 8). However, when student attendance was taken into consideration, the percent of practice items completed per lesson increased to 100 percent. Students who attended each intervention session were able to complete all of the practice items, indicating they met the desired dosage. Students who missed an intervention session were not able to complete the practice items unless the intervention teacher provided a review opportunity upon their return (e.g., lesson 4).

Teachers implemented the *Structures* lessons with a high degree of fidelity. It appears that the training session prior to the study intervention and previewing materials prior to teaching

each lesson was sufficient preparation for teachers to understand how to implement the primary instructional activities.

Limitations

The current study has limitations that might be addressed in future studies. Findings for the research questions (RQ2 in particular – *distal effects on the oral retell measure*) may have been limited by low power to detect an effect. When the additional components have been developed, tested, and refined, we will test the complete intervention in a sufficiently powered efficacy trial.

Findings were also limited by the location and homogeneity of the sample. All children who participated in the study were students at six parochial schools located in the Midwest. Thus, the organizational structures, literacy instruction, and the demographic characteristics of the students and staff limit generalization to other settings.

Finally, although there was a large effect for treatment on the proximal Structure Identification measure, indicating improvement between groups, the treatment group only answered approximately two thirds of the questions correctly at posttest. This may indicate more practice or additional components of the intervention may be necessary to help students obtain mastery. We did not include a delayed posttest identification measure to determine if the effects were maintained over time. Results from the meta-analysis suggest that the effects of text structure instruction are maintained over time on measures of reading comprehension (Authors, 2015). However, there is less certainty about whether the effects of identification of text structures would be maintained.

Recommendations for Future Research

The identification and discrimination component of the *Structures* intervention was effective for improving students' ability to discriminate among text structures. The effects of identification did not translate to statistically significantly differences between the groups on their oral retell scores, although the nonsignificant *ES* was large enough to be practically significant, suggesting further study is warranted. This research suggests students may need additional instruction in using text structures to analyze, interpret, and increase comprehension of expository text. Therefore, future research should examine the effectiveness of combining identification and discrimination training with additional instruction targeting skills related to text structures. We are planning to do this in the development of note-taking and writing instruction components for the *Structures* program.

Teachers implemented the *Structures* lessons with a high degree of fidelity. However, the researchers will not be available to provide in-person training to all teachers who may wish to use *Structures*. Therefore, future research should examine the effectiveness of providing program training through training videos and implementation information in the Program Overview.

Finally, the results of this study reveal instruction in text structure identification and discrimination is effective. However, it is unknown if these results are sustained over time. Therefore, future research should include a text structure identification maintenance measure.

Conclusion

The intervention examined in this study involved only the identification and discrimination component of a more comprehensive text structure intervention (*Structures*) being developed for upper elementary struggling readers. This is an important step in the examination of text structure strategy instruction, as very few studies have examined the impact of single intervention components. This work will help researchers and teachers understand how specific

components of interventions may be impacting student performance. The results of the current study suggest the identification component of this intervention is effective for improving the ability of struggling readers to identify and discriminate among five expository text structures and has the potential to improve oral retells. Future work will involve revising this instructional component and incorporating it into a more comprehensive text structure instruction approach including note-taking and informational text writing.

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