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Effects of Expository Text Structure Interventions on Comprehension: A Meta-Analysis

Nicole Pyle
Utah State University, Logan, USA

Ariana C. Vasquez
University of Pittsburgh, Pennsylvania, USA

Benjamin Lignugaris/Kraft
Sandra L. Gillam
Utah State University, Logan, USA

D. Ray Reutzel
University of Wyoming, Laramie, USA

Abbie Olszewski
University of Nevada, Reno, USA

Hugo Segura
Universidad Autónoma de Chile sede Talca

Daphne Hartzheim
Louisiana State University, Baton Rouge, USA

Woodrow Laing
Utah State University, Logan, USA

Daniel Pyle
Weber State University, Ogden, Utah, USA

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ABSTRACT

This meta-analysis synthesizes results from expository text structure interventions designed to increase comprehension for students in kindergarten to grade 12 published between 1970 and 2013. Twenty-one studies were identified, 19 of which met criteria for a meta-analysis, including 48 study-wise effect sizes that were meta-analyzed to determine (a) how effective expository text structure interventions are in improving comprehension and (b) what features of expository text structure interventions (e.g., number of text structures taught, type of implementer) are associated with improved comprehension outcomes. A random-effects analysis yielded a significant mean effect of .95 overall and a significant mean effect of 1 for researcher-developed comprehension measures. Moderator analyses indicated significant differences in student comprehension outcomes, favoring researchers as implementers, 11-20 hours of interventions, one or two text structures taught, and students in the elementary grades. Instructional features of expository text structure interventions and implications for research and practice are discussed.

In 2010, the National Governors Association Center for Best Practices (NGA Center) and the Council of Chief State School Officers (CCSSO) outlined the Common Core State Standards Initiative in an effort to improve students' college- and career-readiness skills. To meet these Standards, students are expected to read expository text as early as kindergarten. Throughout the elementary grades, the Common Core focus on expository text is equal to narrative text (NGA Center & CCSSO, 2010). In secondary schools, however, the Common Core prioritizes reading expository text over narrative text. Comprehension of expository text is also essential to demonstrate student proficiency on the National Assessment of Educational Progress (NAEP) reading assessment, which reflects the increasing proportion of expository text to narrative text as students advance in grades.

One intervention strategy for comprehending expository texts that has received a great deal of attention is teaching students to recognize expository text structures (Hall, Sabey, & McClellan, 2005; Meyer et al., 2010; Meyer, Wijekumar, & Lin, 2011; Wijekumar et al., 2014; Wijekumar, Meyer, & Lei, 2012; Williams et al., 2007, 2014; Williams, Stafford, Lauer, Hall, & Pollini, 2009). Text structure is the organization of ideas, the relationship among the ideas, and the vocabulary used to convey meaning to the reader (Armbruster, 2004; Shanahan et al., 2010). Various descriptors have been used in the literature to describe types of expository text structures. Meyer and Ray (2011) grouped text structures into six main types: compare-and-contrast (comparison), problem-and-solution, cause-and-effect (causation), sequence (chronology), enumeration (collection, list), and description (categorization, generalization). Other researchers (see Slater, 1985; Williams et al., 2009) have suggested two additional types of expository text structures: position-and-reason (persuasion/claim/support) and pro-and-con. Each text structure type represents a distinct text organization and purpose. For example, compare-and-contrast text structures focus on the similarities or differences between ideas, things, or events, and problem-and-solution text structures focus on describing an unresolved issue and offering antidotes or solutions. Cause-and-effect text structures are used to describe how one event impacts another event, and sequence text structures are used to chronicle how something changes over time.

One important way for readers to build a coherent mental representation of what a text means is to use the structure of the text to help organize their memory for text-based content (Anderson & Pearson, 1984). Kintsch's (2013) construction–integration model of text comprehension explains the cognitive processes that readers use to successfully understand a text. Construction–integration theory posits that comprehension is highly interactive, involving construction and integration processes during which readers make inferences and form a coherent mental representation of text at the micro and macro levels to create a textbase (Kintsch, 1998). During the construction phase, schemata help readers interpret the meaning of a text. This influences the integration process that leads to a coherent representation of the text. During text processing, readers strengthen constructions that fit within the constraints provided by the text, while deactivating constructions that do not fit within the text's constraints. Forming a mental representation of how key ideas in the text fit together, or text structure, is an important part of successful text comprehension (Kintsch, 2013). In turn, readers use text structure knowledge to help them form a coherent mental representation of the text and integrate text-based information and background knowledge to make appropriate inferences and elaborations (Kintsch, 1998; Kintsch & Welsch, 1991). Furthermore, Kintsch (1998) suggested that comprehension processing is influenced by the text–reader–context interaction: the text's genre, the reader's goals, and the discipline of the text. Thus, reading comprehension is an active and complex process that involves (a) comprehending the text; (b) developing, interpreting, and organizing meaningful connections made from the text; and (c) using constructed meaning as appropriate to type of text, purpose, and situation to create a situational model of the text (Kintsch, 2013; National Assessment Governing Board, 2012).

In theory, well-designed text structure instruction helps students construct the organization of text and ideas into a coherent macrostructure (i.e., global organization of ideas into higher order units) and microstructure (i.e., network of idea units that represents the meaning of the text; Kintsch, 2004, 2013). This formation of superordinate concepts to which subsequent information is connected facilitates comprehension (Kintsch, 2004; Meyer & Wijekumar, 2007). Over 40 years ago, Meyer (1975) asserted that if readers can understand that authors purposely use various structures to organize text, the readers are assisted to construct an integrated mental representation of key ideas similar to the text's organization. Dickson, Simmons, and Kame'enui (1995, 1998) found that readers' awareness of text structure helps them recall more information and main ideas from text as compared with readers who have less knowledge of text structures or an inability to identify and use text structures. During the past several decades, researchers have experimentally examined the effects of teaching students to recognize text structures (Meyer et al., 2010; Wijekumar et al., 2012; Williams et al., 2005).

Exposing students, as early as grades K–3, to expository text and teaching them to recognize text structures may build students' understanding and recall of key ideas (Shanahan et al., 2010). Explicitly teaching text structures may help typically achieving students, students at risk for reading difficulties, and students with learning disabilities (LD) organize and integrate textual information to increase their recall and comprehension of expository text (Armbruster, Anderson, & Ostertag, 1987; Dickson et al., 1995; Duke, Pearson, Strachan, & Billman, 2011; Meyer & Ray, 2011; Shanahan et al., 2010; Weisberg & Balajthy, 1989; Wijekumar et al., 2014; Williams et al., 2009, 2014). Knowledge of text structures may lead students to ask relevant questions about the material and may also help students actively monitor their understanding of what they are reading (Gersten, Fuchs, Williams, & Baker, 2001). Researchers have suggested that successful readers recognize text structures as a useful skill for improving their comprehension (Duke et al., 2011; Meyer et al., 2011; Williams et al., 2007).

Expository texts include a broad range of texts across grade spans. Students in grades K–5 read expository text that "includes biographies and autobiographies; books about history, social studies, science, and the arts; technical texts, including directions, forms, and information displayed in graphs, charts, or maps; and digital sources on a range of topics" (NGA Center & CCSSO, 2010, p. 31). Students in grades 6–12 read expository text that

> includes the subgenres of exposition, argument, and functional text in the form of personal essays, speeches, opinion pieces, essays about art or literature, biographies, memoirs, journalism, and historical, scientific, technical, or economic accounts (including digital sources) written for a broad audience. (p. 57)

The variety of text structures used in expository text contributes to the complexity of reading for understanding in several ways. First, the structure of expository text is more complex and implicit than narrative text, and the graphics in expository text typically present essential information (Hiebert & Mesmer, 2013; Shanahan, Fisher, & Frey, 2013). Second, in secondary grades, the number of text structures that students must understand increases, as well as the complexity and length of sentences (Carnegie Council on Advancing Adolescent Literacy, 2010). Moreover, students' lack of reading stamina contributes to poor comprehension as the overall amount of dense, complex text increases in secondary grades (Hiebert, Wilson, & Trainin, 2015). Finally, how expository text structures are presented varies across disciplines, exacerbating the challenge to read for understanding for students who lack expository text structure knowledge (Gersten et al., 2001; Lee & Spratley, 2010).

The wide variability in text types and text structures across grade levels presents comprehension challenges for many students, especially students at risk and students with LD. Reading expository text often leads to breakdowns in strategic text processing and metacognition for these students because they may not possess appropriate comprehension strategies or know when to use a strategy (Gersten et al., 2001; Lee & Spratley, 2010). Students with reading difficulties also struggle to use text structure knowledge to process content knowledge (Englert & Thomas, 1987). Researchers have indicated, however, that students with reading difficulties can learn to understand what constitutes an organized paragraph and, with adequate instruction, can sort disorganized sentences into coherent clusters around subtopics (Dickson et al., 1995; Wong & Wilson, 1984). An analysis of the potential role of these moderating variables (e.g., grade level, disability status, number of text structures taught) is needed to evaluate the effects of expository text structure interventions on comprehension.

Previous Expository Text Structure Reviews

Dickson et al. (1995) reviewed seven primary and seven secondary sources to examine the relation between text organization of narrative and expository text, and comprehension. These sources (i.e., studies, reviews, book chapters) were selected purposely because they included students with diverse learning needs. Only two of the studies reviewed included expository text. In one study, researchers specifically measured text structure knowledge (Englert & Thomas, 1987), and in the other study, researchers measured passage recall (Zabrucky & Ratner, 1992). Dickson et al. provided two suggestions to enhance reading comprehension: Teachers should use highly structured expository texts and also explicitly teach students the text structures used in those texts. Notably, this review was not systematic; rather, the authors self-selected the peer and non-peer-reviewed sources.

More recently, Meyer and Ray (2011) conducted a review of expository text structure interventions implemented in the elementary grades. They found that text structure interventions improve reading comprehension for elementary students. Meyer and Ray suggested that text structure instruction should include (a) appropriate scaffolding that includes increasingly complex texts and more rigorous tasks as students improve their use of text structure strategies; (b) instructive feedback; (c) selection of text that matches the reader's level, particularly when introducing a new text structure; (d) implementation of classroom-based instruction with a focus on content learning; and (e) mindful adaptation of text structure instruction for younger students' needs and abilities. Importantly, none of the studies that Meyer and Ray examined included students with LD, and the review was limited to the elementary grades.

Rationale and Research Questions

To date, there has been no systematic review of the available research on expository text structure interventions for typically achieving students across grades K–12 nor a systematic review of the available research on expository text structure interventions for students at risk or students with LD. Given the relatively large number of available studies on expository text structure interventions, it is important to determine whether these interventions improve comprehension for students with and without LD in secondary and elementary grades. This review expands Dickson et al.'s (1995) report by systematically reviewing peer-reviewed journals to qualify expository text structure intervention studies conducted with typically achieving students, students at risk, and students with LD. The present study also extends Meyer and Ray's (2011) review on expository text structure interventions because we include secondary students.

Specifically, in this meta-analysis, we examine whether individual differences (e.g., grade level, disability status), intervention variables, and outcome measures contribute to the research and practice knowledge of expository text structure interventions for students in grades K–12. This review was designed to address two research questions:

1. How effective are expository text structure interventions in improving comprehension outcomes for students in grades K–12?
2. What features of expository text structure interventions (e.g., number of text structures taught, type of implementer) are associated with improved comprehension outcomes for students?

Method

A five-step process was used to conduct a comprehensive search for expository text structure intervention studies. First, electronic searches of the Academic Search Premier, ERIC, and PsycINFO databases were completed to locate studies published in peer-reviewed journals between 1970 and 2013. Every combination of the descriptors or root words of those descriptors (*text structure*, *text organization*, *text features*, *text signal*, *semantic cues*, *syntactic cues*, *textual cues*, *expository*, *informational*, *read**, *listen**, *comprehend**, *learning difficult**, *learning dis**, *reading difficult**, *reading dis**, *language difficult**, *language dis**, *language impair**, *at-risk*, *low-achiev**, *struggle**, *typical**, and *general education*) were used to maximize the articles located. A separate electronic search was also conducted with various combinations of the descriptors (*text structure*, *comprehension*, *description*, *categorization*, *cause effect*, *compare contrast*, *chronology*, *sequence*, *problem solution*, *position reason*, *enumeration*, and *pro con*) to capture studies that specified text structures commonly found in the research on expository text. The initial search yielded 6,843 abstracts.

Second, abstracts were screened to determine whether they met the following criteria:

- The studies were published in a peer-reviewed journal between 1970 and 2013. This 43-year time span was selected to represent a comprehensive search of the literature, including research conducted after the Common Core State Standards Initiative (NGA Center & CCSSO, 2010).
- Participating students were in grades K–12. This grade span represents the grades in which students should read expository text (NGA Center & CCSSO, 2010).
- Participating students were typically achieving students, students at risk for reading difficulties, and students with LD. Students at risk for reading difficulties and students with LD were defined as at risk, low achievers, or struggling students in the areas of learning, reading, or language difficulties, disabilities, or disorders. Studies were included if disaggregated data were provided for students at risk and students with LD regardless of the characteristics of other students in the study.
- The researchers used targeted, text structure interventions with expository, connected texts. Studies were excluded if researchers did not use expository text (e.g., Williams, Brown, Silverstein, & deCani, 1994) or solely focused on text feature (e.g., headings, subheadings) instruction without a text structure context (e.g., Taylor, 1982). Studies were also excluded if the independent variable did not include instruction on expository text structures as part of the intervention.
- In studies with expository text structure interventions, at least one dependent measure assessed reading comprehension or listening comprehension. We searched for both reading comprehension and listening comprehension as outcome variables to respond to the equal importance of reading and listening comprehension (NGA Center & CCSSO, 2010). Studies qualified if the authors included a measure of content (e.g., vocabulary concepts) and another measure of comprehension (e.g., summarization of a compare-and-contrast text structure; see Wijekumar et al., 2012).
- Researchers used an experimental, quasi-experimental, or single-case design. No qualifying studies were identified with a single-case design.
- The language of instruction was English, the research was conducted in U.S. schools, and articles were published in English within the context of standards-based education (i.e., Common Core) and national reading assessments (i.e., NAEP).

The screening process yielded 672 articles that were then read to determine whether they met the qualifying criteria, which resulted in a total of 20 articles.

Third, references were reviewed from previously published syntheses and meta-analyses evaluating reading comprehension outcomes for typically achieving elementary students (Meyer & Ray, 2011), students with learning difficulties (Dickson et al., 1995), and students with LD (Edmonds et al., 2009; Gajria, Jitendra, Sood, & Gabriell, 2007; Gersten et al., 2001).

Fourth, a manual search of 14 major journals—*American Educational Research Journal*, *The Elementary School Journal*, *Exceptional Children*, *Journal of Educational Psychology*, *Journal of Learning Disabilities*, *Journal of Special Education*, *Journal of Speech, Language, and Hearing Research*, *Learning Disability Quarterly*, *Learning Disabilities Research and Practice*, *Reading and Writing*, *Reading Research Quarterly*, *Remedial and Special Education*, *Review of Educational Research*, and *Scientific Studies of Reading*—was completed for volumes from 2008–2013. These journals were hand-searched because they represent the prominent journals in the field that publish research on reading interventions that include students with and without LD.

Fifth, the references of each reviewed article were examined to identify any relevant studies. Overall, this search procedure resulted in a corpus of 21 studies reported in peer-reviewed journals between 1970 and 2013.

Coding Procedures

An extensive code sheet was adapted from previous syntheses (Edmonds et al., 2009; Solis et al., 2012; the complete code sheet and code definitions are available from the first author). The code sheet was used to organize the following essential information: participants, methodology, intervention and comparison information, clarity of causal inference, measures, and findings. The code sheet used a combination of forced-choice items (e.g., research design, assignment method, fidelity of implementation), open-ended items (e.g., age of participants, duration of intervention, text structure type), and written description of the treatment and control conditions. Although some researchers included alternative treatments (e.g., content area instruction), we only reported the text structure intervention and the control condition in each study.

Four raters were trained on the use and interpretation of items from the code sheet. Each rater participated in 10 hours of training. During training, raters independently coded the same articles, and point-by-point agreement was calculated until inter-rater reliability of 100% was attained on four consecutive articles. Then, the remaining studies were divided between partners. Each article was independently coded and then blind double-coded by a second rater. The percentage agreement (i.e., agreements divided by agreements plus disagreements) between raters for each article was calculated on the 70-item code sheet. The average interobserver agreement was 94% (range = 81–100%; a 71% agreement score occurred with only one article). There were no coding categories in which raters consistently disagreed, and they never disagreed about the text structure type. When disagreements occurred, raters met and reached consensus on how to code the particular item.

Effect Size Calculation

We used the standardized mean difference (Cohen's *d*) to estimate the effect of comprehension. Each effect size was calculated independently and then recalculated and confirmed by a second rater. Data for calculation of effect sizes were available for 19 of the 21 studies. We interpreted effect sizes of .20 as small, .50 as medium, and .80 as large (Cohen, 1988). The findings of the two studies that did not provide data for calculation of effect sizes are synthesized in the Results section.

Meta-Analytic Procedures

A weighting procedure was used to calculate mean effect sizes across independent samples (Borenstein, Hedges, Higgins, & Rothstein, 2005). Each effect size was first multiplied by the inverse of its variance; then, the sum of these products was divided by the sum of their inverses. This procedure allows more weight to samples of larger size, which is generally preferred (Hedges & Olkin, 1985) because larger samples give more precise population estimates. In addition, we calculated 95% confidence intervals for weighted mean effect sizes. If the interval did not contain zero, the null hypothesis that expository text structure interventions had no effect on comprehension was rejected.

We used a shifting unit of analysis (Cooper, Hedges, & Valentine, 2009). In this procedure, each effect size associated with one study is first coded as if it were an independent estimate of the relation between the expository text structure intervention and the outcome. However, when estimating the overall effect of expository text structure interventions, we averaged these effects prior to analysis so one sample only contributes one effect size. In contrast, when conducting moderator analyses, if a single sample provided a test of the effect of the intervention for more than one category of a moderator (e.g., one sample provided the effect of the intervention on more than one type of comprehension measure, such as comprehension questions and graphic organizer), we allowed a single sample to contribute one effect to each moderator category. This method retains as much data as possible from each study while holding to a minimum any violations of the assumption of independent data points.

Effect sizes may vary even if they estimate the same underlying population value. Therefore, homogeneity analyses were needed to determine whether sampling error alone accounted for this variance compared with the observed variance caused by features of the studies. We tested homogeneity of the observed set of effect sizes using a within-class goodness-of-fit statistic (Q_w), which followed an approximate chi-square distribution with $k - 1$ degrees of freedom, where k equals the number of samples. A significant Q_w statistic suggests that sampling variation alone could not adequately explain the variability in the effect size estimation and that moderator variables should be examined (Cooper, 1998). Similarly, homogeneity analyses can be used to determine whether multiple groups of mean effect sizes vary more than predicted by sampling error. In this case, statistical differences among different categories of studies were tested by computing the between-class goodness-of-fit statistic, Q_b, which follows a chi-square distribution with $p - 1$ degrees of freedom, where p equals the number of groups. A significant Q_b statistic indicates that mean effect sizes vary between categories of the moderator variables more than predicted by sampling error alone. We conducted all statistical analyses using the Comprehensive Meta-Analysis statistical software package (Version 2.2; Borenstein et al., 2005).

Measures

All comprehension outcome measures were categorized by outcome measure, researcher-developed comprehension measure, measure of the NAEP cognitive target, and measure type. A separate analysis was conducted for each outcome measure category. The outcome measure was divided into standardized or researcher developed. The type of researcher-developed comprehension measure was categorized into answering comprehension questions, completing a graphic organizer, and recalling/summarizing information (oral or written). Measures of answering comprehension questions included multiple-choice items and questions about the text, such as definitions of vocabulary used, completing a graphic organizer (i.e., filling in text information in a visual matrix), and recalling/summarizing information (i.e., written or oral recall of idea units, summary of a text of a targeted text structure). In addition, identifying text structures was categorized as a separate measure type and included text structure identification, use or recall of clue words or a text structure, or use of a text structure in written expression.

Each of the researcher-developed comprehension measures was categorized according to the three cognitive targets (locate/recall, integrate/interpret, or critique/evaluate) included in the NAEP reading framework (National Assessment Governing Board, 2012). Locate/recall includes identifying explicitly stated main ideas or focusing on specific elements of a story. Integrate/interpret includes making comparisons, explaining character motivation, examining relations of ideas across the text, and using key vocabulary words to aid in passage comprehension. Critique/evaluate includes viewing text critically by examining it from numerous perspectives or judging the overall text quality or the effectiveness of particular aspects of the text. The measure type included measures administered as a posttest, a maintenance test, or a transfer test.

Moderators

Five moderators that are commonly associated with the effect of the interventions were selected to assess whether they result in different comprehension outcomes. Moderators included the number of text structures taught (i.e., divided into one, two, or multiple [three or more]), the type of implementer (i.e., researcher, teacher, computer/online tutor), the grade level of students (i.e., grades K–5, grades 6–12, mixed grades), the learner classification (i.e., typically achieving, at risk, learning disability), and the intervention dosage (i.e., less than 10 hours vs. more than 10 hours but less than 20 hours vs. more than 20 hours).

Fixed and Random Effects

When an effect size is said to be fixed, it is assumed that error is solely from differences among participants sampled in the study. However, it is also possible to view studies as containing other random influences, including differences in teachers, facilities, community economics, and so forth. This view assumes that K–12 classrooms in our meta-analysis also constitute a random sample drawn from a (vaguely defined) population of conditions under which expository text structure interventions occur. If it is believed that such random variation in programs is a significant component of error, a random-effects model should be used that takes into account study-level variance in effect sizes (for a discussion of fixed and random effects, see Hedges & Vevea, 1998).

Rather than opt for a single model describing the underlying variation in effects, both fixed- and random-effects models were applied in this study because significant results from both models improve our confidence and the generalizability of the finding. All analyses were conducted twice, once employing fixed-effects assumptions and once employing random-effects assumptions. By conducting both analyses, we could examine the effects of different assumptions on the outcomes of the synthesis and increase the sensitivity of our analysis (Greenhouse & Iyengar, 1994). For example, if an analysis reveals that a moderator variable is significant under fixed-effects assumptions but not under random-effects assumptions, this result suggests a limit on the generalizability of inferences about the moderator variable.

Results

The findings across the corpus of 21 studies were analyzed to determine the effectiveness of expository text structure interventions and the features of these interventions. First, we provide a synthesis of the study features (i.e., design, sample, intervention; see Table 1) that highlight the salient elements across the corpus of studies. Second, the results of the meta-analysis of 19 treatment/comparison design studies are summarized

TABLE 1
Summary of Expository Text Structure Study Features

Study	Student participants	Grade(s)	Duration	Text structure type(s) taught	Reading material	Implementer
Alvermann (1981)	*N* = 114 TA T1: *n* = 28 T2: *n* = 28 C1: *n* = 29 C2: *n* = 29	10	1 session	Compare-and-contrast and description/categorization	Expository passages Topic: The loss of body water	General education teacher
Alvermann & Boothby (1983)	*N* = 33 HP T: *n* = 17 C: *n* = 16	4	9 periods	Cause-and-effect	Social studies grade-level textbook passages with researcher-developed GOs Topic: Dutch come to America	General education teacher
Alvermann & Boothby (1986)	*N* = 24 TA and HP T1: *n* = 8 T2: *n* = 8 C: *n* = 8	4	14 (T1) or 7 (T2) class periods, 25-minute sessions	Enumeration	Social studies grade-level textbook passages with researcher-developed GOs Topic: Colonists' bid for independence from England	General education teacher
Armbruster, Anderson, & Ostertag (1987)	*N* = 82 TA T: *n* = NR C: *n* = NR	5	11 days, 45-minute sessions	Problem-and-solution	Social studies fourth- and fifth-grade-level textbook passages Topics: Social studies and Jamestown settlers	General education teacher and researcher
Bakken, Mastropieri, & Scruggs (1997)	*N* = 36 LD T: *n* = 18 C: *n* = 18	8	3 sessions, approximately 30 minutes each	Chronology/sequence, description/categorization, and enumeration	Science and social studies passages Topics: Life science, earth science, and U.S. history	Researcher
Boothby & Alvermann (1984)	*N* = 26 TA T: *n* = 11	4	39 sessions, 40 minutes each (13 weeks)	Compare-and-contrast and cause-and-effect	Social studies grade-level textbook passages with researcher-developed GOs Topics: Indians, explorers, and life in Colonial America	General education teacher and researcher
Englert & Mariage (1991)	*N* = 28 LD T: *n* = 11 C: *n* = 17	4–6	2 months	Description/categorization with GO emphasis	Expository passages Topic: Wild animals	Teacher and student leaders
Hall, Sabey, & McClellan (2005)	*N* = 55 TA T: *n* = 8 small guided-reading groups (4 students/group) C: *n* = 8 small guided-reading groups (3 or 4 students/group	2	12–18 sessions, 20–25 minutes each (6 weeks)	Compare-and-contrast	Informational books from a guided-reading collection and compare-and-contrast paragraphs written by the authors Topics: Five animal characteristics and classifications	General education teachers
Meyer et al. (2002)	*N* = 60 TA T1: *n* = 20 T2: *n* = 20 C: *n* = 20	5	25 sessions, 20 minutes each (10 weeks)	Compare-and-contrast (5 sessions), problem-and-solution (8 sessions), cause-and-effect (8 sessions), sequence (2 sessions), and description (1 session)	Web-based structure strategy program Topics: American history and science topics	Trained adult online tutors

(*continued*)

TABLE 1
Summary of Expository Text Structure Study Features (*continued*)

Study	Student participants	Grade(s)	Duration	Text structure type(s) taught	Reading material	Implementer
Meyer et al. (2010)	*N* = 111 HP and AR *n* = 56 in grade 5 *n* = 55 in grade 7 *n* = 70 HP *n* = 41 AR	5 and 7	65 sessions, 90 minutes total, 2 or 3 sessions/week (6 months)	Compare-and-contrast (12 sessions), problem-and-solution (12 sessions), cause-and-effect (16 sessions), sequence (12 sessions), and description (13 sessions)	Authentic expository sources (e.g., youth magazines) Topics: Science (34%), social studies (28%), animals (23%), sports (9%), and food (6%)	Computer (Web-based instruction)
Meyer, Wijekumar, & Lin (2011)	*N* = 131 HP, TA, and AR *n* = 44 HP *n* = 44 TA *n* = 43 AR T1: *n* = 66 T2: *n* = 65	5	T1: 65 sessions, 30 minutes each, 3/week (6 months) T2: 93 available sessions, 30 minutes each, 3/week (6 months)	T1: Compare-and-contrast (12 sessions), problem-and-solution (12 sessions), cause-and-effect (16 sessions), sequence (12 sessions), and description (13 sessions) T2: Compare-and-contrast (19 sessions), problem-and-solution (16 sessions), cause-and-effect (20 sessions), sequence (18 sessions), and description (20 sessions)	Authentic expository sources (e.g., youth magazines) Topics: Science (34%), social studies (28%), animals (23%), sports (9%), and food (6%)	Computer (Web-based instruction)
Reutzel, Smith, & Fawson (2005)	*N* = 80 TA T1: *n* = 42 T2: *n* = 38	2	48 sessions, 35–40 minutes each (16 weeks)	NR; text structure one component of an 8-component (T1) or 6-component (T2) intervention	Science information Big Books Topics: Ocean and pond life cycles, African animals, rock creation and erosion, and bird, insect, and plant life cycles	General education teachers
Slater (1985)	*N* = 224 HP, TA, and AR *n* = 74 HP *n* = 76 TA *n* = 74 AR T1: *n* = 56 T2: *n* = 56 C1: *n* = 56 C2: *n* = 56	9	1 day	Compare-and-contrast, cause-and-effect, position-and-reason, and problem-and-solution	Passages from the junior high American history book *The Free and the Brave* by Henry F. Graff) Topic: American history	General education teachers
Smith & Friend (1986)	*N* = 54 LD T: *n* = 30 (13 higher and 17 lower readers) C: *n* = 24 (15 higher and 9 lower readers)	9–12	4 sessions, 50 minutes each (1 week)	Cause-and-effect, compare-and-contrast, description, problem-and-solution, and sequence	Scripted teacher protocols with transparencies and student activities Topic: Social studies	Experienced teacher

(*continued*)

TABLE 1
Summary of Expository Text Structure Study Features (*continued*)

Study	Student participants	Grade(s)	Duration	Text structure type(s) taught	Reading material	Implementer
Spires, Gallini, & Riggsbee (1992)	N = 50 TA T: n = 25 C: n = 25	4	6 sessions, 50 minutes each (3 weeks)	Compare-and-contrast and problem-and-solution	Passages that included compare-and-contrast and problem-and-solution text structures Topic: NR	General education teacher
Weisberg & Balajthy (1989)	N = 32 AR T: n =16 C: n =16	10–12	6 sessions, 40 minutes each, 2/week (3 weeks)	Compare-and-contrast	Social studies adapted passages Topic: Earthquakes	Researchers
Wijekumar, Meyer, & Lei (2012)	N = 2,643 TA T: n = 65 classrooms C: n = 65 classrooms	4	30–45-minute sessions, 1/week (6 months)	Compare-and-contrast, problem-and-solution, cause-and-effect, sequence, and description	Passages that included compare-and contrast, problem-and-solution, cause-and-effect, sequence, and description text structures Topics: Science, social studies, sports, and current events	Computer (Web-based instruction)
Williams et al. (2005)	N = 76 TA T: n = 4 classrooms C: n = 2 classrooms	2	9 lessons across 15 sessions, 45 minutes each, 2/week	Compare-and-contrast, with GO emphasis	Encyclopedia, trade books, and compare-and contrast paragraphs written by the authors Topic: Five animal classifications	General education teachers
Williams et al. (2007)	N = 120 AR T: n = 5 classrooms C: n = 5 classrooms	2	22 lessons, 30–45-minute sessions	Cause-and-effect	Biographies, trade books, and cause-and-effect paragraphs written by the authors Topics: Colonists, pioneers, and immigrants; homes, schools, and jobs in 3 U.S. communities	General education teachers
Williams et al. (2009)	N = 141 TA T: n = 5 classrooms C: n = 5 classrooms	2	12 lessons across 22 sessions, 45 minutes each, 3/week (2 months)	Compare-and-contrast and pro-and-con	Encyclopedia, trade books, and compare-and-contrast and pro-and-con paragraphs written by the authors Topic: Five animal classifications	General education teachers
Williams et al. (2014)	N = 134 TA and AR T: n = 6 classrooms C: n = 3 classrooms	2	22 lessons, 45-minute sessions, 2/week	Cause-and-effect	Biographies, trade books, and cause-and-effect paragraphs written by the authors Topics: Cherokee, colonists, and pioneers; homes, schools, and jobs in 3 U.S. communities	General education teachers

Note. AR = at risk; C = control condition; C1 = control 1 condition; C2 = control 2 condition; GO = graphic organizer; HP = high performers; LD = learning disabilities; NR = not reported; T = treatment condition; T1 = treatment 1 condition; T2 = treatment 2 condition; TA = typical achievers. The numbers reported are those reflected in the analysis.

to determine the overall effects of expository text structure interventions on comprehension (research question 1) and the possible moderators of the effects (research question 2). Third, the findings of the two studies that did not provide sufficient data to calculate effect sizes are reviewed narratively.

Study Features

Study Design and Quality

Only six of the 21 studies included all of the elements of high-quality treatment/comparison studies: random assignment, intervention described and specified, fidelity of implementation described and assessed, effect size calculation, and assessment of student outcomes with multiple measures, including standardized measures (Gersten et al., 2005; see Table 2). Importantly, in 15 studies, researchers used random assignment, and in all of the studies, researchers included multiple outcome measures. However, standardized reading assessments were included in only six studies (see Table 3).

We examined whether the six high-quality studies resulted in a different effect size than the 13 studies that did not include all of the elements of high-quality studies (see Table 4). With a fixed-errors model, the weighted mean d index for high-quality studies was 0.65 (95% confidence interval [CI] [0.54, 0.76]) and was significantly different from the weighted mean d index of non-high-quality studies ($d = 1.00$, 95% CI [0.90, 1.11]), $Q(1) = 20.34$, $p < .001$. In contrast, with a random-errors model, the weighted mean d index for high-quality studies was 0.70 (95% CI [0.42, 0.98]) and was not significantly different from the weighted mean d index for non-high-quality studies, $d = 1.13$, 95% CI [0.75, 1.51].

Although the quality variable is informative to determine which researchers included essential quality indicators in their text structure intervention studies, the goal of a systematic review is to limit bias in the identification, evaluation, and synthesis of the body of relevant studies that address a specific research question (Valentine, 2009). Moreover, because the quality moderator is significantly different under fixed-error assumptions and is not significantly different under random-error assumptions, the corpus of studies that met the criteria for this review are included in the remaining analyses, and the quality of the studies is reflected in our discussion of the available research.

Sample

The 21 studies included 4,254 students, with sample sizes ranging from 24 to 2,643 students. In six studies, researchers focused exclusively on higher performers ($n = 1$ study), students at risk ($n = 2$ studies), or students with LD ($n = 3$ studies). Students at risk were defined as at risk for academic failure (Williams et al., 2007, 2014) and below-grade-level readers on the basis of a standardized, comprehension measure (Meyer et al., 2010, 2011; Slater, 1985; Weisberg & Balajthy, 1989). In the remaining studies, researchers included a combination of subgroups in their text structure intervention. Although the majority of the studies ($n = 14$) were conducted in grades 2–5, researchers in five studies included students in grades 8–12, and in two studies, researchers included students in both elementary and secondary grades.

Intervention Features

In all of the studies ($n = 21$), researchers delivered expository text structure interventions during reading activities with a focus on learning science or social studies content. Researchers focused their text structure interventions on one text structure in nine studies, two text structures in four studies, and three or more text structures in seven studies. Cause-and-effect was the most common ($n = 10$) text structure taught across the 14 studies that included social science content. Similarly, cause-and-effect was the most common ($n = 8$) text structure taught in elementary grades using social science content. However, compare-and-contrast was the most common ($n = 4$) text structure taught in secondary grades using social science content. Compare-and-contrast was the most common ($n = 8$) text structure taught across the 11 studies that included science content. Similarly, compare-and-contrast was the most common ($n = 7$) text structure taught in elementary grades using science content. However, description was the most common ($n = 3$) text structure taught in secondary grades using science content.

Expository text structure interventions ($n = 18$ studies) often included adapting and scaffolding text structure instruction (e.g., using more complex expository texts as students improve their use of the text structure strategy), so the instruction was tailored to students' level of performance. However, researchers varied their approaches for scaffolding text structure instruction. For example, Williams et al. (2014) used explicit exemplars of text structures during initial instruction. Other approaches to scaffolding included teaching easier text structures (e.g., description) prior to more difficult text structures (e.g., compare-and-contrast; Meyer et al., 2011) and gradually increasing the amount of information that students read and recalled. Moreover, in all studies except one, researchers selected highly structured texts that matched readers' level particularly when introducing a new text structure. Alvermann and Boothby (1983) purposely selected complex, poorly structured texts as a context for their text structure intervention.

Researchers also reported that they included other effective instructional features to teach targeted text

TABLE 2
Quality Indicators of Treatment/Comparison Studies

Study	Random assignment	Independent variable and comparison condition described thoroughly	Fidelity of implementation reported	Multiple outcome measures used	Standardized measure used	Provided the effect size or enough data to compute it
Alvermann (1981)	SCL, CC	✓	—	✓	—	✓
Alvermann & Boothby (1983)	—	✓	✓	✓	—	NC
Alvermann & Boothby (1986)	SC	✓	✓	✓	—	✓
Armbruster, Anderson, & Ostertag (1987)	—	✓	—	✓	—	NC
Bakken, Mastropieri, & Scruggs (1997)	SC	✓	—	✓	—	✓
Boothby & Alvermann (1984)	—	✓	—	✓	—	✓
Englert & Mariage (1991)	—	✓	—	✓	—	✓
Hall, Sabey, & McClellan (2005)	CC	✓	✓	✓	—	✓
Meyer et al. (2002)	SC	✓	—	✓	—	✓
Meyer et al. (2010)[a]	SC	✓	✓	✓	✓	✓
Meyer, Wijekumar, & Lin (2011)[a]	SC	✓	✓	✓	✓	✓
Reutzel, Smith, & Fawson (2005)[a]	SC	✓	✓	✓	✓	✓
Slater (1985)	SC	✓	—	✓	—	✓
Smith & Friend (1986)	—	✓	—	✓	—	✓
Spires, Gallini, & Riggsbee (1992)	SC	✓	—	✓	—	✓
Weisberg & Balajthy (1989)	—	✓	—	✓	—	✓
Wijekumar, Meyer, & Lei (2012)[a]	CC	✓	✓	✓	✓	✓
Williams et al. (2005)	CC	✓	✓	✓	—	✓
Williams et al. (2007)[a]	CC, TC	✓	✓	✓	✓	✓
Williams et al. (2009)	TC	✓	✓	✓	—	✓
Williams et al. (2014)[a]	CC, TC	✓	✓	✓	✓	✓

Note. CC = random assignment of groups/classes to condition; NC = not calculable; SC = random assignment of students to condition; SCL = random assignment of students to groups/classes; TC = random assignment of teachers to condition. A check mark indicates that evidence was present. A dash indicates that evidence was not present.
[a]All indicators are present.

TABLE 3
Summary of Expository Text Structure Study Findings

Study, design, and intervention	Measures and findings: Posttest	Maintenance	Transfer
Alvermann (1981) • T1 (GO description): Focus on a partially completed GO with the reorganization of a top-level text from a textbook (*n* = 28) • T2 (GO comparison): Focus on attending to the relevant information in the passage, key vocabulary terms, and linking information learned from instruction and the passage (*n* = 28) • C1 (no GO description): Focus on reading and recalling the information (*n* = 29) • C2 (no GO comparison): Focus on reading and recalling the information (*n* = 29) Experimental (stratified random assignment of students to groups based on students' reading comprehension scores and then groups randomly assigned to condition) Treatment fidelity: NR	*Written free recall of idea units:* • T1 vs. C1, ES = 1.33 • T1 vs. C2, ES = 0.80 • T1 vs. T2, ES = 0.67 • T2 vs. C1, ES = 0.54 • T2 vs. C2, ES = 0.05	*Written free recall of idea units* (1 week): • T1 vs. C1, ES = 1.59 • T1 vs. C2, ES = 0.96 • T1 vs. T2, ES = 0.52 • T2 vs. C1, ES = 0.94 • T2 vs. C2, ES = 0.37	
Alvermann & Boothby (1983) • T (GO): Focus on attending to the relevant information in the passage, key vocabulary terms, and linking information learned from instruction and the passage (*n* = 17) • C (no GO): Read the passage and write recall (*n* = 16) Quasi-experimental Treatment fidelity: NR	*Written recall of relevant ideas in GO:* T > C *Written recall of irrelevant ideas in GO:* T < C		
Alvermann & Boothby (1986) • T1 (GO): Focus on completing GO after reading for 14 class periods (*n* = 8) • T2 (GO): Focus on completing GO after reading for 7 class periods (*n* = 8) • C (no GO): Focus on reading–recitation method (*n* = 8) Experimental (students randomly assigned to condition) Treatment fidelity: Researcher observed T1, T2, and C sessions for consistent implementation	*End-of-chapter test:* • T1 vs. C, ES = 0.62 • T2 vs. C, ES = 0.24		*Written free recall: Similar textbook topics from trade books:* • *Tobacco trade* (given at posttest, 7 days): T1 vs. C, ES = 0.03; T2 vs. C, ES = −0.88 • *New England Harbor* (given at posttest, 14 days): T1 vs. C, ES = 0.78; T2 vs. C, ES = −0.19
Armbruster, Anderson, & Ostertag (1987) • T (P-S with writing): Focus on definition/description of 13 P-S text structure passages and explicit rules to fill in frames for writing P-S summaries (*n* = NR) • C (P-S with questioning): Focus on the same P-S text structure passages and answer 5 questions about each passage (*n* = NR) Quasi-experimental Treatment fidelity: NR	*Main idea essay question:* T > C *Written summaries—idea units:* T > C *Written summaries—quality:* T > C		

(*continued*)

TABLE 3
Summary of Expository Text Structure Study Findings (*continued*)

Study, design, and intervention	Measures and findings		
	Posttest	Maintenance	Transfer
Bakken, Mastropieri, & Scruggs (1997) • T (text structure): Focus on main idea, supporting evidence, and translating information into own words, targeting text structure and main idea strategy instruction with expository texts (*n* = 18) • C (traditional instruction): Focus on information and answers to specific questions about the narrative science content (*n* = 18) Experimental (students stratified by gender and randomly assigned to condition) Treatment fidelity: NR	*Oral free recall science test:* • Central idea units: T vs. C, ES = 2.50 • Incidental idea units: T vs. C, ES = 1.50 • Total idea units: T vs. C, ES = 2.27	*Oral free recall science test* (2 day): • Central idea units: T vs. C, ES = 3.44 • Incidental idea units: T vs. C, ES = 1.79 • Total idea units: T vs. C, ES = 3.18	*Oral free recall social studies test* (2 day): • Central idea units: T vs. C, ES = 2.19 • Incidental idea units: T vs. C, ES = 2.35 • Total idea units: T vs. C, ES = 2.62
Boothby & Alvermann (1984) • T (GO): Focus on a C-C or C-E GO (*n* = 11) • C (no GO): Focus on same material with similar instruction of introduction of new words, silent reading, and discussion (*n* = 15) Quasi-experimental Treatment fidelity: NR	*Written free recall test of main idea units*: T vs. C, ES = 0.91	*Written free recall test of main idea units* (2 day): T vs. C, ES = 0.33 *Written free recall test of main idea units* (1 month): T vs. C, ES = 0.38	
Englert & Mariage (1991) • T (POSSE): Focus on predicting, organizing, searching for text structure, summarizing, and evaluating using a strategy sheet and cue cards (*n* = 11) • C (no text structure instruction): Focus on predictions, answering questions, and discussion using same text (*n* = 17) Quasi-experimental Treatment fidelity: NR	*Written free recall test:* • Holistic: T vs. C, ES = 1.37 • Total number of ideas: T vs. C, ES = 1.90 • Number of main ideas: T vs. C, ES = 1.13 *Strategy knowledge*: T vs. C, ES = 0.85		
Hall, Sabey, & McClellan (2005) • T (text structure): Focus on structure of text in 3 main sections: introducing the text to students, reading the text, and discussing and revisiting the text (*n* = 31) • C (no instruction): Business as usual included small-group guided reading (*n* = 24) Experimental (classrooms randomly assigned to condition) Treatment fidelity: 45–60 minutes once per week for 6 weeks; observations (*n* = 6) of T = 76% of components taught	*Summary:* • C-C text: No transfer (T topic): T vs. C, ES = 3.30 • Unstructured text: T vs. C, ES = 0.12 *Strategies:* • Recall of clue words[a] • GO matrix: T vs. C, ES = 6.28 • Use of clue words[a] *Concepts:* • Vocabulary words[a] • C-C[a]		*Summary* (given at posttest): C-C text: • Near transfer (turtles): T vs. C, ES = 1.90 • Far transfer (trees): T vs. C, ES = 0.85

(*continued*)

TABLE 3
Summary of Expository Text Structure Study Findings (*continued*)

Study, design, and intervention	Measures and findings: Posttest	Measures and findings: Maintenance	Measures and findings: Transfer
Meyer et al. (2002) • T1 (structure strategy = Internet with tutors): Focus on feedback, encouragement, directions, and additional instruction to redo lessons until mastery (*n* = 20) • T2 (structure strategy = Internet without tutors): Focus on daily feedback as students independently master sessions 1–25 (*n* = 20) • C (Accelerated Reader): Implement Accelerated Reader, read storybooks, and complete comprehension tests on the computer (*n* = 20) Experimental (students randomly assigned to condition) Treatment fidelity: NR	*Total recall:* • T1 vs. C, ES = 0.55 • T2 vs. C, ES = 0.28 *Main ideas identification:* • T1 vs. C, ES = 0.49 • T2 vs. C, ES = 0.12 *Main idea questions:* • T1 vs. C, ES = 0.42 • T2 vs. C, ES = -0.04 *Top-level structure*[a]	*Total recall* (2.5 month): • T1 vs. C, ES = 0.78 • T2 vs. C, ES = 0.65 *Main ideas identification:* • T1 vs. C, ES = 0.81 • T2 vs. C, ES = 0.80 *Main idea questions:* • T1 vs. C, ES = 0.36 • T2 vs. C, ES = 0.86 *Top-level structure*[a]	
Meyer et al. (2010) • T1 (Web-based ITSS): Focus on modeling the use of the structure strategy, key idea, defining the organization of text structures, signaling words, reading 5 top-level text structure passages (varied in complexity and embedding of other text structures as students work through lessons on each of the 5 text structures), scaffolding with visual and writing prompts to assist with writing main ideas and recalls, assessing students' work in the lessons with immediate feedback varied by S vs. E, and practice lessons with and without Ch • T2 (ITSS): Although all students received the same structure strategy instruction, compared on reading level, feedback, and Ch: T1 and T2 varied depending on the comparison (designated in the Findings column); the T1 and T2 comparisons based on reading level and then further compared based on feedback and Ch: BG (*n* = 41) who received S with no Ch (*n* = 10) vs. Ch (*n* = 10); compared with the BG who received E with no Ch (*n* = 10) vs. Ch (*n* = 11); HA (*n* = 70) who received S with no Ch (*n* = 17) vs. Ch (*n* = 15); compared with the HA who received E with no Ch (*n* = 18) vs. Ch (*n* = 20) Experimental (stratified random assignment of students to 1 of 12 reading-level strata based on students' composite reading score) Treatment fidelity: 100% completed first 12 lessons, 78% completed first 20 lessons, 64% completed first 24 lessons, and 19% completed all 65 lessons	*GSRT* • T1 BG-S-NC vs. T2 BG-S-C, ES = 0.00 • T1 BG-E-NC vs. T2 BG-E-C, ES = 0.29 • T1 HA-S-NC vs. T2 HA-S-C, ES = 0.47 • T1 HA-E-NC vs. T2 HA-E-C, ES = 0.17 *Comparison free total recall:* • T1 BG-S-NC vs. T2 BG-S-C, ES = −0.08 • T1 BG-E-NC vs. T2 BG-E-C, ES = 0.76 • T1 HA-S-NC vs. T2 HA-S-C, ES = −0.18 • T1 HA-E-NC vs. T2 HA-E-C, ES = 0.47 *P-S free total recall:* • T1 BG-S-NC vs. T2 BG-S-C, ES = −0.19 • T1 BG-E-NC vs. T2 BG-E-C, ES = 0.24 • T1 HA-S-NC vs. T2 HA-S-C, ES = −0.45 • T1 HA-E-NC vs. T2 HA-E-C, ES = 0.66 *Comparison signaling test:* • T1 BG-S-NC vs. T2 BG-S-C, ES = 0.09 • T1 BG-E-NC vs. T2 BG-E-C, ES = −0.03 • T1 HA-S-NC vs. T2 HA-S-C, ES = 0.73 • T1 HA-E-NC vs. T2 HA-E-C, ES = −0.36	*Comparison free total recall* (4 months): • T1 BG-S-NC vs. T2 BG-S-C, ES = −0.06 • T1 BG-E-NC vs. T2 BG-E-C, ES = 0.08 • T1 HA-S-NC vs. T2 HA-S-C, ES = −0.02 • T1 HA-E-NC vs. T2 HA-E-C, ES = 0.70 *P-S free total recall* (4 months): • T1 BG-S-NC vs. T2 BG-S-C, ES = 0.06 • T1 BG-E-NC vs. T2 BG-E-C, ES = 0.02 • T1 HA-S-NC vs. T2 HA-S-C, ES = −0.17 • T1 HA-E-NC vs. T2 HA-E-C, ES = 0.36 *Comparison signaling est* (4 months) • T1 BG-S-NC vs. T2 BG-S-C, ES = 0.65 • T1 BG-E-NC vs. T2 BG-E-C, ES = 0.32 • T1 HA-S-NC vs. T2 HA-S-C, ES = 0.69 • T1 HA-E-NC vs. T2 HA-E-C, ES = 0.17	

(*continued*)

TABLE 3
Summary of Expository Text Structure Study Findings (*continued*)

	Measures and findings		
Study, design, and intervention	Posttest	Maintenance	Transfer
Meyer, Wijekumar, & Lin (2011) • T1 (standardized): Web-based structure strategy instruction (ITSS) of the same, fixed sequence of lessons regardless of their performance; focus on the definition of 5 text structures, signaling words (turned color) when discussed, read articles with computer and independently, feedback given, learning activities, write main idea, andorganize understanding and recall (*n* = 66) • T2 (individualized): Similar ITSS as T1; differentiated the sequence, difficulty, text complexity, and amount of practice to meet students' online performance needs, with potentially twice as many practice sessions (*n* = 65) Experimental (students randomly assigned to the standardized test form, then their composite score used for stratified random assignment to condition or researcher-developed test form) Treatment fidelity: T1: Mean lessons completed = 37; T2: Mean lessons completed = 35; students in either condition did not complete more lessons per structure	*GSRT*: T1 vs. T2, ES = −0.14 *Comparison total recall*: T1 vs. T2, ES = −0.13 *Comparison top-level structure*: T1 vs. T2, ES = 0.01 *P-S total recall*: T1 vs. T2, ES = −0.05 *P-S top-level structure*: T1 vs. T2, ES = −0.27 *Signaling test*[a]	*Comparison total recall* (1 month): T1 vs. T2, ES = −0.08 *Comparison top-level structure* (1 month): T1 vs. T2, ES = 0.09 *P-S total recall* (1 month): T1 vs. T2, ES = −0.12 *P-S top-level structure* (1 month): T1 vs. T2, ES = 0.17 *Signaling test* (1 month)[a]	
Reutzel, Smith, & Fawson (2005) • T1 (transactional strategy instruction): Focus on explicit gradual release of cognitive comprehension strategies to teach activating background knowledge, text structure, predicting, goal setting, asking questions, imagery, monitoring, and summarizing (*n* = 42) • T2 (single strategy instruction): Focus on explicit gradual release of cognitive comprehension strategies to teach activating background knowledge to make connections, predicting, visualizing, monitoring, questioning, and summarizing (*n* = 38) Experimental (stratified random assignment of students to condition based on students' state reading test score) Treatment fidelity: Observations (*n* = 16) of T1 = 79% of components taught; observations (*n* = 16) of T2 = 77% of components taught; interr-ater reliability = 89–96%	*Gates–MacGinitie*: T1 vs. T2, ES = 0.20 *State end-of-level comprehension test items*: T1 vs. T2, ES = 0.62 *Familiar retell—superordinate/main idea units*: T1 vs. T2, ES = 0.10 *Familiar retell—subordinate/detail idea units*: T1 vs. T2, ES = 1.40 *Science knowledge*: Science acquisition test[a]		*Unfamiliar retell—superordinate/main idea units* (given at posttest): T1 vs. T2, ES = 0.47 *Unfamiliar retell—subordinate/detail idea units*: T1 vs. T2, ES = 0.48

(*continued*)

TABLE 3
Summary of Expository Text Structure Study Findings (*continued*)

Study, design, and intervention	Measures and findings: Posttest	Measures and findings: Maintenance	Measures and findings: Transfer
Slater (1985) • T1 (structural organizer with outline grid): Focus on description of top-level structure benefits to remember information, brief example, outline grid, fill in grid, and written recall summary (*n* = 56) • T2 (structural organizer without outline grid): Focus on description of top-level structure benefits to remember information, brief example, and written recall summary (*n* = 56) • C1 (control with note-taking): Focus on reading passage and taking notes during reading, and writing everything remembered (*n* = 56) • C2 (control without note-taking): Focus on reading the passage and writing everything remembered (*n* = 56) Experimental (students at each ability level randomly assigned) Treatment fidelity: NR	*Total idea units recalled in written summaries:* • T1 vs. C1, ES = 0.55 • T1 vs. C2, ES = 1.64 • T1 vs. T2, ES = 1.24 • T2 vs. C1, ES = −0.52 • T2 vs. C2, ES = 0.25 *Total items correct on multiple-choice comprehension test:* • T1 vs. C1, ES = 0.03 • T1 vs. C2, ES = 0.98 • T1 vs. T2, ES = 0.46 • T2 vs. C1, ES = −0.45 • T2 vs. C2, ES = 0.57		
Smith & Friend (1986) • T (activity packets): Focus on text structure, clue words, and a 7-step strategy for using text structure (*n* = 30) • C (Productive Thinking Program): Focus on teaching creative problem solving, passages, workbook, class discussion, and describe P-S; training period focused on extra time for reading (*n* = 24) Quasi-experimental Treatment fidelity: NR	*Text structure identification:* • T vs. C, low readers, ES = 3.67 • T vs. C, high readers, ES = 3.03 *Idea units recalled:* • T vs. C, low readers, ES = 1.08 • T vs. C, high readers, ES = 1.72	*Text structure identification* (1 week): • T vs. C, low readers, ES = 2.57 • T vs. C, high readers, ES = 2.96 *Idea units* (1 week): • T vs. C, low readers, ES = 1.18 • T vs. C, high readers, ES = 1.44	
Spires, Gallini, & Riggsbee (1992) • T (structure-based strategy): Focus on text organizational patterns that included P-S and C-C formats and cue words (*n* = 25) • C (no instruction): Focus on extra time for reading passages (*n* = 25) Experimental (students randomly assigned to condition) Treatment fidelity: NR	*Summary test 1 P-S:* T vs. C, ES = 0.14 *Summary test 1 C-C:* T vs. C, ES = 0.52 *Summary test 2 P-S:* T vs. C, ES = 0.84 *Summary test 2 C-C:* T vs. C, ES = 0.66 *Summary test 3 P-S:* T vs. C, ES = 1.04 *Summary test 3 C-C:* T vs. C, ES = 0.71 *Multiple-choice test 1 P-S*[a] *Multiple-choice test 1 C-C*[a] *Multiple-choice test 2 P-S*[a] *Multiple-choice test 2 C-C*[a] *Multiple-choice test 3 P-S*[a] *Multiple-choice test 3 C-C*[a] *Student prediction*[a]	*Summary test 4 P-S* (3 weeks)[a] *Summary test 4 C-C* (3 weeks)[a] *Multiple-choice test 4 P-S* (3 weeks)[a] *Multiple-choice test 4 C-C* (3 weeks)[a]	

(*continued*)

TABLE 3
Summary of Expository Text Structure Study Findings (*continued*)

Study, design, and intervention	Measures and findings: Posttest	Measures and findings: Maintenance	Measures and findings: Transfer
Weisberg & Balajthy (1989) • T (text structure): Focus on why recognition of specific organizational patterns in text can improve comprehension, how to recognize signal words cuing C-C information, and taught explicit rules and modeling for constructing GO and writing summaries (*n* = 16) • C (no instruction): Focus on alternative comprehension instruction and teacher-led discussion of short stories (*n* = 16) Quasi-experimental (students in a reading class) Treatment fidelity: NR			*GO of nonadapted social studies passage of C-C structure* (1 month): • T vs. C, low prior knowledge, ES = 1.26 • T vs. C, moderate prior knowledge, ES = 1.25 *Writing summary quality* (1 month): • T vs. C, low prior knowledge, ES = 1.93 • T vs. C, moderate prior knowledge, ES = 1.65 *Comprehension test* (1 month): • T vs. C, low prior knowledge, ES = 0.07 • T vs. C, moderate prior knowledge, ES = 0.84
Wijekumar, Meyer, & Lei (2012) • T (ITSS): Focus on signaling words in a passage, identify each of the 5 text structures in each topic domain, and construct a main idea for the passage with ITSS modeling, providing practice tasks, assessments, feedback, and scaffolding as a partial substitute of the language arts curriculum (*n* = 65 classrooms) • C (no instruction): Focus on the same language arts curriculum for the same time and duration as T in that school (*n* = 65 classrooms) Experimental (classrooms randomly assigned to condition within schools) Treatment fidelity: Observations (*n* = 2) of T and C classrooms conducted weekly and computer usage logs on ITSS reviewed	*GSRT*: T vs. C, ES = 0.32 *Signaling test*[a] *Main idea quality*[a] *Comparison competency*: T vs. C, ES = 0.43 *P-S competency*: T vs. C, ES = 0.47		*Comparison total recall* (rats; given at posttest): T vs. C, ES = 0.31 *P-S total recall* (rats; given at posttest): T vs. C, ES = 0.56

(*continued*)

TABLE 3
Summary of Expository Text Structure Study Findings (*continued*)

Study, design, and intervention	Measures and findings: Posttest	Maintenance	Transfer
Williams et al. (2005) • T (text structure): Focus on structure of text: clue words, trade book reading and discussion, vocabulary development, reading and analysis of target paragraph, GO, C-C strategy questions, summary writing, and lesson review (*n* = 51) • C (no instruction): Business as usual (*n* = 25) Experimental (classrooms randomly assigned to condition; conditions blocked by school: *n* = 3) Treatment fidelity: Observations (*n* = 2) of T = 77% of components taught	*Strategy:* • Recalling clue words[a] • Locating clue words[a] • GO sentence generation—oral: T vs. C, ES = 1.59 • GO sentence generation—written: T vs. C, ES = 1.47 • Recall of C-C questions: T vs. C, ES = 1.51 • Information web/GO of content: T vs. C, ES = −0.26 *Structure:* • Written summary of C-C: T vs. C, ES = 1.29 *Content:* • Vocabulary concepts[a] and detail questions: T vs. C, ES = 1.00		*Structure* (given at posttest, oral summary): • Immediate transfer (taught and nontaught animals)[a] • Near transfer (nontaught animals)[a] • Far transfer (nonanimal content)[a] • Structure P-C transfer (animals)[a]
Williams et al. (2007) • T (text structure): Focus on text structure: clue words, vocabulary, questions, biographies and trade books, GO, reading and analysis of C-E target paragraph, and lesson review (*n* = 60) • C (no instruction): Business as usual (*n* = 60) Experimental (classrooms and teachers randomly assigned to condition; conditions blocked by school: *n* = 3; 12 students from each classroom randomly selected for the statistical analysis) Treatment fidelity: Observations (*n* = 10) of T = 100% of sections taught, except 30% of review section taught	*WRMT–R Word Identification:* T vs. C, ES = −0.32 *WRMT–R Passage Comprehension:* T vs. C, ES = 0.06 *Strategy:* • Locating clue words,[a] underlining clauses,[a] and completing the GO of C-E: T vs. C, ES = 1.28 • Recalling C-E questions: T vs. C, ES = 1.13 *Content*[a] *Comprehension:* Written (1:1 C-E): • Noncausal question: T vs. C, ES = 1.84 • Cause question: T vs. C, ES = 1.04 • Effect question: T vs. C, ES = 1.53		*Comprehension* (given at posttest, oral): • Near transfer (1:multiple C-E; games): Noncausal question,[a] cause question,[a] and effect question[a] • Far transfer (1:multiple C-E; unrelated topic): Noncausal question,[a] cause question,[a] and effect question[a] • Authentic less structured text (1:multiple C-E): Noncausal question,[a] cause question,[a] and effect question[a] • Authentic less structured text (1:1 C-E): Noncausal question,[a] cause question,[a] and effect question[a]

(*continued*)

TABLE 3
Summary of Expository Text Structure Study Findings (*continued*)

	Measures and findings		
Study, design, and intervention	**Posttest**	**Maintenance**	**Transfer**
Williams et al. (2009) • T (text structure): Focus on structure of text: clue words, trade book reading and discussion, vocabulary development, reading and analysis of target paragraph, GO/matrix, C-C questions, summary writing, and lesson review (*n* = 67) • C (no instruction): Business as usual (*n* = 74) Experimental (teachers randomly assigned to condition; conditions blocked by school: *n* = 4) Treatment fidelity: Observations (*n* = 1) of T = 79% of components taught; inter-rater reliability = 97%	*Identification:* • Fact paragraph[a] • C-C paragraph[a] *Strategy:* • Recalling C-C clue words[a] • Recalling C-C questions: T vs. C, ES = 1.81 • GO/matrix: T vs. C, ES = 3.49 • Locating P-C clue words[a] • GO/Informational Web of content: T vs. C, ES = 1.86 *Comprehension:* • Free summary—Written C-C text: T vs. C, ES = 2.67 • Oral mixed text C-C[a] • Oral mixed text P-C[a] • Oral animals C-C text[a] • Prompted summary—Written C-C text: T vs. C, ES = 3.24 • Oral mixed text C-C[a] • Oral mixed text P-C[a] • Oral animals C-C text[a] • Oral descriptive text: Prompted description summary[a] *Content*[a]		*Transfer: Free summary* (given at posttest, oral): • Transfer C-C text (different animals): T vs. C, ES = 4.09 • Transfer C-C text (different topics): T vs. C, ES = 1.52 • All P-C text: T vs. C, ES = 2.22 • Authentic text: T vs. C, ES = 1.07 *Transfer: Prompted summary* (given at posttest, oral): • Transfer C-C text (different animals): T vs. C, ES = 4.91 • Transfer C-C text (different topic): T vs. C, ES = 2.56 • All P-C text: T vs. C, ES = 2.03 • Authentic text: T vs. C, ES = 4.36

(*continued*)

TABLE 3
Summary of Expository Text Structure Study Findings (*continued*)

	Measures and findings		
Study, design, and intervention	**Posttest**	**Maintenance**	**Transfer**
Williams et al. (2014) • T (text structure): Focus on C-E text structure: C-E clue words, questions, C-E GO, reading and analysis of C-E target paragraphs, trade book reading and discussion, vocabulary, community chart, and lesson review (*n* = 86) • C (no instruction): Business as usual (*n* = 48) Experimental (classrooms and teachers randomly assigned to condition; conditions blocked by school: *n* = 3) Treatment fidelity: Observations (*n* = 2) of T = most lesson parts taught, except for the lesson review; fidelity considered satisfactory because teachers told to use lessons as a general guideline rather than as a script	*WRMT–R Word Identification*: T vs. C, ES = −0.01 *WRMT–R Passage Comprehension:* T vs. C, ES = 0.09 *Strategy:* • Recalling clue words[a] and recalling C-E questions: T vs. C, ES = 2.02 • Completing the GO of C-E: T vs. C, ES = 1.55 • Underlining clauses of C-E: T vs. C, ES = 1.65 • Completing the web GO of content: T vs. C, ES = 1.22 *Content*[a] *Sentence combination*[a] *Comprehension:* • Explicit teaching: T vs. C, ES = 1.48 • Cause question: T vs. C, ES = 1.82 • Effect question: T vs. C, ES = 2.05 • Noncausal question: T vs. C, ES = 0.79	*Strategy* (after summer break): • Recalling clue words[a] and recalling C-E questions: T vs. C, ES = 1.09 • Underlining clauses of C-E: T vs. C, ES = −0.44 *Content* (after summer break)[a] *Sentence combination:* • Sentence combination—with pictures: T vs. C, ES = 2.52 • Sentence combination—listening: T vs. C, ES = 2.31 • Sentence combination—reading: T vs. C, ES = 1.82	*Transfer: Comprehension:* • Oral (games; given at posttest): T vs. C, ES = 1.71 • Oral (games; after summer break): T vs. C, ES = 0.53 • Written (celebrations): T vs. C, ES = 1.86 • Authentic text: T vs. C, ES = 1.77

Note. AR = at risk; BG = below-grade-level readers; C = control condition; C1 = control 1 condition; C2 = control 2 condition; C-C = compare-and-contrast; C-E = cause-and-effect; Ch = choice; E = elaborated feedback; ES = effect size; GO = graphic organizer; Gates–MacGinitie = Gates–MacGinitie Comprehension Subtest, Level 3, Form T; GSRT = Gray Silent Reading Test; HA = higher ability readers; ITSS = Intelligent Tutoring of the Structure Strategy (self-paced); MC = multiple choice; NC = no choice; NR = not reported; P-C = pro-and-con; P-S = problem-and-solution; S = simple feedback; T = treatment condition; T1 = treatment 1 condition; T2 = treatment 2 condition; TP = typical performers; WRMT–R = Woodcock Reading Mastery Test–revised. Standardized measures are the GSRT, Gates–MacGinitie, and WRMT–R. The numbers reported are those reflected in the analysis. Italics represent the measure or measurement domain.
[a]This outcome is included in the analysis but excluded in the table due to limited space.

TABLE 4
Results of Analyses Examining the Overall Effect of Text Structure on Comprehension-Related Outcomes

Outcome	k	Cohen's d: Fixed (random)	95% confidence interval		Q_b: Fixed (random)
			Low estimate	High estimate	
Study quality					20.34*** (3.23)
• High quality (*n* = 6)	22	0.65*** (0.70***)	0.54 (0.42)	0.76 (0.98)	
• Not high quality (*n* = 13)	26	1.00*** (1.13***)	0.90 (0.75)	1.11 (1.51)	*Q*
Studies (*n* = 19)	48	0.83*** (0.95***)	0.76 (0.71)	0.91 (1.19)	424.19***

***$p < .001$.

structures, such as modeling, scaffolding, corrective feedback, increasingly complex texts, and clue word recognition to teach compare-and-contrast, problem-and-solution, cause-and-effect, sequence, description, enumeration, and pro-and-con text structures. Increasingly rigorous instructional tasks with progress monitoring was also used to teach compare-and-contrast, problem-and-solution, cause-and-effect, sequence, description, and pro-and-con text structures. Graphic organizers were used to teach all eight text structures addressed in this review. There is little known about what instructional features might be used to effectively teach a position-and-reason text structure. Moreover, in half of the studies, it is not entirely clear what instructional features were included in text structure interventions. To illustrate, researchers used the term *explicit instruction* in 10 studies when describing their intervention. Explicit instruction is a global construct that may include from seven (see Reutzel, Child, Jones, & Clark, 2014) to 16 instructional features (see Archer & Hughes, 2011).

The control conditions varied from a focus on extra time for reading passages (Spires, Gallini, & Riggsbee, 1992), to business-as-usual instruction using the district's language arts curriculum (Wijekumar et al., 2012), to an alternative treatment, such as a reading intervention without expository text structure instruction (Reutzel, Smith, & Fawson, 2005).

In 11 of the 21 studies, researchers implemented the text structure intervention from one to four months and, in three studies, for 6 months. In 20 of the 21 studies, researchers provided either the number of sessions ($\overline{X} = 21$ sessions; range = 1–65 sessions) or the number of hours ($\overline{X} = 18$ hours; range = 1.5–97.5 hours) that students received the intervention. Researchers implemented less than 10 instructional sessions in seven studies, between 11 and 20 sessions in four studies, and more than 21 sessions in nine studies. Researchers in one study did not report the number of intervention sessions implemented. Researchers implemented interventions less than 10 hours in eight studies, between 11 and 20 hours in five studies, and more than 21 hours in four studies. Researchers in four studies did not report hours of intervention. Overall, intervention sessions were implemented one to three times per week for 20–50 minutes.

Teachers implemented the intervention most frequently (*n* = 12 studies), whereas online tutors delivered Web-based instruction in four studies. In the remaining studies, either researchers (*n* = 2 studies) or a combination of researchers, teachers, and student leaders (*n* = 3 studies) delivered instruction.

Meta-Analytic Findings

The unadjusted effects of text structure type on comprehension-related outcomes ranged from −0.88 to 16.98 (see Table 3 for a summary of the study findings). Using fixed-error assumptions, the weighted mean *d* index was 0.83 (95% CI [0.76, 0.91]) and was significantly different from zero (see Table 4 for the analysis of the overall effect). With a random-errors model, the weighted average *d* index was 0.95 (95% CI [0.71, 1.19]) and was significantly different from zero. The tests of the distribution of *d* indexes revealed that we could reject the hypothesis that the effects were estimating the same underlying population value, $Q(47) = 424.19$, $p < .001$.

Outcome Measures

A separate analysis was conducted for each outcome measure category (see Table 5): outcome measure type (researcher developed or standardized), researcher-developed measures (answering comprehension questions, completing a graphic organizer, recalling/summarizing information [oral or written], and identifying text structures), measure of the NAEP cognitive target (locate/recall, integrate/interpret, or critique/evaluate), and measure type (a posttest, a maintenance test, or a transfer test).

Effect sizes were grouped by studies that included researcher-developed outcome measures (*k* = 46), such as a free-recall measure, or standardized outcome measures (*k* = 9), such as the Woodcock Reading Mastery Test–Revised (Woodcock, 1987). Under both fixed-error assumptions and random-error assumptions, the

TABLE 5
Results of Outcome Measure Analysis

Outcome	k	Cohen's d: Fixed (random)	95% confidence interval		Q_b: Fixed (random)
			Low estimate	High estimate	
Outcome measure type					76.14*** (34.48***)
• Researcher developed	46	0.85*** (1.00***)	0.78 (0.75)	0.93 (1.26)	
• Standardized	9	0.10 (0.11)	−0.05 (−0.05)	0.25 (0.26)	
Measure category					43.10*** (5.92)
• Comprehension questions	24	0.93*** (1.08***)	0.83 (0.68)	1.03 (1.48)	
• Graphic organizer	6	1.71*** (2.15***)	1.47 (1.18)	1.94 (3.13)	
• Recall/summarization	23	0.86*** (0.97***)	0.75 (0.65)	0.98 (1.29)	
• Text structure specific measure	19	0.84*** (1.37***)	0.69 (0.76)	0.98 (1.98)	
NAEP measure type					28.34*** (0.37)
• Locate/recall	39	0.75*** (1.06***)	0.67 (0.77)	0.83 (1.34)	
• Integrate/interpret	22	1.19*** (1.23***)	1.05 (0.74)	1.32 (1.72)	
Measure type					13.98** (2.73)
• Posttest	39	0.86*** (0.99***)	0.77 (0.69)	0.95 (1.29)	
• Maintenance	17	0.66*** (0.73***)	0.51 (0.43)	0.82 (1.02)	
• Transfer	16	1.03*** (1.13***)	0.91 (0.69)	1.15 (1.56)	

Note. NAEP = National Assessment of Educational Progress. No studies included NAEP measures of critique/evaluate.
$^{**}p < .01$. $^{***}p < .001$.

effect of expository text structure interventions on comprehension was significantly different from zero for researcher-developed outcome measures but not for standardized outcome measures. In the fixed-errors model, the weighted mean *d* index was significantly higher for researcher-developed outcome measures ($d = 0.85$, 95% CI [0.78, 0.93]) than for standardized outcome measures ($d = 0.10$, 95% CI [−0.05, 0.25]), $Q(1) = 76.14$, $p < .001$. Similarly, in the random-errors model, the weighted mean *d* index was significantly higher for researcher-developed outcome measures ($d = 1.00$, 95% CI [0.75, 1.26]) than for standardized outcome measures ($d = -0.05$, 95% CI [−0.05, 0.26]), $Q(1) = 34.48$, $p < .001$.

For each study, the researcher-developed measures were then categorized as those that primarily focused on answering comprehension questions ($k = 24$), completing a graphic organizer ($k = 6$), recalling/summarizing information ($k = 23$), and identifying text structures ($k = 19$). Under fixed-error assumptions, the effect of expository text structure interventions on comprehension was significantly different from zero for measures of answering comprehension questions, completing a graphic organizer, recall/summarization, and text structure–specific measures. In the fixed-errors model, the weighted mean *d* index was significantly higher for completing graphic organizers (e.g., Venn diagrams, flowcharts; $d = 1.71$, 95% CI [1.47, 1.94]) than for the other outcome measure types, $Q(3) = 43.10$, $p < .001$. However, large effect sizes were also found for measures that included comprehension questions, recall/summarization, and text structure measures. No significant differences were evident under random-error assumptions.

When the outcome measures were divided into the NAEP cognitive targets, large effect sizes were found on measures of integrate/interpret ($k = 22$), and medium effects were found on measures of locate/recall ($k = 39$), but both the large and medium effects were not significantly different under random-error assumptions. In the fixed-errors model, the weighted mean *d* index was significantly higher for integrate/interpret ($d = 1.19$, 95% CI [1.05, 1.32]) than for the locate/recall measure types, $Q(1) = 28.34$, $p < .001$. Similarly, medium to large effect sizes, although not significantly different, were found on posttest ($k = 39$), maintenance ($k = 17$), and transfer measures ($k = 16$). In the fixed-errors model, the weighted mean *d* index was significantly higher for transfer ($d = 1.03$, 95% CI [0.91, 1.15]) than for the posttest and maintenance measure types, $Q(2) = 13.98$,

p < .01. No significant differences were evident under random-error assumptions.

Publication Bias

A trim-and-fill analysis was used to examine whether publication bias impacted the conclusions (see Table 6). When looking for studies to the left of the mean, one study was trimmed from the fixed-effects model, resulting in a slightly reduced magnitude, and no studies were trimmed from the random-effects model. When looking for studies to the right of the mean, no studies were trimmed from the fixed-effect model, and five studies were trimmed from the random-effects model, resulting in a slightly increased magnitude. Overall, after adjusting for publication bias, the summary effect of text structure interventions on comprehension remained positive and significantly different from zero.

Moderator Analyses

Because there was heterogeneity among the study results, we examined whether the magnitude of the effect of expository text structure interventions on comprehension-related outcomes was moderated by the number of text structures taught, type of implementer, grade level of students, learner classification, and intervention dosage. We found that the number of text structures taught, type of implementer, grade level of students, and intervention dosage significantly moderated the effect of expository text structure interventions on comprehension-related outcomes under both fixed- and random-effects assumptions. These variables are subsequently discussed. However, the learner classification was only significant under the fixed-error assumptions; thus, it is not reported. For a summary of all moderator results, see Table 7.

Number of Text Structures Taught

For number of text structures taught, effect sizes were grouped by studies including one text structure (k = 14), two text structures (k = 12), and three or more text structures (k = 21) taught during the intervention. With the fixed- and random-error models, the effect of expository text structure interventions on comprehension was significantly different from zero for one, two, and three or more text structures taught. Under fixed-error assumptions, the weighted mean d index was significantly higher for two text structures taught (d = 1.36, 95% CI [1.19, 1.52]) than for one text structure taught (d = 1.12, 95% CI [0.96, 1.27]) and three or more text structures taught (d = 0.45, 95% CI [0.34, 0.56]), $Q(2)$ = 98.78, p < .001. Conversely, under random-error assumptions, the weighted mean d index was significantly higher for one text structure taught (d = 1.49, 95% CI [1.02, 1.95]) than for two text structures taught (d = 1.14, 95% CI [0.55, 1.74]) and three or more text structures taught (d = 0.51, 95% CI [0.27, 0.75]), $Q(2)$ = 15.13, p < .01.

Type of Implementer

For type of implementer, effect sizes were grouped by studies into those having a researcher (k = 2), a teacher (k = 31), or a computer/online tutor (k = 14) provide the intervention. With the fixed- and random-error models, the effect of expository text structure interventions on comprehension was significantly different from zero for researchers, teachers, and computer/online tutors. Under fixed-error assumptions, the weighted mean d index was significantly higher for researchers (d = 1.71, 95% CI [1.14, 2.29]) than for teachers (d = 1.00, 95% CI [0.91/1.10]) and computer/online tutors (d = 0.37, 95% CI [0.22, 0.52]), $Q(2)$ = 60.06, p < .001. Similarly, under random-error assumptions, the weighted mean d index was significantly higher for researchers (d = 1.78, 95% CI [0.54, 3.01]) than for teachers (d = 1.21, 95% CI [0.88, 1.55]) and computer/online tutors (d = 0.37, 95% CI [0.22, 0.52]), $Q(2)$ = 24.61, p < .001.

Grade Level

For grade level, effect sizes were grouped by studies including elementary (grades K–5; k = 25), secondary (grades 6–12; k = 13), or mixed grades (inclusive of elementary and secondary; k = 10). With the fixed- and random-error models, the effect of expository text structure interventions on comprehension was significantly

TABLE 6
Trim-and-Fill Publication Bias Analysis

Looking for missing studies	FE trim-and-fill	RE trim-and-fill
To the left of the mean	1 study trimmed • FE: Cohen's d = 0.83, 95% CI [0.75, 0.91] • RE: Cohen's d = 0.93, 95% CI [0.69, 1.17]	0 studies trimmed
To the right of the mean	0 studies trimmed	5 studies trimmed • FE: Cohen's d = 0.97, 95% CI [0.89, 1.04] • RE: Cohen's d = 1.08, 95% CI [0.83, 1.33]

Note. CI = confidence interval; FE = fixed effect; RE = random effects.

TABLE 7
Results of Moderator Analyses

Moderator	k	Cohen's d: Fixed (random)	95% confidence interval		Q_b: Fixed (random)
			Low estimate	High estimate	
Number of text structures taught					98.78^{***} (15.13^{**})
• One	14	1.12^{***} (1.49^{***})	0.96 (1.02)	1.27 (1.95)	
• Two	12	1.36^{***} (1.14^{***})	1.19 (0.55)	1.52 (1.74)	
• Three or more	21	0.45^{***} (0.51^{***})	0.34 (0.27)	0.56 (0.75)	
Type of implementer					60.06^{***} (24.61^{***})
• Researcher	2	1.71^{***} (1.78^{*})	1.14 (0.54)	2.29 (3.01)	
• Teacher	31	1.00^{***} (1.21^{***})	0.91 (0.88)	1.10 (1.55)	
• Online tutor	14	0.37^{***} (0.37^{***})	0.22 (0.22)	0.52 (0.52)	
Grade level					35.40^{***} (12.79^{**})
• Elementary	25	1.03^{***} (1.20^{***})	0.93 (0.82)	1.14 (1.58)	
• Secondary	13	0.63^{***} (0.85^{**})	0.50 (0.47)	0.77 (1.23)	
• Mixed	10	0.41^{***} (0.41^{***})	0.18 (0.17)	0.64 (0.66)	
Learner classification					7.67^{*} (1.55)
• Typical achiever	18	1.09^{***} (1.12^{***})	0.97 (0.75)	1.21 (1.59)	
• At risk	7	0.99^{***} (1.28^{***})	0.82 (0.69)	1.15 (1.88)	
• Learning disabilities	4	1.65^{***} (1.70^{***})	1.21 (0.97)	2.10 (2.44)	
Intervention dosage					78.76^{***} (23.64^{***})
• 10 hours or less	11	0.58^{***} (0.80^{**})	0.43 (0.33)	0.73 (1.26)	
• 11–20 hours	17	1.21^{***} (1.59^{***})	1.09 (1.10)	1.33 (2.08)	
• 21 hours or more	13	0.35^{***} (0.35^{***})	0.17 (0.17)	0.52 (0.52)	

$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

different from zero for elementary, secondary, and mixed grades. Under fixed-error assumptions, the weighted mean d index was significantly higher for elementary (d = 1.03, 95% CI [0.93, 1.14]) than for secondary (d = 0.63, 95% CI [0.50, 0.77]) and mixed grades (d = 0.41, 95% CI [0.18, 0.64]), $Q(2) = 35.40$, $p < .001$. Similarly, under random-error assumptions, the weighted mean d index was significantly higher for elementary (d = 1.20, 95% CI [0.82, 1.58]) than for secondary (d = 0.85, 95% CI [0.47, 1.23]) and mixed grades (d = 0.41, 95% CI [0.17, 0.66]), $Q(2) = 12.79$, $p < .01$.

Intervention Dosage

For intervention dosage, effect sizes were grouped by studies including low (k = 11), moderate (k = 17), or high (k = 13) dosage of intervention. Studies with the intervention lasting from one to 10 hours were classified as low, from 11 to 20 hours as moderate, and more than 21 hours as high. With the fixed- and random-error models, the effect of expository text structure interventions on comprehension was significantly different from zero for low, moderate, and high dosage of intervention. Under fixed-error assumptions, the weighted mean d index was larger for moderate-dosage studies (d = 1.21, 95% CI [1.09, 1.33]) than for low- (d = 0.58, 95% CI [0.43, 0.73]) and high-dosage studies (d = 0.35, 95% CI [0.17, 0.52]), $Q(2) = 78.76$, $p < .001$. Similarly, under random-error assumptions, the weighted mean d index was larger for moderate-dosage studies (d = 1.59, 95% CI [1.10, 2.08]) than for low- (d = 0.80, 95% CI [0.33, 1.26]) and high-dosage studies (d = 0.35, 95% CI [0.17, 0.52]), $Q(2) = 23.64$, $p < .001$.

Synthesis of Two Additional Studies

Two studies did not provide sufficient data for the meta-analysis conducted on the other 19 studies. The researchers in these two studies examined pretest–posttest gains for students' comprehension following expository text structure interventions (Alvermann & Boothby, 1983; Armbruster et al., 1987). Armbruster et al. and Alvermann and Boothby reported gains in comprehension outcomes for the treatment condition in comparison with the control condition, suggesting that typically performing students and higher performers are responsive to expository text structure interventions, thus corroborating the effects from this meta-analysis.

Discussion

In this systematic review of 21 studies, we analyzed the effects of expository text structure interventions on comprehension outcomes of typically achieving students, at-risk students, and students with LD in grades K–12. Overall, we found that expository text structure interventions produced a large effect on reading comprehension and that high-quality studies resulted in significant but less robust effect sizes than non-high-quality studies. Further, we found that the number of text structures taught, type of implementer, grade level of students, and dosage significantly moderated the effect of expository text structure interventions on comprehension-related outcomes under both fixed- and random-effects assumptions. We discuss these findings within the complex interaction among text, reader, and context in reading comprehension (Duke & Carlisle, 2011; Kintsch, 2004). Specifically, we expand on the findings relative to expository text structure intervention features (context), expository text structure types (text), students' responsiveness (reader) to expository text structure interventions, and the comprehension measure types administered to evaluate students' reading comprehension.

Expository Text Structure Intervention Features

In this review, we replicate and expand the findings from earlier reviews (Dickson et al., 1995; Gajria et al., 2007; Gersten et al., 2001; Meyer & Ray, 2011; Ray & Meyer, 2011), that teaching students to recognize text structures helps students understand expository text. It is likely that critical instructional features in text structure instruction include adapting and scaffolding instruction combined with instructional feedback so the instruction is tailored to students' performance level.

In several studies, researchers used a gradual release approach to scaffold instruction. Researchers of high-quality studies decreased the supports available as students progressed in the lessons (Reutzel et al., 2005; Williams et al., 2007, 2014). For example, Reutzel et al. structured their interventions so teachers gradually released cognitive comprehension strategies to their students. Reutzel et al. reported significantly greater gains in comprehension for students who were taught text structures using a gradual release approach than for students whose training did not include text structure instruction.

Another scaffolding technique is to use increasingly complex expository texts as students improve their use of the text structure strategy (e.g., Williams et al., 2014). Following this instruction, students worked with the same text structures embedded in more complex text. Shanahan et al. (2010) suggested that during initial instruction, teachers should use texts that contain familiar topics so students have sufficient background knowledge and can focus on the text structure strategy. After this, teachers might gradually transition to texts containing less familiar topics. This approach to text structure instruction may provide the scaffolding that is particularly effective for students with LD (Snider, 1989). Overall, it is unclear whether using one of these scaffolding strategies is more effective than others in expository text structure instruction.

Clue word, or signal word, instruction was also included in many high-quality studies in this review and may be a critical feature of expository text structure instruction (e.g., Meyer et al., 2010; Wijekumar et al., 2012; Williams et al., 2007). Importantly, based on our analysis, it is not evident whether other instructional features are necessary to efficiently teach students to use text structures to improve their comprehension skills. As noted earlier, many researchers used the term *explicit instruction* to describe their intervention. Because this term is used in a variety of ways by various researchers (e.g., Archer & Hughes, 2011; Reutzel et al., 2014), it is uncertain exactly what instructional features researchers employed in many of the studies.

Expository Text Structure Types

Researchers investigated the effects of teaching up to eight expository text structure types across the corpus of studies. Overall, compare-and-contrast was taught most often, and the four other commonly taught text structures were description, cause-and-effect, problem-and-solution, and sequence. The text structures taught varied across content and grade spans. In the elementary grades, cause-and-effect text structure was taught most often using social science content, whereas compare-and-contrast text structure was taught most often using science content. Whereas, in the secondary grades, compare-and-contrast text structure was taught most often using social science content, description text structure was taught most often using science content. There is a lack of research evaluating position-and-reason, pro-and-con, and enumeration text structures.

One strategy for organizing text structure instruction might be to begin with highly structured text structures that are easily identified, and then gradually introduce more complex text structures. Meyer and Freedle (1984) suggested that instruction may progress in the following sequence: description, cause-and-effect, problem-and-solution, and compare-and-contrast. Akhondi, Malayeri, and Samad (2011) also suggested that instruction should begin with description and end with compare-and-contrast text structure because most textbooks are organized in this manner. As more complex text structures are introduced, teachers might increase complexity by compounding the number and type of text structures encountered in a single text (Meyer & Ray, 2011; Shanahan et al., 2010).

However, researchers have varied in their recommendations for which expository text structure type is easiest for students to learn. Englert and Hiebert (1984) suggested that enumeration and sequence are the easiest text structures for students to learn because they are similar to the time-based structures found in narratives and therefore are more familiar to students. In contrast, other researchers reported that teaching enumeration text structure resulted in poor comprehension outcomes because it is less structured (Meyer & Freedle, 1984; Sanders & Noordman, 2000). Ray and Meyer (2011) concluded in their review that cause-and-effect, problem-and-solution, and compare-and-contrast are highly structured and more easily identifiable text structures, making them more desirable for expository text structure interventions. In contrast, Englert and Hiebert found that compare-and-contrast was the hardest text structure for students to learn.

Finally, it is not clear whether initial instruction on one text structure type results in higher comprehension outcomes than teaching another text structure type. In this review, we could not statistically analyze the relative effectiveness of the various text structure types on comprehension of expository text because there are only nine studies in which researchers taught a single text structure. In three studies, researchers taught cause-and-effect text structure, and in three other studies, researchers taught compare-and-contrast text structure. In the remaining studies using a single text structure, researchers taught a description, enumeration, or problem-and-solution text structure.

Our analysis suggests that graphic organizers were used to teach the eight expository text structures reviewed. Researchers also used modeling, scaffolding, corrective feedback, increasingly complex texts, increasingly rigorous instructional tasks with progress monitoring, and clue word recognition to teach expository text structures, with the exception of position-and-reason text structure. Interestingly, we found that teaching one or two types of expository text structures resulted in large effects on comprehension measures, whereas teaching three or more text structures resulted in small effects on comprehension measures. This finding should be interpreted cautiously, however, because the type of text structures taught and the order in which they are taught may vary based on content area (e.g., cause-and-effect as a critical text structure in social studies, compare-and-contrast as a critical text structure in science). Cause-and-effect and compare-and-contrast were the most commonly taught expository text structures perhaps because these two text structures are most recognizable and familiar. Thus, teaching cause-and-effect and compare-and-contrast text structures may result in larger effects.

It is important to recognize that expository text often includes multiple text structures within one text. This requires students to identify various text structures to derive meaning from different text organizations. Examination of texts within a discipline may uncover variation of expository text structures depending on the type of text. This variation of text structures may increase the overall complexity of the text and moderate students' comprehension. For instance, a social science textbook may include cause-and-effect, compare-and-contrast, and sequence text structures organized in a narrative, story presentation of historical events. Other social science texts, such as legal documents and primary accounts, may be dominated by description and position-and-reason text structures. Teachers must take into account the variation of text structures embedded within the various texts employed in a particular discipline and teach the text structures that align to those texts. Research comparing the effects of teaching individual text structure types in various content areas is needed to better understand whether teaching a particular text structure type results in larger effects on students' comprehension than teaching another text structure type, whether comprehension outcomes increase when students learn about additional text structures, and whether teaching one text structure mediates the time required to teach additional text structures.

Type of Implementer

Researcher-implemented text structure interventions produced larger effects than teacher-implemented text structure interventions or online tutor interventions. Importantly, this conclusion is based on only two studies that included two effect sizes in which researchers implemented text structure interventions. However, this has been a common finding of intervention research. For example, Gajria et al. (2007) and Scruggs, Mastropieri, Berkeley, and Graetz (2010) reported that researcher-implemented interventions resulted in larger effect sizes than teacher-implemented interventions. To improve teacher-implemented expository text structure interventions, teachers must receive targeted training to ensure that they recognize the various text structure types in expository text and that they use instructional strategies that are supported in the available research (Duke et al., 2011; Meyer & Ray, 2011). Researchers have shown that teachers can learn to more accurately identify expository text structures in as few as two hours of training (Reutzel, Jones, Clark, & Kumar, 2016).

We also found that computer-based text structure instruction resulted in a smaller effect size than researcher- or teacher-delivered text structure interventions. Gajria et al. (2007) also found that when instructional delivery involved a computer or multimedia tool, the effect size was smaller than either a researcher- or teacher-delivered intervention. Importantly, we found only four studies that included 14 effect sizes in which researchers used online delivery for text structure instruction. Although the overall effect size for online tutor interventions was small, well-designed online instruction can produce improved outcomes relative to typical, teacher-delivered language arts instruction. For example, in a high-quality study, Wijekumar et al. (2012) used online tutoring as a partial substitute for the standard language arts curriculum and found small effects on a standardized measure and small to medium effects on researcher-developed measures. More research is needed, however, that directly compares computer-delivered text structure instruction with person-delivered (teacher or researcher) text structure instruction with the same instructional design features to draw further conclusions about the effectiveness of expository text structure interventions when implemented online or in person.

Intervention Dosage

Researchers who designed their intervention with moderate dosage (i.e., 11–20 hours) had large effect sizes on students' comprehension, researchers who provided low-dosage interventions (i.e., 10 or fewer hours) had medium effect sizes, and high-dosage interventions (i.e., 21 or more hours) had small effects. Importantly, in three of the high-quality studies, researchers provided a moderate dosage (Wijekumar et al., 2012; Williams et al., 2007, 2014), and in three other high-quality studies, researchers provided a high-dosage intervention (Meyer et al., 2010, 2011; Reutzel et al., 2005). In reviews of other reading interventions, researchers also found that shorter interventions demonstrated larger effects than longer interventions for students at risk and students with LD (Elbaum, Vaughn, Hughes, & Moody, 2000; Scruggs et al., 2010). Overall, the high-quality studies resulted in no effect to a medium effect size on standardized measures of comprehension, so any conclusion regarding the dosage of intervention should be approached cautiously.

It is likely that other variables interact with the intervention dosage to influence the effectiveness of the intervention. Some of these variables may include how the intervention is designed, the scope and sequence of topics throughout a curriculum, the other skills that might be taught concurrent with a target skill, instructional and task supports, instructional group size, and the frequency and duration of the intervention. Additional research is needed to investigate what combination of intervention dosage and other variables result in the largest effect sizes on students' comprehension.

Students' Responsiveness

In the moderator analysis, we found that expository text structure interventions resulted in large effects on comprehension measures with students in the elementary grades, medium effects on comprehension measures with students in the secondary grades, and small effects on comprehension measures with students in mixed grades. Researchers have found that effect sizes on standardized tests of reading have shown to decline as students move from early to later grades (Bloom, Hill, Black, & Lipsey, 2008). Although this finding aligns with Shanahan et al.'s (2010) recommendation to explicitly teach expository text structures in the elementary grades, it should be interpreted cautiously because there were no high-quality studies identified at the secondary grades.

Large effect sizes for text structure interventions were observed across all learners (i.e., typical achievers, students at risk, students with LD). Although the largest mean-weighted effect size on comprehension outcomes was found with students with LD, it should be interpreted cautiously because it is based on only four effect sizes, and none of the studies that included students with LD were identified as high quality. However, Edmonds et al. (2009) and Scammacca et al. (2007) reported in their reviews of reading interventions that students with LD showed higher effect sizes across reading outcome measures than the studies with students at risk, struggling readers and the studies with combined students at risk and students with LD.

Measures

There is a substantial difference between comprehension outcomes on researcher-developed measures and standardized measures. In high-quality studies, no effect to large effect sizes on researcher-developed measures were reported, favoring expository text structure instruction. Given the short-term nature of the research reviewed (interventions ranged from one day to six months, or 1.5–97.5 hours), it is not surprising that the effects of expository text structure interventions did not appear to generalize to broader, standardized measures of comprehension. This has been common in intervention research conducted over a relatively short period of time (Swanson, Hoskyn, & Lee, 1999). Elleman, Lindo, Morphy, and Compton (2009) found a similar effect of vocabulary interventions on comprehension of students in grades pre-K–12. The authors explained that designing standardized measures that are sensitive enough to detect short-term growth will greatly improve our understanding of effective interventions and, possibly, effects from long-term interventions. Finally, more research is needed on interventions longer than 21 hours using standardized measures to evaluate outcomes.

Further, standardized comprehension measures tend to be reader-based measures, as they assess a reader's ability to correctly answer passage-independent items (Keenan & Betjemann, 2006) or a reader's decoding or listening comprehension (Keenan, Betjemann, & Olson, 2008). It may be that standardized comprehension measures are not as sensitive to instruction on expository text structures and to a reader's growth on constructing the textbase (microstructure and macrostructure) representation, especially as readers move up in grades.

We explored students' performance on four types of researcher-developed measures (i.e., comprehension questions, graphic organizer, recall/summarization, text structure–specific measures) to understand whether expository text structure interventions produced more favorable results on a specific type of measure. It is interesting that researchers who used graphic organizers to measure outcomes produced the largest effect sizes. Importantly, researchers in two of the high-quality studies used graphic organizers to measure the effects of expository text structure instruction on comprehension (Williams et al., 2007, 2014). Graphic organizers might show large effects because readers visually represent the text information and then may reflect on the relations among these ideas. Substantial evidence suggests that identifying the big ideas in a text and graphically representing the meanings and relation of the ideas improves students' recall and comprehension of text (National Reading Panel, 2000). Further, graphic organizers can support instructional scaffolding (as students read more text, they can add text information to the graphic organizer to visually represent the text structure) for improved comprehension of a selected text (National Reading Panel, 2000). During instruction, this visual representation of the text structure organization can be a powerful tool for helping students develop schemata for specific text structures (DiCecco & Gleason, 2002) and for students to comprehend, learn, and remember information (Duke et al., 2011). It is possible that graphic organizers contributed to increased effects, especially if the text structure intervention included a visual component.

Additionally, we investigated students' performance on researcher-developed comprehension measures that we categorized into one of the three NAEP cognitive targets (locate/recall, integrate/interpret, and critique/evaluate). The National Assessment Governing Board (2012) described a cognitive target as a mental process or kind of thinking that underlies reading comprehension. The structure of the integrate/interpret measure is quite similar to the instructional framework used in most of the expository text structure studies. That is, students are required to analyze short paragraphs of well-structured text that characterize a particular text structure. It appears that students who learn to identify expository text structures might be more adept at locating and integrating big ideas and recalling information in new text. Importantly, no studies included critique/evaluate-type measures. Additional research is needed using critique/evaluate-type measures that are similar to those used on the NAEP. Further research investigating students' performance on comprehension measures categorized into these three cognitive targets may offer insights into a tiered complexity of cognitive tasks assessed in comprehension measures. Following text structure instruction, students might perform quite well on standardized measures such as the NAEP. Additional, longitudinal research is needed that includes standardized measures to evaluate the broad, long-term effects of text structure interventions.

The three interactive factors of text, reader, and context determine the extent to which an assessment is designed to either support or inadvertently place students at risk of not being able to demonstrate what they are capable of as readers (Thurlow et al., 2009). Thus, the type of reading comprehension measure used reflects the impact of expository text structure interventions on how students construct a coherent macrostructure and microstructure. Students' favorable performance on graphic organizers may indicate that expository text structure interventions, as implemented in the available research, are an effective intervention strategy for helping students locate and recall ideas, as well as construct ideas and integrate inferences that lend themselves to improved responses on reading comprehension measures, specifically measures that include graphic organizers and comprehension questions. Importantly, findings from this review do not suggest that other expository text structure intervention approaches, such as an intervention with higher dosage or an intervention applied with greater fidelity (both of which are weaknesses in the present research), might result in stronger outcomes on other comprehension measures. Additional, high-quality research is needed that is specifically designed to help students construct the mental representations of the organizational frameworks needed to proficiently respond to comprehension items that target students' cognitive abilities to locate/recall, integrate/interpret, and critique/evaluate textual information, as well as measures of comprehension questions, graphic organizers, recall/summarization comprehension measures, and text structure–specific measures. Finally, expository text structure interventions include various instructional features across contexts (e.g., grade levels, content areas) and various text structure types (e.g., cause-and-effect) embedded in texts that range from highly to less structured. Moreover, there are a number of student variables that impact comprehension of expository text and have not been well controlled in the available research, such as the student's ability to read the text and variation in students' background knowledge.

Limitations

There are a number of limitations in this body of literature that suggest some caution when interpreting the findings of this study. First, this is a relatively small corpus of 21 studies. Moreover, all of the studies included in this review used researcher-developed measures, many of which provide no evidence of reliability.

Second, we could not isolate a common set of instructional features within a subset of studies that allowed us to examine the differential effects of specific instructional packages. Consequently, we could not evaluate which components of text structure instruction are key ingredients needed to improve reading comprehension of expository text. Similarly, we could not evaluate which text structure types are most effective for improving reading comprehension, because the majority of studies included multiple and different text structure types.

Third, researchers collected fidelity of implementation data in only nine studies. Fidelity of implementation is critical for verifying that all instructional components are implemented as intended and consistently throughout the intervention. Typically, researchers reported how many instructional components were implemented; however, none of the researchers reported whether implementers consistently followed all of the prescribed steps in a scaffolding procedure or provided instructional feedback that met a minimum level of quality. Thus, although all instructional components might have been implemented in a study, it is possible that the quality of instruction for some text structures was better than for other text structures.

Fourth, although we referenced the definitions provided by NAEP (see National Assessment Governing Board, 2012, Exhibit 8) to determine the most appropriate cognitive target per comprehension measure in the NAEP measure type analysis, we recognize that our coding of one cognitive target per measure discounts any other appropriate cognitive target. The conclusions and comparisons that we can draw from this analysis are limited because the NAEP test items may be intercorrelated, as each item may measure more than one cognitive target (American Institutes for Research, n.d.).

Implications for Practice

Despite the limitations in the body of literature on expository text structure instruction, it is evident that expository text structure instruction is an effective research-based reading comprehension strategy for a range of student abilities and grade levels. It is likely that text structure instruction is effective because it presents students with an organizational framework for approaching expository text that is often complex and dense with academic vocabulary. Although we cannot suggest the key intervention components needed to teach text structures effectively, we can offer broad suggestions for teaching them.

Teachers should explicitly describe expository text structures and teach students the clue words associated with various text structures, model the use of text structures in reading (and writing) to draw students' attention to the organization of the text to identify the key ideas and details to support their text recall, and consider introducing graphic organizers as a support to assist students with identifying and using the text structures to organize the critical information collaboratively with students. Teachers need access to exemplary, single-structured texts for use as model texts to then prepare students to comprehend multiple-structured texts (Jones, Clark, & Reutzel, 2016). In addition to teaching students to identify expository text structures, teachers might also teach students text features as another signal for where information is located in text and how it is organized. Although isolating text structures may be an effective tool for scaffolding instruction, it is important that students take increasing responsibility for attending to the complexity of text structures in authentic texts and have independent opportunities to engage with the structure of texts in the context of developing deeper knowledge in a particular content area (Duke et al., 2011).

Implications for Future Research

There is a broad range of research needed to enhance our understanding of when, how, and with whom expository text structure interventions are effective. First, we found only one study that addressed the effect of expository text structure interventions on students' listening comprehension. Williams et al. (2014), in a high-quality study, found that students who were taught a cause-and-effect text structure outperformed students in a control condition on a sentence combination listening measure. Considering the substantial research conducted by Williams and colleagues (2005, 2007, 2009, 2014) in grade 2, expository text structure research that integrates listening comprehension in grades K–2 may have value in improving students' reading of expository text in future grades.

Second, the majority of expository text structure research with young children has been with students in grade 2 (Williams et al., 2005, 2007, 2009, 2014) and grade 5 (Meyer et al., 2002, 2010, 2011), yet no studies were implemented in grades K, 1, or 3. Moreover, there have been few studies (n = 5) implemented in the secondary grades, yet 70% of the expected curriculum in these grades includes expository text (NGA Center & CCSSO, 2010). There is a clear need for researchers to evaluate expository text structure interventions in grades 9–12, particularly because the high school studies are 30 years old. In light of the Common Core, it is pertinent to focus on strategies that will enhance comprehension of expository text in the elementary and secondary grades and determine the most effective sequence to teach text structures.

Third, because researchers typically implemented instruction at the classroom level, research is needed to understand whether there are differential effects of text structure instruction based on instructional group size.

Fourth, we did not locate any studies that included English learners as participants, and only three studies included students with LD. Future research is needed to evaluate the responsiveness of English learners and students with LD to expository text structure interventions. Considering that students with LD appear to respond most favorably to expository text structure interventions, researchers should investigate the precise instructional features of expository text structure interventions that are most effective. Future meta-analyses investigating this instructional precision and the characteristics of researcher-developed comprehension measures may provide insights into what comprehension instructional features are most effective and what measures yield the largest effect sizes.

Fifth, additional high-quality research is needed in which researchers compare comprehension outcomes (including measures of graphic organizers and text structure measures) using clearly described expository text structure interventions that include a range of instructional features, so we clearly understand what instructional practices (e.g., use of scaffolding techniques, clue word instruction, graphic organizers) are most effective and efficient for teaching text structures.

Finally, more high-quality research is needed to understand if all text structures must be taught or if students can derive new text structure knowledge after learning a foundation set of highly structured text structures, such as compare-and-contrast, cause-and-effect, and description/categorization. There may be other text structures beyond the five commonly referenced expository text structures that warrant additional research. In particular, given the emphasis on persuasive writing and argumentation in the Common Core, it may be beneficial to conduct more research on position-and-reason and argument text structures and examine the effects of these interventions on students' comprehension. This is particularly important as the Common Core implementation and assessment rolls out in school districts throughout the United States.

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NICOLE PYLE (corresponding author) is an assistant professor of adolescent literacy and secondary education in the School of Teacher Education and Leadership at Utah State University, Logan, USA; e-mail nicole.pyle@usu.edu.

ARIANA C. VASQUEZ is a postdocoral associate in the School of Education at the University of Pittsburgh, Pennsylvania, USA; e-mail avasquez@pitt.edu.

BENJAMIN LIGNUGARIS/KRAFT is the head and a professor in the School of Teacher Education and Leadership at Utah State University, Logan, USA; e-mail ben.lig@usu.edu.

SANDRA L. GILLAM is a professor in the Department of Communicative Disorders and Deaf Education at Utah State University, Logan, USA; e-mail sandi.gillam@usu.edu.

D. RAY REUTZEL is the dean of the College of Education at the University of Wyoming, Laramie, USA; e-mail dreutze1@uwyo.edu.

ABBIE OLSZEWSKI is an assistant professor in the Department of Speech Pathology and Audiology at the University of Nevada, Reno, USA; e-mail aolszewski@med.unr.edu.

HUGO SEGURA is an assistant professor at the Escuela de Fonoaudiologia at the Universidad Autónoma de Chile sede Talca; e-mail hugo.segura@gmail.com.

DAPHNE HARTZHEIM is an assistant professor in the Department of Communication Sciences and Disorders at Louisiana State University, Baton Rouge, USA; e-mail dhartz4@lsu.edu.

WOODROW LAING is an undergraduate student at Utah State University, Logan, USA; e-mail woodrow.laing@aggiemail.usu.edu.

DANIEL PYLE is an assistant professor in the Department of Teacher Education at Weber State University, Ogden, Utah, USA; e-mail danielpyle@weber.edu.