Read Writ (2018) 31:2041–2064
https://doi.org/10.1007/s11145-018-9870-5

An analysis of the ecological components within a text structure intervention

Andrea L. Beerwinkle[1] · Kausalai Wijekumar[1] · Sharon Walpole[2] · Rachael Aguis[3]

Published online: 26 May 2018

Abstract The Component Model of Reading expanded upon the Simple View of Reading by adding an ecological and psychological component. Elements of the ecological component include teacher knowledge, information provided in textbooks, and teacher instructional practices. In this study, the authors examined the extent of teacher knowledge about text structure, the extent to which textbooks focused on text structure related skills and strategies as well as the percentage each skill and strategy was covered in lessons and teacher instructional practices. Such analysis shows that although text structure interventions may have positive effects on student reading comprehension, there are multiple elements of the ecological component that may be counteracting the benefits of the intervention. First, teachers have a limited knowledge of the five common text structures. Second, textbooks systematically minimize text structure instruction and only cover comprehension skills and strategies sporadically throughout a year-long curriculum. Third, teacher learning of text structures and change in practice was moderated by these ecological factors including textbook scheduled instruction and administrator support.

Keywords Ecological components · Teacher knowledge · Textbook content · Teaching practices · Text structure

✉ Andrea L. Beerwinkle
abeerwinkle@tamu.edu

[1] Department of Teaching, Learning, and Culture, Texas A&M University, 308 Harrington Tower, College Station, TX 77843, USA

[2] School of Education, University of Delaware, Newark, DE, USA

[3] Rachael Aguis, University of Malta, Msida, Malta

Introduction

A significant number of students at all grade levels have low reading achievement. Across the United States, students are struggling to reach grade level reading expectations. Almost two-thirds of fourth grade students are reading at or below the basic reading level (NAEP, 2015). These numbers do not improve as students progress through middle school and high school. This means that the majority of students in the United States have reading skills considered below grade level and are likely to struggle with tasks such as making inferences, analyzing and summarizing texts, and other higher-level skills needed for success in both school and life.

Models of readings such as the Simple View of Reading (Gough & Tunmer, 1986; Hoover & Gough, 1990) and McKenna and Stahl's (2009) Modified Cognitive Model are widely used to help explain areas of reading that influence students' reading comprehension. These areas, such as language comprehension, decoding skills, and strategy use, have become the standard for interventions designed to improve reading comprehension. However, the SVR and Modified Cognitive Model do not specifically take into account classroom elements like teacher knowledge, textbook contents, and teacher practices that help create the classroom environment.

Aaron, Joshi, Gooden, and Bentum (2008) proposed an expanded SVR, the Component Model of Reading (CMR), by including psychological and ecological components that also affect the acquisition of literacy skills (Fig. 1). Home environment, culture, parental involvement, classroom environment, peer influence, dialect, and English as a second language all contribute to the ecological environment. While there are studies that explore multiple elements of the ecological component (Chiu, McBridge-Chang, & Lin, 2012) and single elements, such as dialect (Ortiz et al., 2012), there are few studies that focus on the combined ecological factors of teacher knowledge, observed teaching practices, and textbook content.

The purpose of this article is to describe the ecological component of reading (Aaron et al., 2008) within a study of a text structure intervention at high poverty

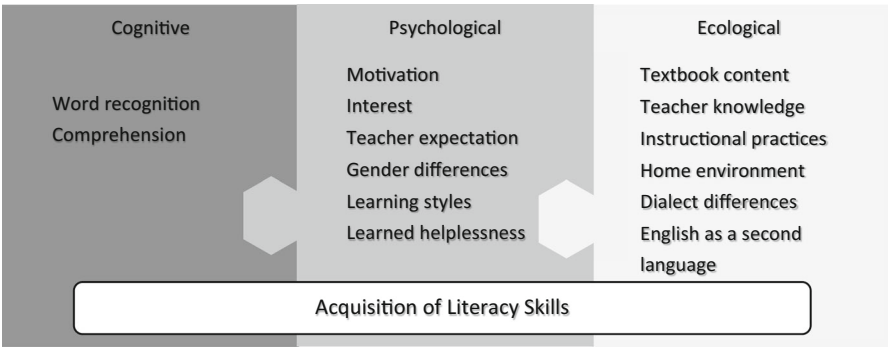

Fig. 1 Component Model of Reading (Aaron, Joshi, Gooden, & Bentum, 2008)

mostly urban schools. Specifically, this article focuses on the classroom environment through the contributions of teacher knowledge (Joshi & Aaron, 2012), textbook information, and teacher practices. In-school reading intervention research does not happen in perfect laboratory conditions. The ecological environment that Aaron et al. (2008) suggest is also an important factor in researching the impact of reading interventions in real-world settings. Describing the ecological elements that interact with a text structure based reading comprehension intervention is important to the literature on text structure research, because it provides an in depth look at the real world ecological context in which students are expected to learn and provides a window into uptake and implementation of innovations by practitioners.

Context of reading comprehension and text structure

The most recent NAEP results show that 64% of fourth-grade students are reading at or below the basic reading level (NAEP, 2015). The percentage of students reading below grade level increases drastically for African American (81%) and Hispanic students (78%), students with disabilities (88%), and students eligible to receive free and reduced-priced lunch (78%) (NAEP, 2015). As students progress through middle school and high school, their poor reading achievement continues. What is more troubling is that since 1992 these numbers have remained relatively unchanged. This means that for over two decades the majority of students in the United States have not been able to read above a basic level and have entered the workforce or post-secondary education with reading skills far below what is needed for success. Foorman, Petscher, Stanley, and Truckenmiller (2016) found similar struggles for fifth and eighth-grade students. In a latent analysis of reading and language variables, 53% of fifth-grade students and 72% of eighth-grade students scored low on all variables. Consistent low performance across multiple measures suggests that current school literacy practices are not functionally meeting the needs of the majority of students.

Reading comprehension is an essential skill needed to progress through school and for active, successful participation in adult life. Correctly taking medicine, comparing insurance policies, evaluating political candidates and a host of other day-to-day tasks require not just the ability to read but also comprehend. Reading comprehension is not only a literacy skill but also a life skill. It is one of the five important reading skills highlighted by the National Reading Panel (National Institute of Child Health and Human Development, 2000). The texts that are at the heart of everyday life are typically expository texts. (i.e. news articles, restaurant reviews, political websites, PTA newsletters, etc.)

Following Chall's (1983) stages of reading, upper elementary school is the time when students leave the learning to read stage and enter the reading to learn stage. In this stage instruction shifts from narrative texts to expository texts and strategies to extend comprehension. School personnel frequently expect students in the fourth and fifth grades to be able to read well and begin applying reading comprehension skills in not only their reading/English Language Arts classrooms but in their science and social studies classrooms where expository replaces narrative.

However, expository texts are vastly different from the narrative texts to which students are accustomed. Most students' experiences with narrative texts go back several years. Parents and teachers read narratives aloud, long before students can read, and narratives are the texts that most students use when learning to read. Narratives have characters, clear beginnings, middles, and ends, and problems that are usually clearly and neatly resolved. Expository texts are almost the opposite of narratives in every way. First, students receive minimal exposure to expository texts in both early childhood and the primary grades. Duke (2000) found that less than 10% of books in first-grade classrooms were informational texts and that students spent only 3.6 min per day on average working with informational texts during written language activities. This lack of exposure at the younger grades only enhances the struggles students face in the upper grades. Second, expository texts are filled with facts, dates, comparisons, contrasts, causes, and effects that lack organization in the familiar beginning, middle, and end structure of narrative (Bakken & Whedon, 2002). Third, expository texts require different mental tasks than narrative texts (Hebert, Bohaty, Nelson, & Brown, 2016). Pairing students' lack of experience with expository with expository's significant differences from narrative makes it clear why upper elementary students struggle when expected to independently read and comprehend expository texts. Whether students are ready or not for expository texts, learning standards such as the Common Core State Standards (CCSS, Reading CCSS.ELA-Literacy.RI.5.1 to RI.5.10) specifically address elements of expository such as text structure beginning in the fourth grade.

While there are a variety of strategies that can improve reading comprehension, there is strong support for teaching students about text structure as a means of improving comprehension. *Improving Reading Comprehension in Kindergarten through 3rd Grade* (Shanahan et al., 2010), an Institute of Education Sciences (IES) Practice Guide, supports the use of text structure to improve comprehension. Additionally, text structure instruction supports several of the recommendations by the National Reading Panel (National Institute of Child Health and Human Development, 2001) on reading comprehension. Both the CCSS and the Texas Essential Knowledge and Skills (TEKS) also support text structure-based instruction.

Research suggests that teaching students about the five text structures (cause and effect, problem and solution, compare and contrast, sequence, and description) can help improve students' reading comprehension, especially of expository texts. Multiple experimental studies (Bakken, Masteropieri, & Scruggs, 1997; Meyer et al., 2002; Spires et al., 1992; Wijekumar, Meyer, & Lei, 2012; Wijekumar et al., 2014) have shown positive effects for interventions that teach students about text structures and how to use them to improve reading comprehension.

Prior research and background

Despite the multitude of studies on text structure and reading comprehension, no studies have yet to fully describe the ecological environment of these interventions. Understanding the ecological elements can help create a better understanding of the

conditions in which instruction takes place. By better understanding these conditions, researchers and practitioners can then begin to explore the relationship between the ecological components, text structure interventions, and student reading comprehension. Interventions may need to be adjusted based on these factors to achieve better outcomes for students. Ideally, textbooks will also be revised to include recent findings about evidence-based practices.

The ecological component includes environmental factors that can influence the acquisition of literacy skills. As stated previously, these factors are in part made of the classroom environment. This includes teacher knowledge (Binks-Cantrell, Washburn, Joshi, & Hougen, 2012; Chiu et al., 2012; Connor, Son, Hindman, & Morrison, 2005; Joshi & Aaron, 2012; Piasta, Connor, Fishman, & Morrison, 2009; Pressley, Wharton-McDonald, Mistretta-Hampston, & Echevarria, 1998), information presented in textbooks (Joshi et al., 2009), and teacher practices (Chiu et al., 2012).

Binks-Cantrell et al. (2012) show that a lack of teacher knowledge has a detrimental effect on student achievement. Teacher candidates with lower understandings of language constructs had teacher educators who also had a lower understanding of language constructs. In contrast, teacher educators with higher levels of understanding had teacher candidates with higher levels of understanding. Piasta et al. (2009) found a similar situation with teacher knowledge and explicit decoding instruction. Teachers with low levels of language and early literacy knowledge were significantly less effective in improving first-grade students' word reading skills than teachers with higher levels of knowledge. Teachers with a lower level of understanding were unable to give knowledge they did not have, knowledge that ultimately affects students' acquisition of literacy skills. Therefore studying the ecological component of teacher text structure knowledge as part of a reading comprehension intervention is important to developing a better understanding of the real world elements that may influence research findings about the impact of a reading comprehension intervention.

Chiu et al. (2012) add support to the importance of the ecological domain as a contributor to reading. In a study of almost 190,000 fourth grade students living in 38 countries on five continents, Chiu et al. explored the link between the cognitive, ecological, and psychological components on low reading achievement. The ecological elements explored focused on family life, the school environment, and characteristics of classroom teachers. Four variables were focused on within teacher characteristics- availability of specialists, depth of teacher training in teaching reading, amount of reading for professional development, the extent to which the teacher developed student reading skills, and teacher career satisfaction. Chiu et al. found that the ecological domain accounted for 91% of the variance in reading difficulty. Unfortunately, teacher characteristics were not significantly linked to low reading performance. However, Chiu et al. looked at teacher training and professional development, not teacher knowledge. Teaching materials, such as textbooks, were not included in the review.

Further support for the impact of the ecological domain comes from Joshi et al. (2009). Joshi et al. analyzed the extent to which reading education course textbooks contained the National Reading Panel (NRP) recommended five components of

literacy instruction and that the definitions of those elements matched the NRP's definition. Out of 17 textbooks examined, 13 contained all five literacy components. Furthermore, these components were at maximum covered within 60% of the text with 20–30% being closer to the average. Joshi et al. also examined the percentage of pages covering each component of reading within each textbook. Phonemic awareness, phonics, fluency, vocabulary were consistently covered less than 10% of the total coverage allotted to the five components. Text comprehension was given slightly higher coverage with percentages ranging from 5 to 20%. Joshi et al. make the argument that the lack of adequate information in textbooks is in part responsible for low levels of teacher knowledge that ultimately influence how students acquire literacy skills. Therefore, describing the comprehension skills and strategies within reading textbooks in use during a text structure intervention can provide additional information about ecological components that affect students' reading comprehension.

Text structure strategy

Theoretical framework

The theoretical framework for the intervention analyzed in this study has its roots in what Meyer, Brandt, and Bluth (1980) refer to as the text structure model. The text structure strategy stems from research showing that information presented higher in the content structure of a text is connected to better recall than information presented lower in the content structure (Meyer, 1975). The text structure strategy is the use of the content structure of a text to organize information in the memory, which in turn helps with recall (Meyer et al., 1980). Additionally, the use of the text structure strategy without prior instruction has been found to follow along comprehension ability lines (Meyer et al., 1980). Good comprehenders are more likely to use the same top-level structure as the text when recalling what was read than poor comprehenders (Meyer et al., 1980). Furthermore, following the top-level structure of a passage can provide students with "a systematic learning and retrieval guide" (Meyer et al., 1980, p. 99).

Text structure intervention

The text structure strategy has been heavily studied (Meyer et al., 2002, 2010; Meyer & Wijekumar, 2014; Wijekumar et al., 2014; Wijekumar, Meyer, & Lei, 2012, 2013, 2017) and found to improve structure strategy competency and reading comprehension. The text structure strategy intervention has been developed to guide students in using the structure of the text being read throughout the entire reading process (before, during, and after), see Fig. 1 in Wijekumar et al. (2017) in this issue, and is different from the ways that textbooks and teachers typically address text structure. Students use the structure of the text to select important ideas, identify and write the main idea, summarize the text, encode information into their

strategic memory, monitor comprehension, make inferences, research and elaborate on new areas of interest, transform knowledge, and write about new topics.

Method

Design of study

The data for this ecological environment analysis comes from a multi-site randomized controlled study of a text structure intervention in high poverty schools. The purpose of the study was to test the efficacy of a web-based intelligent tutoring system for the structure strategy (ITSS) to teach fourth- and fifth-grade students attending high poverty schools. Random assignment was conducted within school districts at the school level. This design maintained the same textbooks between intervention and control schools due to district level decisions on curricula. The design also prevented any contamination of control classrooms due to the strong professional development and support for classroom implementation (e.g., printed materials, posters, bookmarks for students). Within the 24 participating schools (wave 1 of data collection) average percent of students eligible to receive a free or reduced-price lunch was 96%, reporting minority status was 97.5%, households reporting at least one adult with a bachelor's degree was 18%, and per student expenditure within school was $12,634. All intervention teachers participating in the study completed surveys prior to the start of the school year during the professional development sessions and at the conclusion of the study after posttests were administered. Prior to the start of the intervention, teachers within treatment schools received 2 days of professional development on how to use text structure instruction in their classroom and how to support the ITSS technology use in the computer labs. During the intervention, teachers were expected to use text structure during the language arts period to frame student comprehension of texts being read as well as use text structure specific stems when writing the main idea and a summary of the text. Students at treatment schools also used ITSS for a minimum of 45 min per week during their regularly scheduled English Language Arts time.

Data from initial and concluding surveys, teacher observations during the intervention, and content evaluation of textbooks used by participating schools were analyzed to better understand the ecological context of a multi-site randomized control study of a text structure intervention at high poverty mostly urban campuses in grades 4 and 5. The initial survey asked teachers about their knowledge of text structures and their use of text structures during instruction (See "Appendix 1" for survey questions). The concluding survey gathered additional demographic information about teachers (i.e. level of education, and number of years taught). During teacher observations, a trained member of the research team recorded the amount of time dedicated to practices concerning reading, summarizing, writing main ideas, etc. The textbook content analysis included reviewing and counting the stated comprehension skills and strategies presented in each lesson or unit of the textbooks in use at participating schools.

Participants

Participants for this study were the treatment and control group teachers who signed a consent to participate in a multi-site randomized control trial that included high poverty schools from three states across the United States (see Table 1). The teachers taught either fourth (n = 65) or fifth grade (n = 66) at their respective schools and had an average of 15 years teaching experience. The highest degree earned for the majority of teachers (64%) was a bachelor's degree. The remaining 36% held Master's degrees. The schools served a student population where over 90% of students were eligible for a free or reduced-price lunch and over 95% Hispanic students.

Survey questions

The initial survey asked teachers if they knew about text structure, if they used text structure in language arts instruction, and to list all the text structures they taught. The concluding survey asked teachers about additional demographic information including number of years teaching and highest degree.

Textbook analysis

Reading textbooks for grades 3, 4, and 5 from the Texas Journeys (Baumann et al. 2011a, b, c, d series and the Scott Foresman Reading Street (Afflerbach et al. 2011a, b, c, d, e, f) series were analyzed for the comprehension skills and comprehension strategies covered in each lesson. All but 12 classrooms in the study used these textbooks. Although the intervention focused on grades 4 and 5, the textbooks for grade 3 were analyzed in an effort to better understand the skills that students in grade 4 were exposed to and expected to have mastered prior to entering the grade. Lessons centered on both fiction and non-fiction texts.

Textbook analysis methodology

The lead author conducted the analysis of comprehension skills and strategies covered within the Texas Journeys and Scott Foresman reading textbooks based on an objective count of comprehension skills and strategies explicitly stated in the table of contents in each textbook series. Figures 2 and 3 show examples of the table of contents for both textbooks. Each lesson lists the focus comprehension skill and strategy for that lesson. Both textbook series list the comprehension skill first

Table 1 Demographics

	Mean	SD	N
Years of teaching	15.4	7.49	104
Highest degree	1.36	0.48	104
Teach 4th grade			36
Teach 5th grade			68

Highest degree 1 = BS, 2 = MA, 3 = PhD

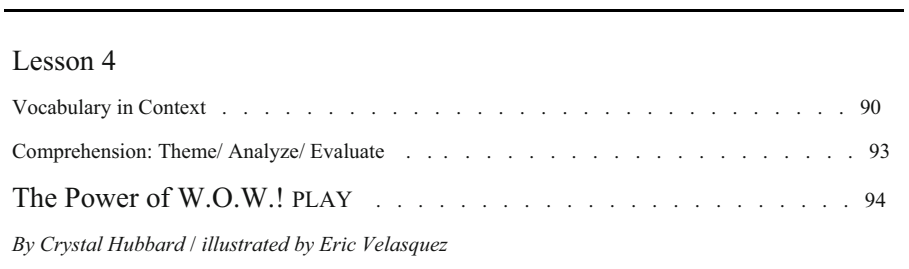

Fig. 2 Excerpt from Texas Journeys, Table of Contents, grade 5

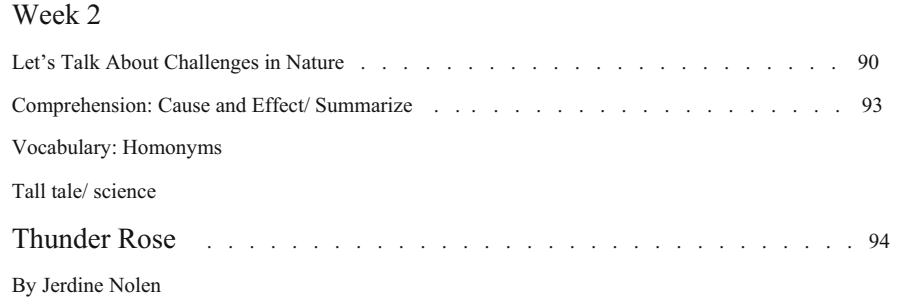

Fig. 3 Excerpt from Scott Foresman Reading Street, Table of Contents, grade 5

and the strategy second. The lead author reviewed the table of contents for each textbook and tallied the number of times/lessons the textbook reported a comprehension skill and strategy. A percentage of lessons covering each skill and strategy was calculated by dividing the number of lessons addressing the specific skill or strategy in the textbook by the total number of lessons in the book and then multiplying that number by 100.

The lead author also analyzed each comprehension skill and strategy for its connection to one of the five text structures by Meyer (1975) (comparison, cause-and-effect, problem-and-solution, sequence, and description). Strategies such as "sequence of events" and "compare and contrast" were considered connected to Meyer's (1975) identified text structures. However, strategies like "theme" and "persuasion" were not. The lead author calculated the percentage of lessons with comprehension skills and strategies that dealt with text structure for each textbook series. This percentage was calculated by adding the number of unique lessons with skills and strategies that specifically dealt with text structure (i.e. compare and contrast, sequence, cause-and-effect, problem-and-solution, description) and then dividing the number of unique lessons represented and multiplying by 100 to create a percentage.

Two additional researchers on the team then verified these tables of contents, the number of occurrences of reading comprehension strategies, and use of text structures. There were no corrections made to the counts or percentages based on this review. A primary reason for this accuracy was due to the use of the table of contents strategies that did not vary from the reading comprehension strategies list

identified. If there were minor differences in phrasing, they were easy to resolve (e.g., summarizing vs. write a summary).

Classroom observations

Teacher observations took place during February 2017, and a trained member of the research team conducted all observations. Due to the large number of classrooms participating in the study, observations were conducted in two waves. The first-wave data is used in this manuscript. The team member spent 20–40 min in each classroom. The amount of time in each classroom varied based on the amount of time allowed by the school for observations and the number of classrooms to observe. During the observations, instructional practices focused on reading (e.g. writing a main idea, generate inference) and specifically with use of text structure (e.g., main idea with text structure, summarization with text structure) as well as additional areas (e.g., classroom management—whole class vs. small group instruction) were recorded on a tablet device (see sample screen in "Appendix 2"). The observer recorded what instruction was happening every 90 s on the device. There were no value judgments related to this observation and instead the focus was on what specific strategy or skill was taught during the 90-second block of time. If the teacher provided instruction about inferences then the inference box was checked. During the next 90 s, the observer marked what happened at that time. This approach provides a focus on the type of instruction and not on the quality of the instruction.

Findings

Teacher knowledge of text structure and use in instruction

Teacher knowledge of text structure and use in instruction are presented in Tables 3. All teachers positively indicated using text structures. Approximately 89% teachers

Table 2 Teacher knowledge about text structure

	Mean	SD	N	%
Do you use text structures? (1 = yes, 0 = no)	1	0	175	100
Do you teach text structure during ELA? (1 = yes, 0 = no)	.87	0.38	153	87
Text structures listed	1.52	0.67	175	99
Non-text structures listed as text structures	2.26	1.23	175	94
Listed 0 text structures			1	.57
Listed 1 text structure			97	55
Listed 2 text structure			64	36
Listed 3 text structure			13	7.39
Listed 4 text structure			1	.57
Listed 5 text structure			0	0

stated that they used text structure during language arts instruction. The initial survey asked teachers to list all of the text structures that they taught. On average teachers listed close to four ideas as text structures. However, of the ideas listed, only an average of 1.52 (SD = 0.67) were actual text structures identified by Meyer (1975) (i.e. cause and effect, problem and solution, comparison, description, sequence). The majority of teachers (55%) correctly listed one text structure, 36% correctly listed two text structures, and 7% of teachers correctly listed four text structures. No teachers correctly listed all five text structures and one teacher was unable correctly list any text structures. On average teachers listed an additional 2.42 items (SD = 1.00) that were not text structures (i.e. summary, story structure).

Textbook analysis

Textbook analysis of the percentage of lessons dedicated to the coverage of each comprehension skill and comprehension strategy showed that no skill or strategy was mentioned more than 24% of the time for either textbook series. The average number of lessons a comprehension strategy was covered was between 2.08 and 2.5 lessons for the Texas Journeys series (Baumann et al., 2011a, b, c, d) and 1.82 and 2 lessons for the Scott Foresman Reading Street (Afflerbach et al., 2011a, b, c, d, e, f) series which had 20 lessons per book compared to the Journeys series which had 25. Each skill was covered an average of 2 lessons or 10% of the total lessons in Reading Street (Afflerbach et al., 2011a, b, c, d, e, f) and 4.16 lessons or just over 16% of total lessons in the Texas Journeys (Baumann et al., 2011a, b, c, d) series. The content analyses of the textbook series are presented in Tables 3, 4, 5, 6 and 7.

In the Texas Journeys (Baumann et al., 2011a, b, c, d) series, cause and effect was consistently tied at all grade levels for the largest percentage of coverage at 12% or three lessons. Author's purpose (grade 3, 4), compare and contrast (grade

Table 3 Count and percentages of times comprehension skills are included in Texas Journeys series

Comprehension skill	Grade 3		Grade 4		Grade 5	
	N	%	N	%	N	%
Author's purpose	3	12	3	12	2	8
Cause and effect	3	12	3	12	3	12
Compare and contrast	3	12	3	12	2	8
Conclusions and generalizations	3	12	1	4	2	8
Fact and opinion	1	4	2	8	2	8
Main ideas and details	2	8	2	8	2	8
Persuasion	N/A	N/A	1	4	2	8
Sequence of events	2	8	2	8	3	12
Story structure	3	12	1	4	2	8
Text and graphic features	3	12	2	8	1	4
Theme	N/A	N/A	2	8	2	8
Understanding characters	2	8	3	12	2	8

3, 4), conclusions (grade 3), story structure (grade 3), sequence of events (grade 5), text and graphic features (grade 3), and understanding characters (grade 4) had similar levels of coverage (i.e. 12%) at their respective grade levels for the Texas Journeys (Baumann et al., 2011a, b, c, d) series. The Scott Foresman Reading Street (Afflerbach et al., 2011a, b, c, d, e, f) series covered all comprehension skills twice.

The percentage breakdown of comprehension strategies showed similarly small percentages of coverage. For both textbook series, the number of different strategies covered was smaller than the number of comprehension skills and therefore the percentages were higher. However, no skill was covered more than a quarter of the total lessons. In the grade 3 textbook of the Texas Journeys (Baumann et al., 2011a, b, c, d) series, infer/predict was covered in the greatest percentage of lessons at 24% or six lessons. In grade 4 infer/predict and in grade 5 monitor/clarify were both covered in five lessons (20%) which was the most of any strategy at both grade levels. For the Scott Foresman Reading Street (Afflerbach et al., 2011a, b, c, d, e, f) series, most strategies were covered twice. In grade 5, background knowledge was covered once and visualize was covered in three lessons.

Comprehension skills that dealt with text structure made up 32% of lessons (eight lessons) for the Texas Journeys (Baumann et al., 2011a, b, c, d) series and between 28 and 32% (7–8 lessons) for the Scott Foresman Reading Street (Afflerbachet al., 2011a, b, c, d, e, f) series. Cause and effect, compare and contrast, and sequence were covered in both textbook series. Problem and solution was covered secondarily through the story structure skill in the Texas Journeys (Baumann et al., 2011a, b, c, d) series at grades 3 and 5. The Scott Foresman Reading Street (Afflerbach et al., 2011a, b, c, d, e, f) series also included general text structure as a comprehension strategy.

All textbooks presented text structure to some extent. However, they present a different approach to using text structures than those used in recently concluded interventions (Wijekumar, et al., 2014).

Table 4 Count and percentages of times comprehension skills are included in Scott Foresman reading street series

Comprehension skill	Grade 3		Grade 4		Grade 5	
	N	%	N	%	N	%
Author's purpose	2	10	2	10	2	10
Cause and effect	2	10	2	10	2	10
Character, setting, theme	2	10	2	10	2	10
Compare and contrast	2	10	2	10	2	10
Draw conclusions	2	10	2	10	2	10
Fact and opinion	2	10	2	10	2	10
Generalize	2	10	2	10	2	10
Graphic sources	2	10	2	10	2	10
Main ideas and details	2	10	2	10	2	10
Sequence	2	10	2	10	2	10

Table 5 Count and percentages of times comprehension strategies are included in Texas journeys series

Comprehension skill	Grade 3		Grade 4		Grade 5	
	N	%	N	%	N	%
Analyze/evaluate	4	16	3	12	4	16
Infer/predict	6	24	5	20	4	16
Monitor/clarify	3	12	4	16	5	20
Question	4	16	4	16	4	16
Summarization	4	16	5	20	4	16
Visualize	4	16	4	16	4	16

Table 6 Counts and percentages of comprehension strategies in Scott Foresman reading street series

Comprehension strategies	Grade 3		Grade 4		Grade 5	
	N	%	N	%	N	%
Background knowledge	2	13.33	2	10	1	5
Important ideas	1	6.66	2	10	2	10
Inferring	N/A	N/A	2	10	2	10
Monitor and clarify	1	6.66	2	10	2	10
Plot/inferring	1	6.66	2	10	N/A	N/A
Predict and set purpose	2	13.33	2	10	2	10
Questioning	1	6.66	2	10	2	10
Story structure	2	13.33	2	10	2	10
Summarize	1	6.66	2	10	2	10
Text structure	2	13.33	2	10	2	10
Visualize	2	13.33	2	10	3	15

Table 7 Count and percentages of lessons that included comprehension skills and strategies that address Text Structure in each of the textbooks

	Texas Journeys 3		Texas Journeys 4		Texas Journeys 5		Scott Foresman Reading Street 3		Scott Foresman Reading Street 4		Scott Foresman Reading Street 5	
	N	%	N	%	N	%	N	%	N	%	N	%
Text Structure	8	32	8	32	8	32	7	28	8	32	7	28

Classroom observations

Observations of instructional practices took place in 36 classrooms (see Table 8). Analysis of observed practices showed that across all observations the average percentage of time spent on any one instructional practice ranged from zero to 5%. Additionally, analysis showed that participation in instructional practices varied

widely. In more than half of classrooms, the teacher or students were observed using text structure with narratives, but in no classrooms was the teacher or students observed summarizing or writing recalls for narrative or expository texts. Teachers who provided comprehension instruction did so for an average 2.89% (SD = 0.06) of the observation time for narrative texts and 0.86% (SD = 0.5) for expository texts. Teachers and/or students read narrative texts an average 9.42% of the observed time. Teachers or students read expository texts for an average 5.86% of the observed time. Teacher and/or student use of text structure with narrative and/or expository texts happened in an average 13.58% of the observed time. Teachers and/or students spent an average 4.65% of observed time finding signaling words with narrative and expository texts. Teachers and/or students writing the main idea for a

Table 8 Average percentages of time observed in instructional tasks

Instructional tasks	Percent of time	
	Mean (%)	SD
Teacher narrative comprehension instructions	2.89	.06
Teacher Expository Comprehension instructions	.86	.03
Teacher read narrative	3.95	.08
Teacher read expository	.49	.02
Student read narrative	5.47	.09
Student read expository	5.37	.08
Teacher summarizes narrative	0	0
Teacher summarizes expository	0	0
Student summarizes narrative	0	0
Student summarizes expository	0	0
Teacher use text structure with narrative	4.27	.07
Teacher use text structure with expository	2.20	.06
Student use text structure with narrative	4.12	.07
Student use text structure with expository	2.99	.06
Teacher find signaling words with narrative	1.27	.04
Teacher find signaling words with expository	0	0
Student find signaling words with narrative	1.59	.04
Student find signaling words with expository	1.79	.05
Teacher write narrative main idea, non-text structure	1.53	.06
Teacher write expository main idea, non-text structure	.93	.04
Student write narrative main idea, non-text structure	2.76	.09
Student write expository main idea, non-text structure	1.85	.08
Teacher write narrative main idea, text structure	2.91	.06
Teacher write expository main idea, text structure	0	0
Student write narrative main idea, text structure	.88	.03
Student write expository main idea, text structure	1.00	.04

narrative or expository text without using the intervention main idea steam happen for an average 7.07% of the observed time. Teachers and/or students engaged in writing the main idea for narrative or expository using the intervention main idea stem an average 4.79% of the observed time.

Discussion of ecological elements

Elements of the ecological domain of reading as described by Aaron et al. (2008) have been shown to influence student reading and achievement. The present study explored teacher knowledge about text structure, textbook coverage of text structure, and teacher instructional practices as related to a text structure intervention at high poverty mostly urban schools to gain a more detailed understanding of the environment in which the intervention took place and students were expected to learn. This investigation extends previous research by more fully exploring the classroom ecological components and conditions within a text structure intervention.

Teacher text structure knowledge

The Peter Effect (Applegate & Applegate, 2004) states that teachers cannot give what they do not have. Analysis of the introductory survey shows that 91% of teachers correctly included *two or fewer* text structures in their list of text structures used in instruction. If the majority of teachers have a 20–40% understanding of text structure, how then can teachers be expected to give what they do not possess- text structure knowledge? Furthermore, how does this limited knowledge influence teacher implementation of the text structure intervention? Additionally, 81% of teachers listed at least two incorrect text structures, such as summary or persuasion, which are types of texts, not ways of organizing them. When using the text structure strategy, students are taught to use the structure of the text to guide them throughout the entire reading process, see Fig. 1 in Wijekumar et al. in this issue. However, when first using the text structure strategy, students require a great deal of teacher modeling, specifically in identifying the structure of the text. Teachers with low levels of text structure knowledge may not be able to adequately model identification and use of text structures as required by the text structure strategy. This may then limit the ability of students to fully utilize the text structure strategy to improve reading comprehension. These data show that teachers lack full knowledge of the five common text structures and appear to have misunderstandings of what text structures are. Based on this information, the ecological environment with regard to teacher knowledge appears to be lacking. Strong teacher professional development may be necessary to overcome the lack of teacher knowledge. This review also does not highlight administrator knowledge or perceptions about text structures. The connection between teacher text structure knowledge and its influence on the implementation of a text structure intervention and student reading comprehension must be studied further.

Textbooks and text structure

The most noteworthy finding about the content of the textbooks is the paucity of the coverage of the various comprehension strategies and skills. Teachers frequently rely upon textbooks as a guide in instructing students in a variety of reading skills. These types of textbooks are generally designed to roughly cover the whole school year. Therefore, textbooks with limited coverage of these skills may influence how often students are exposed to these skills and as a result student reading comprehension.

In all textbooks, no skill or strategy was covered more than six times over the course of the book. Critical reading skills like identifying the main idea and summarizing were covered in only 7–20% of lessons. The Texas Journeys (Baumann et al., 2011a, b, c, d) series covered main idea in two lessons at each grade level and summarization in four lessons in grades 3 and 5 and five lessons in the grade 4 book. The Scott Foresman Reading Street (Afflerbach et al. 2011a, b, c, d, e, f) presented information using a similar approach. These textbooks are frequently used as the year's reading curriculum. This means that a student taught with only the Texas Journeys (Baumann et al., 2011a, b, c, d) series receives main idea instruction twice during the whole school year.

The intervention in effect during this study took place at high poverty mostly urban schools. Current NAEP (2015) results show that students in high poverty environments have lower reading comprehension than students in higher SES environments. Therefore, these students require both high-quality regular classroom instruction and high-quality interventions to attempt to close the gap between their reading achievement and that of their on-level peers. However, the main idea instruction for both textbook series consisted of vague approaches. One series telling students that a text can have several main ideas with supporting details, see Fig. 4, and the other series stating that the main idea is the most important idea about a topic and that supporting details are smaller pieces of information that give more information about the main idea, see Fig. 5. This approach of telling students that the main idea is the most important idea about a topic yet providing absolutely no guidance in *how* to determine what constitutes an important idea lacks the transparent and explicit instruction required by students who are unsure of where to start. This approach is also antithetical to the way students learn to identify and write main ideas using the text structure strategy. The text structure strategy provides students with clear patterns that guide students in identifying the key information of the text based on the structure of the text, (The cause is _____. The effect is _____.) see Fig. 6. Because reading instruction provided in reading textbooks and through the text structure strategy are so different, students receive conflicting messages that may counteract the effectiveness of the text structure strategy. The ecological component of which textbook series is used may, therefore, influence reading achievement.

Additionally, consistent multiple and repeated exposures to and practice in a new skill are necessary for students to develop mastery. However, the number of lessons in reading textbooks that address key skills such as summarization and main idea may not be enough to help students develop mastery and go against the text

Target Skill: Main Idea and Details

As you read *Cougars,* look for main ideas about these great cats and details about their lives and habitats that support each idea. A selection can have several main ideas with supporting details. Make a graphic organizer like this one to keep track of a main idea and its supporting details. Then list the supporting details in logical order.

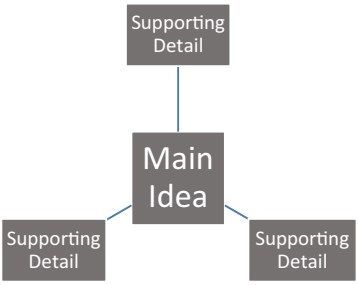

Fig. 4 Excerpt from Journeys, Main Idea instruction, grade 5

Comprehension Skill
Main Idea

- The main idea is the most important idea about a topic. Details are small pieces of information that tell more about the main idea.
- Sometimes the author states the main idea of a paragraph of an entire article in a single sentence at the beginning, middle, or end.
- Use a graphic organizer like the one below to help you summarize and maintain the meanings of main ideas and supporting details from "Bronze" on page 357. Be sure to keep the ideas and details in logical order.

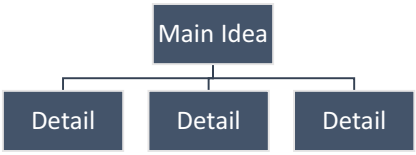

Fig. 5 Excerpt from Reading Street, Main Idea instruction, grade 5

Main Idea Stems

Cause and Effect:

The cause is _____. The effect is _____.

Problem and Solution:

The problem is _____. The solution is _____.

Comparison:

_____, _____, and _____ were compared on _____ and _____

Fig. 6 Text structure strategy main idea stems

structure strategy that instructs students to write the main idea using the scaffolds and summarize the text each time they read. By following the textbook instructional plans, teachers reported that they infrequently asked students to write main ideas. Teachers also reported that they used the textbook's "skill of the week" approach to guide their instruction. This means that teachers may not have covered main idea and summarization with each text as the text structure intervention intended and instead only covered the skills when the textbook covered main idea or summarization. These ecological elements (teacher practice and textbook content) may have resulted in students receiving neither high-quality classroom instruction nor a high-quality text structure intervention. More importantly, students fail to receive consistent practice to master the skills of selecting important ideas and generating the gist (i.e., main idea) of the passage being read. Further, students fail to achieve the full potential of the text structure strategy when they do not see the utility value of generating main ideas with all their textbook lessons because generating main ideas is not part of all lessons.

Additionally, textbook passages used few signals or contained many conflicting signals confusing the teachers about which text structure(s) should be used to organize instruction. The lack of clear signaling words in addition to low teacher knowledge about text structures may have resulted in the teachers' difficulty with identifying text structures not explicitly stated by the textbooks. Professional development at the start of intervention taught teachers to examine each text to determine the best overall text structure. However, the structure identified by the textbook was still used, even when a different structure was more appropriate (i.e. problem-and-solution instead of cause-and-effect). This means that when a textbook did not identify the text structure a misidentified structure may have been used, which is another potential influence of the ecological domain on the text structure strategy intervention. Additionally, students may have only received instruction in cause-and-effect, compare-and-contrast, and sequence because these text structures are explicitly covered in the textbooks. This is another example of a potential influence of the ecological domain on the intervention.

Based on the analysis of textbooks used at schools participating in a text structure intervention, the interaction between textbook information, its influence on teachers and what they teach, and text structure interventions needs to be studied in future. A better understanding of these interactions will provide further information on how the ecological component contributes to and detracts from literacy acquisition. Most importantly, learning outcomes measured at the conclusion of the intervention delivery may be impacted by contradicting instruction based on textbook approaches.

Classroom observations

The average percentage of time spent providing comprehension instructions, reading, using text structure, finding signaling words, writing main ideas, and summarizing was limited as noted in the observations. These numbers have important implications for regular classroom instruction. However, placing these numbers in the context of a text structure intervention where text structure, main

idea, and recall are key elements means that the limited amount of time spent on and the sparse number of classrooms engaging in such actives may have a critical effect on the potential outcomes related to the use of the intervention.

By far the most striking finding is that in absolutely no classrooms did the research team member observe teachers or students summarizing or writing recall statements. Students cannot take ownership and develop mastery of what they do not practice. Additionally, an intervention cannot be fully effective in improving reading comprehension if elements from the intervention are not included in practice. Students also do not experience the utility value of learning these strategies if they are not encouraged to use them in their regular classroom instruction.

The lack of summary and limited amount of main idea practice during the observations hints at two areas that deserve further examination in the context of classroom ecological environment and intervention implementation. The first area is understanding prior instructional practices and the second is the effect of implementation fidelity. Based on the total lack of summarization/recall practice during the observations and minimal observations of classrooms engaging in main idea practice, it is possible that writing main ideas and summaries in any form are not currently consistent practices for these teachers. Developing an understanding of prior instructional practices (e.g. the ecological domain of the classroom) and how they influence an intervention is an area that should be further explored. The second area that deserves exploration is the effect of fidelity in implementing each element of the text structure intervention on the overall effectiveness of the intervention. Inconsistencies in the ecological element of instructional practices may inhibit students from fully benefiting from the intervention.

General discussion

Given the variety of classrooms in the United States, the ecological environments of these schools are likely to vary greatly. Even more specifically, teacher knowledge of text structure, textbook content, and classroom practices are likely to vary because of context. The description of the ecological components presented draws from data collected during a text structure intervention conducted at high-poverty mostly urban schools. This synthesis of information provides an opportunity to understand the context in which researchers and practitioners implement text structure strategies to improve reading comprehension. Specifically, two key areas of the ecological component warrant additional study in the light of these data about text structure and elements of the classroom environment. The first is the influence of teaching materials and the second is the influence of the teacher via teaching practices and knowledge.

Evidence from the content analysis of textbooks used during the intervention clearly highlights instructional materials that were at minimum not supportive of teaching text structure and its related elements (main idea and summary). Further research needs to investigate the influence of such materials on the implementation of text structure interventions.

The influence of the teacher via teaching practices and knowledge is not a new concern for education research. However, fully understanding how these

components positively or negatively affect the implementation of a text structure intervention has not been fully studied.

The conclusion from this description of aspects of the ecological domain of reading supports that better understandings of how instructional materials and teacher influence impact intervention implementation are needed to improve not only the implementation process but these ecological components that influence student learning as well.

Appendix 1

Survey of Language Arts Practices

Dear Teacher,

We are gathering information from each participating teacher so that we can carefully create the software and teacher professional development materials. Please answer the following questions based on your own classroom practices. Thank you for your input on this important project.

1. Demographic information
   a. School Name: _____ Grade: _____
   b. Years of teaching: _____ Highest Degree: _____ (e.g., BS)
2. What Language Arts (LA) textbooks do you use?
3. What other reading materials do you use in your classroom? (other than textbooks)
4. Please give us examples of books that your students usually like to read?
5. How do you organize your LA period? (e.g., whole group, small group)
6. Do you do any work on the computer related to LA, if yes, please tell us what it is?
7. What types of reading comprehension methods do you use in the classroom? (e.g, summarize)
8. Do you teach text structure during LA? How often?
9. If you do teach text structure, what types of text structure do you present?
10. How much time each week do you devote to text structure?
11. Please give us a brief background about the typical students in your classroom so that we can take your needs into consideration while developing the materials for this project.

Thank you very much for your time in completing this important survey!

Appendix 2

Goals and Activities for the Day
What was the stated goals of the class period e.g., comprehension, vocab, writing:
Sample of activities to report: 90 second blocks of time spent Comprehension Instructions Read Re-Read Ask Questions Develop Background Knowledge Pre-teach Vocabulary Summarize Generate Questions Use Text Structure Find Signaling Words Write Main Idea (local approach) Write Main Idea (structure strategy approach) Write Recall Metacognitive Prompts Question the author Complete Story maps Generate Concept maps
Related literacy instruction e.g., writing

References

Aaron, P. G., Joshi, R. M., Gooden, R., & Bentum, K. E. (2008). Diagnosis and treatment of reading disabilities based on the component model of reading. *Journal of Learning Disabilities, 41,* 67–84.

Afflerbach, P., Blachowicz, C., Boyd, C. D., Izquierdo, E., Juel, C., Kame'enui, E., et al. (2011a). *Reading Street (Grade 3, vol. 1)*. Glenview, Illinois: Pearson.

Afflerbach, P., Blachowicz, C., Boyd, C. D., Izquierdo, E., Juel, C., Kame'enui, E., et al. (2011b). *Reading Street (Grade 3, vol. 1)*. Glenview, Illinois: Pearson.

Afflerbach, P., Blachowicz, C., Boyd, C. D., Izquierdo, E., Juel, C., Kame'enui, E., et al. (2011c). *Reading Street (Grade 4, vol. 1)*. Glenview, Illinois: Pearson.

Afflerbach, P., Blachowicz, C., Boyd, C. D., Izquierdo, E., Juel, C., Kame'enui, E., et al. (2011d). *Reading Street (Grade 4, vol. 2)*. Glenview, Illinois: Pearson.

Afflerbach, P., Blachowicz, C., Boyd, C. D., Izquierdo, E., Juel, C., Kame'enui, E., et al. (2011e). *Reading Street (Grade 5, vol. 1)*. Glenview, Illinois: Pearson.

Afflerbach, P., Blachowicz, C., Boyd, C. D., Izquierdo, E., Juel, C., Kame'enui, E., et al. (2011f). *Reading Street (Grade 5, vol. 2)*. Glenview, Illinois: Pearson.

Applegate, A. J., & Applegate, M. D. (2004). The peter effect: Reading habits and attitudes of preservice teachers. *The Reading Teacher, 57,* 554–563.

Bakken, J. P., Mastropieri, M. A., & Scruggs, T. E. (1997). Reading comprehension of expository science material and students with learning disabilities: A comparison of strategies. *The Journal of Special Education, 31,* 300–324.

Bakken, J. P., & Whedon, C. K. (2002). Teaching text structure to improve reading comprehension. *Intervention in School and Clinic, 37,* 229–233.

Baumann, J. F., Chard, D. J., Cooks, J., Cooper, J. D., Gersten, R., Lipson, M., et al. (2011a). *Texas Journeys (Grade 3, vol.1)*. Orlando: Houghton Mifflin Harcourt.

Baumann, J. F., Chard, D. J., Cooks, J., Cooper, J. D., Gersten, R., Lipson, M., et al. (2011b). *Texas Journeys (Grade 3, vol.2)*. Orlando: Houghton Mifflin Harcourt.

Baumann, J. F., Chard, D. J., Cooks, J., Cooper, J. D., Gersten, R., Lipson, M., et al. (2011c). *Texas Journeys (Grade 4)*. Orlando: Houghton Mifflin Harcourt.

Baumann, J. F., Chard, D. J., Cooks, J., Cooper, J. D., Gersten, R., Lipson, M., et al. (2011d). *Texas Journeys (Grade 5)*. Orlando: Houghton Mifflin Harcourt.

Binks-Cantrell, E., Washburn, E. K., Joshi, R. M., & Hougen, M. (2012). Peter effect in the preparation of reading teachers. *Scientific Studies of Reading, 16,* 526–536.

Chall, J. S. (1983). *Stages of reading development*. New York: McGraw-Hill.

Chiu, M. M., McBride-Chang, C., & Lin, D. (2012). Ecological, psychological, and cognitive components of reading difficulties: Testing the component model of reading in fourth graders across 38 countries. *Journal of Learning Disabilities, 45,* 391–405.

Connor, C. M., Son, S., Hindman, A. H., & Morrison, F. J. (2005). Teacher qualifications, classroom practices, family characteristics, and preschool experience: Complex effects on first graders' vocabulary and early reading outcomes. *Journal of School Psychology, 43,* 343–375.

Duke, N. K. (2000). 3.6 minutes per day: The scarcity of informational texts in first grade. *Reading Research Quarterly, 35,* 202–244.

Foorman, B. R., Petscher, Y., Stanley, C., & Trunckenmiller, A. (2016). Latent profiles of reading and language and their association with standardized reading outcomes in kindergarten through tenth grade. *Journal of Research on Educational Effectiveness*. https://doi.org/10.1080/19345747.2016.1237597.

Gough, P., & Tunmer, W. (1986). Decoding, reading and reading disability. *Remedial and Special Education, 7*(1), 6–10.

Hebert, M., Bohaty, J. J., Nelson, J. R., & Brown, J. (2016). The effects of text structure instruction on expository reading comprehension: A meta-analysis. *Journal of Educational Psychology, 105,* 609–629.

Hoover, W., & Gough, P. (1990). The simple view of reading. *Reading and Writing: An interdisciplinary Journal, 2,* 127–160.

Joshi, R. M., & Aaron, P. G. (2012). Componential model of reading (CMR): Validation studies. *Journal of Learning Disabilities, 45,* 387–390.

Joshi, R. M., Binks, E., Graham, L., Ocker-Dean, E., Smith, D. L., & Boulware-Gooden, R. (2009). Do textbooks used in university reading education courses conform to the instructional recommendations of the National Reading Panel? *Journal of Learning Disabilities, 42,* 458–463.

McKenna, M., & Stahl, S. (2009). *Assessment for reading instruction* (2nd ed.). New York, NY: Guilford Press.

Meyer, B. J. F. (1975). *The organization of prose and its effects on memory*. Amsterdam: North -Holland.

Meyer, B. J. F., Brandt, D. M., & Bluth, G. J. (1980). Use of the top-level structure in text: Key for reading comprehension of ninth-grade students. *Reading Research Quarterly, 16,* 72–103.

Meyer, B. J. F., Middlemiss, W., Theodorou, E., Brezinski, K. L., McDougall, J., & Bartlett, B. J. (2002). Effects of text structure strategy instruction delivered to fifth-grade children using the internet with and without the aid of older adult tutors. *Journal of Educational Psychology, 94,* 486–519.

Meyer, B. J. F., & Wijekumar, K. (2014). Why fifth- and seventh-graders submit off-task responses to a web-based reading comprehension tutor rather than expected learning responses. *Computers & Education*, *75*, 229–252.

Wijekumar, K. K., Meyer, B. J. F., & Lei, P. (2012). Large-scale randomized control trial with 4th graders using intelligent tutoring of the structure strategy to improve nonfiction reading comprehension. *Educational Technology Research and Development*, *60*, 986–1013. https://doi.org/10.1007/s11423-012-9263-4.

Wijekumar, K., Meyer, B. J. F., & Lei, P.-W. (2013). High-fidelity implementation of web-based intelligent tutoring system improves fourth and fifth graders content area reading comprehension. *Computers & Education*, *68*, 366–379.

Wikejumar, K., & (K.), Meyer, B. J. F., Lei, P., (2017). Web-based text structure strategy instruction improves seventh graders' content area reading comprehension. *Journal of Educational Psychology, Advance online publication.*. https://doi.org/10.1037/edu0000168.

Wijekumar, K., Meyer, B. J. F., Lei, P., Lin, Y., Johnson, L. A., Spielvogel, J. A., et al. (2014). Multisite randomized controlled trial examining intelligent tutoring of structure strategy for 5th-grade readers. *Journal of Research on Educational Effectiveness*, *7*, 331–357. https://doi.org/10.1080/19345747.2013.853333.

National Assessment of Educational Progress (NAEP) 2015. Available at http://www.nationsreportcard.gov/reading_math_2015/#reading?grade=4 on April 27, 2017.

National Reading Panel (U.S.), & National Institute of Child Health and Human Development (U.S.). (2000). *Report of the National Reading Panel: Teaching children to read: an evidence-based assessment of the scientific research literature on reading and its implications for reading instruction: reports of the subgroups*. Washington, D.C.: National Institute of Child Health and Human Development, National Institutes of Health.

Ortiz, M., Folsom, J. S., Al Otaiba, S., Greulich, L., Thomas-Tate, S., & Connor, C. M. (2012). The component model of reading: Predicting first grade reading performance of culturally diverse students from ecological, psychological, and cognitive factors assessed at kindergarten entry. *Journal of Learning Disabilities, 45,* 406–417.

Piasta, S. B., Connor, C. M., Fishman, B. J., & Morrison, F. J. (2009). Teacher's knowledge of literacy concepts, classroom practices, and student reading growth. *Scientific Studies of Reading, 13,* 224–248.

Pressley, M., Wharton-McDonald, R., Mistretta-Hampston, J., & Echevarria, M. (1998). Literacy instruction in 10 fourth- and fifth-grade classrooms in upstate New York. *Scientific Studies of Reading, 2,* 159–194.

Shanahan, T., Callison, K., Carriere, C., Duke, N. K., Pearson, P. D., Schatschneider, C., & Torgesen, J. (2010). Improving reading comprehension in kindergarten through 3rd grade: A practice guide (NCEE 2010-4038). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education. Retrieved from whatworks.ed.gov/publications/practiceguides.

Spires, H. A., Gallini, J., & Riggsbee, J. (1992). Effects of schema-based and text structure-based cues on expository prose comprehension in fourth graders. *Journal of Experimental Education, 60,* 307–320. https://doi.org/10.1080/00220973.1992.9943868.