An Analysis of Grade 4 Reading Textbooks used in Mainland China: Do the Texts and Activities Support Higher Order Reading Comprehension Skills?

Shuai Zhang[1] · Kausalai (Kay) Wijekumar[2] · Bing Han[2]

Abstract

The current study focused on the required Grade 4 reading textbooks published by Mainland China's People's Education Press. Using the construction–integration model (C–I; Kintsch in Psychol Rev 95:163–182, 1988; Discourse Process 39:125–112, 2005) as the theoretical framework, we analyzed the texts and activities in the textbooks on the following domains: (1) genre, (2) top-level structure (TLS), the C–I model activated in a (3) passage comprehension and (4) a word comprehension activity, and (5) whether the activities addressed the TLS to help students integrate prior knowledge under appropriate schemata. Our results suggested that among the 63 texts, only 2 had a comparison text structure. Also, only 20% of the 125 activities addressed a situation model of comprehension. Moreover, only 10 word comprehension activities were included in the textbooks (five promoted word comprehension in a situation model). Lastly, while many texts contained a problem and solution or cause and effect structure, most activities did not help students to identify the correct TLS. Therefore, the textbook design was not aligned with the C–I theory to promote higher-order reading comprehension skills. We suggested that textbook designers should consider a balanced representation of different TLSs, and teachers need to provide other activities that can guide students to comprehend a word and text in a TLS-appropriate situation model.

✉ Shuai Zhang
  zhangs4@appstate.edu

[1] Department of Reading Education and Special Education, Reich College of Education, Appalachian State University, Office 412 J, Boone, NC 28608, USA

[2] Texas A&M University, College Station, TX, USA

1 Introduction

Despite some district-level differences, in China, elementary schools typically have six grades (Grades 1–6; Ministry of Education 2019). In Mainland China, students in Grades 1–3 focus on acquiring basic skills of reading (e.g., *pinyin* and basic character recognition), and starting from Grade 4, students should be taught higher-order reading comprehension skills (Cai 2017; Xie 2015). These higher-order skills include main idea generations, summarization, and inference making (Elleman 2017). Therefore, building higher-order reading comprehension skills for students in Grade 4 is essential to prepare these students for future challenges (Cai 2017; Kamil et al. 2008; Ye 2020).

For years, education in China has been critiqued for focusing on preparing students for tests rather than helping them become better comprehenders (Kritzer 2014; Li 2017; Zhu and Wang 2005). Recently, China has aimed to shift from memory-based and examination-oriented education (or *Yingshi Jiaoyu*) to *Quality Education* (or *Suzhi Jiaoyu*; Ministry of Education 1985, 2001a, b, 2011). The essence of Quality Education is to develop well-rounded, higher-order skills for students; in specific, *application, communication*, *creativity, imagination*, and *independence* are the major skills for instructional foci (Dello-Iacovo 2009; Jin and Cortazzi 2002; Zhu and Wang 2005; Zhong 2005). Also, since 1990, China has doubled its investment in education with more than 4% of the overall GDP now devoted to it (Chinese Government Report 2016; Word Bank 2013). This percentage was similar to the U.S.'s expenditure on education (5%; Word Bank 2013). Therefore, from the policy level, China is making endeavors to improve school curriculum and instruction.

Following the national call for Quality Education, the Chinese reading curriculum has also been undergoing active changes (Wang 2011; Zhong 2006). Since 2019, the latest versions of textbooks published by People's Education Press were required to be used in schools across schools in Mainland China (Ministry of Education 2019). Compared to previous versions, the latest version has reduced the number of required texts, integrated different genres, and the activities in the textbooks have focused more on the application skills (Ministry of Education 2019).

As textbooks are essential components of reading comprehension instruction (Aaron et al. 2008), it is imperative to investigate if textbooks are well designed based on students' needs, especially Grade 4 students who need high-quality materials to foster higher-order reading comprehension skills. Despite the fact that previous researchers have analyzed reading textbooks on the activities used to promote these higher-order reading comprehension skills (e.g., Beerwinkle et al. 2018; Berkeley et al. 2016), few such studies have been conducted for Chinese textbooks. Therefore, the current study offers these insights with the analysis of the latest version of the Grade 4 textbooks used in Chinese language arts classrooms for reading comprehension instruction (hereafter *Grade 4 Chinese reading textbooks*). We adopted the construction–integration model (C–I; Kintsch 1988, 2005) and its developments (Perfetti and Stafura 2014; Meyer and Poon 2001) to guide our analysis of text choices and comprehension activities. Our ultimate goal was to provide theory-based textbook design and instructional suggestions to textbook designers and teachers.

1.1 Reading Comprehension as a C–I Process

As addressed in the C–I model (Kintsch 1988, 2005), reading comprehension is a construction (bottom-up) and integration (top-down) process. In specific, the construction occurs at

a (a) *surface model* and (b) *textbase model*, and the integration is completed in a (3) *situation model* (Kintsch 2005). A surface model involves the process of storing phonological, orthographic, and semantic information into short-term memory (Bogaerds-Hazenberg et al. 2020; Elleman 2017). A textbase model of reading includes literal meaning constructions via microstructure propositions (i.e., literal understanding of sentences) and macrostructure propositions (i.e., literal understanding of paragraph-level ideas; Elleman 2017; Schmalhofer et al. 2002; Kintsch 2005). To successfully infer implicit messages from textbase propositions, students need to *situate* themselves in context and integrate prior knowledge to eliminate irrelevant information from working memory and make inferences around the main idea (Kintsch 2005; Schmalhofer et al. 2002). As a final product of a C–I process, a coherent mental representation of a text will be built and the main idea and relevant inferences can be generated (Kintsch 2005; Pearson and Cervetti 2015).

Reading comprehension skills that occur in a situation model is considered as higher-order comprehension skills (Elleman 2017; Elleman and Oslund 2019; Pearson and Cervetti 2015). These skills include but not limited to main idea generation, summarizing, predicting, and inferencing, as they require students to integrate prior knowledge to select important ideas or infer implicit messages. Studies have found that starting from Grade 4, reading comprehension difficulties were more associated with a deficiency in activating a situation model of comprehension but less with surface-level, memory-based skills or literal understanding of propositions (Basaraba et al. 2013; Bowyer-Crane and Snowling 2005; Meyer and Freedle 1979). As textbooks play an essential role in classroom instruction (Aaron et al. 2008; Beerwinkle et al. 2018), the activities in textbooks for Grade 4 and up should promote these higher-order comprehension skills (Roehling et al. 2017; Wijekumar et al. 2020).

However, previous textbook analyses suggested that a situation model, the one that activates prior knowledge to solve higher-order comprehension problems, was not adequately fostered in reading activities in textbooks (Beerwinkle et al. 2018; Berkeley et al. 2016). Beerwinkle et al. (2018) analyzed Grades 3–5 English reading textbook activities from different publishers and found they did not address reading comprehension skills that require integration such as main idea and summary. Berkeley et al. (2016) examined how U.S. middle school social studies textbooks supported reading comprehension instruction and found most activities did not engage students in active integration (e.g., ask students to summarize texts but do not provide guidance). These findings suggest that textbooks have not adequately addressed the reading comprehension needs of the students in the U.S. However, the alignment of Chinese reading textbooks' design and student's higher-order reading comprehension needs has not been studied.

1.2 Word Comprehension from a C–I Perspective

The original C–I emphasized the sentence and discourse reading comprehension, but the role of written word comprehension (hereafter *word comprehension*) in the C–I process was not emphasized until recently. Perfetti and colleagues (Perfetti 2007; Perfetti and Stafura 2014) elaborated on the role of word comprehension in the C–I process. In specific, Perfetti and Stafura suggest that skilled readers construct a literal understanding of a word at first but actively update a word's meaning based on the information that followed. Therefore, word comprehension instruction needs to involve activities that support situational reading comprehension rather than just encourage students to look up words from dictionaries (Cobb and Blachowicz 2014; Wright and Cervetti 2017). In a systematic review of the

relationship between word comprehension and reading comprehension, Wright and Cervetti (2017) found that the interventions that teach students to actively apply word meanings in context had better reading comprehension outcomes than dictionary-based instruction. Such instruction is particularly important for multiple-meaning words and technical terms (Apthorp et al. 2012; Nelson and Stage 2007). To facilitate such instruction, reading textbooks for upper elementary grades (Grades 4–6) should provide word comprehension activities and engage students in seeking the word meanings in a text-provided situation model. However, to our knowledge, the analysis of how Chinese word comprehension is addressed in textbook activities has never been conducted.

1.3 Text Factors in a C–I Process: Genre and Top-level Structure

As mentioned, the updated C–I model considers both word and passage reading comprehension as a bottom-up (word and passage meaning construction) and top-down process (prior knowledge integration). However, the top-down process, or the integration process in a situation model, is influenced by text characteristics such as *genre* and *text structure* (Jian and Ko 2014; Meyer and Poon 2001; Pearson and Cervetti 2015). Genre categories, including *folklore, modern fantasy, historical fiction, science fiction, realistic fiction, informational book, biography, and poetry,* vary in the way a scene/character is portrayed (Tunnell et al. 2000). For example, a fantasy is stories that can never happen in the real world (e.g., animals talking to humans); fiction texts are stories that could happen in the historical, contemporary, or futuristic worlds; and informational and biography are factual portrayals of object, animal, or people (Tunnell et al. 2000). Reading different genres may open a "window" for students to experience different prose (Tunnell et al. 2000). Textbook genre analysis studies have found that diversity in the genre is essential to motivating different types of readers (Akins et al. 2018; Guthrie et al. 2007; Hebbecker et al. 2019). Under the C–I model, when students are encouraged to read different genres, various knowledge can be activated and integrated that may benefit knowledge growth (Cervetti and Hiebert 2018).

However, the integration process needs to be explicitly guided by the structure of a text so that irrelevant inferences can be inhibited and relevant inferences can be retained in working memory to help readers identify the gist of a text. There are five text structures, including *description (or enumeration), sequence, comparison, cause and effect, and problem and solution* (Meyer 1975; Meyer and Poon 2001). Different from the genres, the five structures vary on the logical organizations. For example, a comparison text compares two or more objects, and a cause and effect text provides a reason for an occurred event and its outcome. While some texts appear to have multiple text structures, it is the holistic structure (or top-level structure [TLS]) that needs to be used to guide students in seeking the main idea (or the *gist*; Meyer et al. 1980; Van den Broek et al. 2005). Experimental studies have found that using TLS to generate main ideas had direct causal influences on students' reading comprehension skills (e.g., Meyer and Poon 2001; Wijekumar et al. 2012, 2014, 2017). For most readers, explicit instructional activities are needed to guide students in differentiating extraneous details and the main idea by identifying the TLS (Bogaerds-Hazenberg et al. 2020), and textbook activities are among the instructional activities that need to foster the TLS and main idea instruction (Beerwinkle et al. 2018).

Further, Meyer and colleagues suggested that comparison, cause and effect, and problem and solution structures were more logically organized than description and sequence texts (Meyer and Freedle 1984; Meyer and Ray 2011). Therefore, engaging students in identifying and using these three text structures helped students in

generating main ideas by selecting important ideas from the text (Meyer 1975; Meyer and Freedle 1984; Meyer and Ray 2011; Wijekumar et al. 2012, 2017, 2018). Therefore, textbooks should provide more comparison, cause and effect, and problem and solution texts than description and sequence structures.

In TLS and textbook studies, Berkeley et al. (2014, 2016) found that over 50% of the passages in the middle school social studies textbooks were descriptive, and comparison and problem and solution together represented less than 15% across publishers. This unbalanced representation of TLS may have impeded students' experience with different text structures and the development of knowledge-integration skills. Meanwhile, few studies have investigated whether the activities in textbooks have helped the students to identify the TLS, and even fewer such studies have been conducted on Chinese reading textbooks. As the TLS plays an essential role in the integration process, we suggest that textbook activities of a text need to guide students in seeking for the TLS of a text, which can help students capture the main idea of a passage and make inferences under appropriate schemata (Meyer and Poon 2001; Wijekumar et al. 2020).

1.4 The Current Study

Hence, textbook designers need to consider both reading comprehension factors (passage and word reading comprehension) and text characteristics (genre and text structure) to foster higher-order reading comprehension. Also, textbook activities should be designed to help students identify the TLS and thus allow integration skills (e.g., main idea generation, inference making) to occur under appropriate schemata. In this study, we made the first attempt to analyze these areas in the required Grade 4 Chinese reading textbooks. As indicated by the panel of Institute of Educational Science (IES) in their document for instructional practices, the literacy needs of students in Grade 4 "have more in common with those of students in middle and high school than they do with students in early elementary grades" (Kamil et al. 2008, p. 1). In Mainland China, Grade 4 is also considered as the critical transitioning grade from early literacy to adolescent literacy (Cai 2017; Ye 2020). The current study focused on textbook materials as essential aspects of Grade 4 reading instruction, as teachers in Mainland China rely on these materials as per curriculum requirements (Cheng and So 2015; Curdt-Christiansen 2020). Therefore, the quality of reading textbooks is directly associated with instructional quality and thus needs to be critically analyzed (Beerwinkle et al. 2018, 2020).

Our analysis first focused on how different genres and TLSs were represented in Grade 4 textbooks. Then we analyzed the C–I model that a passage reading or a word comprehension activity has addressed. Lastly, we analyzed whether the activities for a particular text have helped students to identify the TLS. Specifically, we asked the following research questions.

RQ 1: Do Chinese Grade 4 reading textbooks represent different genres and top-level structures?

RQ 2: Do the passage and word comprehension activities actively engage readers in exercising a situation model of reading comprehension?

RQ 3: Do the activities engage students to facilitate situational reading comprehension with the appropriate top-level structure?

2 Method

2.1 Sample Materials

The current study adopted the latest version of reading textbooks published by People's Education Press, which has been made a required instructional material in Mainland China's Chinese language arts classrooms (Ministry of Education 2019). We analyzed both the Fall and Spring textbooks for Grade 4. Across the two textbooks, there were 63 texts, and each text is followed by a varying number of reading activities that were designed to support reading comprehension instruction.

2.2 Coding Schema

Our coding focused on five domains: (1) genre, (2) top-level text structure, (3) the C–I model that is activated in a (2) passage or (3) a word reading comprehension activity, and (5) whether the activities addressed the TLS (or TLS-activity alignment). Appendix 1 presents the coded information that includes the five domains.

2.3 Domain 1: Genre Coding

We followed the suggestion of Tunnell et al. (2000) and coded the 63 texts into eight genres: (a) Fictions, including (a1) *realistic fiction,* (a2) *historical fiction,* and (a3) *science fiction;* (b) fantasy, including (b1) *folklore* and (b2) *modern fantasy,* (c) nonfiction, including (c1) *biography* and (c2) *informational texts*; and finally, (d) *poetry*. According to Tunnell et al. (2000), realistic and historical fiction are both written based on believable settings and situations. Still, the former is based on the contemporary world, and the latter is depicting historical stories. Science fiction, on the other hand, features stories based on futuristic or scientific elements. Folklore and modern fantasy are both based on unrealistic context (e.g., animals can talk). The former is passed down by generations to help people learn lessons from stories, and the latter is stories with magical elements. Further, biography and informational texts present facts rather than stories, but the former are stories about a person, and the latter is documented facts about scientific elements. Finally, poetry is an artistic expression of ideas and feelings through carefully selected and structured words.

2.4 Domain 2: TLS Coding

Following the suggestion of Meyer (1975) and Meyer and Poon (2001), the 63 texts were coded into five categories, including *(a) cause and effect, (b) problem and solution, (c) comparison, (d) description, and (e) sequence*. If a text contains multiple text structures, we coded it based on the holistic structure (i.e., the top-level structure). Based on Meyer and Poon (2001), the difference between a cause and effect and problem and solution is that the latter provides the solutions to a problem, but the former only suggests the effects and their reasons. A comparison structure usually involves comparing and contrasting at least two objects, characters, or scientific facts. Description and sequence differ on whether

the depicted stories/facts are unordered enumerations or follow a chronological/logical sequence.

2.5 Domains 3 and 4: Coding of the C–I Model in a Passage and Word Comprehension Activity

Reading activities were used for coding of the (1) passage comprehension model and (2) word comprehension model. The activity descriptions were the basis for the activity coding. Based on the C–I model and its further elaborations (e.g., Kintsch 1988, 2005; Pearson and Cervetti 2015; Schmalhofer et al. 2002). We coded the activities into *(a) surface model, (b) textbase model (micro propositions), (c) textbase model (macro propositions),* and *(d) situation model.*

2.5.1 The Surface Model for Passage Comprehension

As explained by Schmalhofer et al. (2002), the surface model refers to the short memory of linguistic codes, and such activities require sufficient decoding and short memory capacity, but that process involves little word and sentence comprehension (also see Bogaerds-Hazenberg et al. 2020). Example activities include: *Read the following poem and pay attention to the pronunciations* and *recite the whole poem.*

2.5.2 The Textbase Model (Micro and Macro Levels) for Passage Comprehension

Activities that tap into textbase propositions address literal comprehension, which is further categorized into micro and macro propositions: Whereas micro propositions involve semantic processing at a sentence level (e.g., *explain the meaning of the below sentence*), macro propositions activities require readers to find literal ideas presented across multiple sentences (e.g., *read the following paragraph and explain the meaning*).

2.5.3 The Situation Model for Passage Comprehension

Finally, activities that tap into a situation model involve a process of integrating prior knowledge to update and enhance comprehension (Kintsch 1988, 2005). These activities require readers to situate themselves into context and make relevant inferences. Examples include: *Situate yourself into the story and explain the author's purpose in the below paragraph* (Bogaerds-Hazenberg et al. 2020; Schmalhofer et al. 2002).

2.5.4 The Three C–I Models for Word Comprehension Activities

As per Perfetti and Stafura's (2014) suggestion, we coded the word comprehension activities into surface, textbase, and situation models. The coding rationale was the same as the passage comprehension models except that the activities focus on individual words. In the coding book, if a word comprehension activity only involved pronunciations or memorizations (e.g., *read the list of words aloud and pay attention to the pronunciation*), the activity was coded as a surface model. If an activity involves an explanation of the meaning of the words in an isolated context (e.g., *find the meaning of the following words in your dictionary*), then it was coded as a textbase model. Finally, if the activity involved explanations

of a word based on the reading context, the activity was coded as a situation model (e.g., *Explain which characters in the story are related to the following words*).

2.6 Domain 5: TLS–Activity Alignment Coding

Finally, we investigated whether a passage or word comprehension activity involves identifying and applying a TLS. For example, the activities in a comparison text structure text should have at least one question addressing the comparison structure (e.g., *compare and contrast the two objects on the following categories*). If none of the questions addressed the TLS, these activities would be coded as "no alignment with the top-level structure."

2.7 Interrater Reliability

The first author, a native speaker of Mandarin Chinese and a professor in reading education, coded all the activities. The third author, a former Chinese-as-a-foreign-language teacher and a current doctoral student in reading education, coded 21 (30% of the total number texts) of the texts and the 43 activities associated with the 21 texts (34% of the total activities). The two authors coded the texts and activities in independent settings. The interrater reliability was reported based on the commonly coded passages and activities. We calculated the interrater reliability for all five domains. The disagreements, if any, were resolved through discussions between the two authors.

2.8 Calculation

The Excel sheet with the five domains of coding (also see Appendix 1) was exported to SPSS for calculation. We used frequencies and percentages to represent the number and weight of different categories within each domain. A percentage was calculated by dividing the frequency of a category either by the total number of passages (for the genre, TLS, and TLS–activity alignment) or activities (for a C–I model in a passage or word reading comprehension activity). The calculations were conducted in SPSS Version 25.

3 Results

Overall, there were 63 passages and 125 activities. This section first described the interrater reliability coefficients for the five domains and then described genre, text structure, and structure–activity alignment results at the text level ($n = 63$). The passage and word comprehension models were presented at the activity level ($n = 125$). We also used the plus sign (+) and minus sign (−) to indicate the percent increase or decrease of the Spring textbook compared to the Fall textbook.

3.1 Interrater Reliability

Among the five coding domains, the interrater reliability was 100% for the genre, 95.23% for TLS, 93.02% for the C–I model in text comprehension activities, 100% for the C–I model in word comprehension activities, and 95.23% for the TLS–activity

alignment. A discussion was initiated between the two authors, and the conflicts were completely resolved during the discussion.

3.2 Domain 1: Genre

As shown in Table 1, poetry ($n=20$; 32%) and realistic fiction occupied the majority of the genres ($n=14$; 22%), and modern fantasy ($n=2$; 3%) and science fiction ($n=1$; 2%) were the least frequent. The Spring textbook had fewer Folklore (− 10%) and more Poetry (+ 17%) texts than the Fall textbook.

3.3 Domain 2: Top-level Structure (TLS).

As also shown in Table 1, among the five text structures, the majority of the passages addressed cause and effect ($n=21$%; 33%), problem and solution ($n=19$; 30%), and description text structures ($n=24$%). The least frequent was the comparison structure ($n=2$; 3%), and the Spring textbook has no comparison texts. The changes on the TLS between the two textbooks were within 8%.

Table 1 Genre and top-level structure represented in grade 4 textbook

	Total (n)	Total (%)	F (n)	F (n)	S (n)	S (%)
Genre						
Folklore	5	8	4	13	1	3
Modern fantasy	2	3	1	3	1	3
Science fiction	1	2	0	0	1	3
Realistic fiction	14	22	7	23	7	22
Historical fiction	5	8	2	6	3	9
Informational	10	16	6	19	4	13
Biography	6	9	4	13	2	6
Poetry	20	32	7	23	13	41
Total	63	100	31	100	32	100
Top-level structure						
Cause and effect	21	33	9	29	12	38
Problem and solution	19	30	10	32	9	28
Comparison	2	3	2	6	0	0
Description	15	24	5	16	10	31
Sequence	6	10	5	16	1	3
Total	63	100	31	100	32	100

n, frequency; %, percent; *F*, fall; *S*, spring

Table 2 Model of reading rated based on the construction–integration model

	Total (n)	Total (%)	F (n)	F (%)	S (n)	S (%)
Passage comprehension						
Not a text comprehension activity	10	8	9	14	1	2
Surface model	26	21	13	21	13	21
Textbase model (micro)	31	25	15	24	18	29
Textbase model (macro)	33	26	10	16	21	34
Situation model	25	20	16	25	9	15
N total	125	100	63	100	62	100
Word comprehension						
Not a word comprehension activity	115	92	60	95	55	89
Surface model	3	2	0	0	3	5
Textbase model	2	2	0	0	2	3
Situation model	5	4	3	5	2	3
N total	125	100	63	100	62	100

n, frequency; %, percent; *F*, fall; *S*, spring

3.4 C–I Model

3.4.1 Domain 3: Passage Comprehension Models

A shown in Table 2, there were 26 surface models (21%), 31 micro propositions (25%), 33 macros propositions (26%), and 25 situation models activities (20%). Hence, textbase propositions were the most frequent (51%), and the situation model was the least frequent. Meanwhile, there were fewer situation models (−10%) and more macro proposition activities (+18%) in the Spring textbook than those in the Fall textbook. Other differences between the two textbooks were within 6%.

3.4.2 Domain 4: Word Comprehension Models

Only 10 out of the 125 activities (8%) addressed word comprehension skills, and only 5 addressed the situation model of word comprehension ($n=3$ from Fall and $n=2$ from Spring). The remaining 5 out of the 10 word comprehension activities focused on the surface ($n=3$) and literal comprehension ($n=2$), and they all appeared in the Fall textbook.

3.4.3 Domain 5: TLS–Activity Alignment

As shown in Table 3, overall, there was a medium consistency between the description structures and their activities (53%). That is, among the 15 description texts, 8 of them had activities asking students to enumerate the major elements of the text (e.g., *Describe what have the author seen in Paragraph 2*). The consistency between the sequence text structure and their activities was high (83%), indicating the vast majority of the sequence texts had activities that addressed the sequence structure (e.g., *describe this tour by sequence*). Among the 2 comparison texts, one text had comparison activities (e.g., *describe the similarities and differences between the two types of houses),* and the other did not. However, few cause and effect (33%) and problem and solution texts' activities (26%) addressed

Table 3 Frequency and percentages of activities that are tied to the top-level structure of a passage

	n aligned	Total n	% aligned	n aligned (F)	Total n (F)	% aligned (F)	n aligned (S)	Total n (S)	% aligned (S)
Cause and effect	7	21	33	1	9	11	5	12	42
Problem and solution	5	19	26	3	10	30	2	9	22
Comparison	1	2	50	1	2	50	0	0	0
Description	8	15	53	2	5	40	6	10	60
Sequence	5	6	83	5	5	100	0	1	0
Total	26	63	100	12	31	39	13	32	41

To be rated as "Aligned," at least one activity from that passage needs to be tied to the top-level structure

F, fall; *S*, spring

the corresponding text structure. Comparing the Spring textbook with the Fall textbook, TLS–activity alignment improved for the Cause and effect (+31%) and Description texts (+20%), and decreased for Problem and Solution (−8%). There was no comparison and only 1 sequence text in the Spring textbook, making the trend analysis less meaningful for these two structures.

4 Discussion

The current study examined the texts and activities in the two required Grade 4 Chinese reading textbooks. We evaluated these textbook elements based on the construction–integration (C–I) model (Kintsch 1988). Overall, there were 63 analyzed texts and 125 activities. Except for modern fantasy and science fiction, the textbooks well represented the other genres, with poetry and realistic fiction representing the most. Moreover, the texts had adequately represented all the text structures except for the comparison structure. However, only 20% of the activities involved a situation model of reading comprehension. Also, the textbooks had weak connections between problem and solution and compare and contrast structures and their activities. The trend analysis did not suggest apparent improvements from the Fall textbook to the Spring textbook.

4.1 The Role of Text Features in Reading Comprehension Acquisition and Instruction

According to Aaron et al. (2008), textbooks as an ecological component play a vital role in reading comprehension beyond cognitive (e.g., decoding and comprehension) and psychological (e.g., motivation) factors. In China, teachers typically rely on textbooks for instruction (Cheng and So 2015; Curdt-Christiansen 2020), and thus the quality of reading textbooks is critical in instruction and student reading comprehension development.

Our study began with an analysis of the genre. While previous studies divided the genre into two broad categories: narrative and expository, we detailed such categorization into 8 specific categories per Tunnell et al.'s (2000) framework. According to teaching standards in western countries, by the end of elementary education, students should be able to understand and distinguish various genres and gather knowledge in different domains (e.g., The U.S. National Governors Association Center for Best Practices and Council of Chief State School Officers 2010; [Netherlands] Expertgroep Doorlopende Leerlijnen Taal en Rekenen 2009). Although such standards have not been made explicit in the reading curriculum of China, different genres may attract different readers and can be considered as an important motivation factor for reading (Akins et al. 2018; Guthrie et al. 2007).

We found that among the eight categories, science fiction was the least represented in the Grade 4 textbook, with only 1 out of the 63 texts belonging to this genre. Science fiction may be seen as a scaffold to help students transition from narrative to informational texts: First, earlier studies have found that informational texts posed more difficulties for students due to difficult words and dense information (Best et al. 2008; Francis et al. 2018). Then, Gavaler and Johnson (2017) found that the story elements in science fiction can significantly reduce the cognitive loads and raise interest levels for comprehending scientific facts presented in science fiction. Future policymakers in China may consider incorporating more science fiction into the curriculum to value the potential cognitive and motivational benefits of reading science fiction. Also, only 16%

of texts were informational, while most texts were about stories or poetry. Considering the increasing demands of learning new information from reading in Grade 4 (Chall 1983), we suggest that more informational texts should be incorporated into Chinese textbooks for these grades.

On the other hand, TLS is considered as both a text feature and a cognitive process during reading comprehension (Kintsch and Van Dijk 1978). In this analysis, the majority of the TLSs were problem and solution, cause and effect, and description, but only two texts adopted a comparison structure. Across different genres, TLS is essential for students to understand the main idea of a text as it represents how authors organized their ideas when composing a text (Meyer and Ray 2011). Whereas description and sequence text structures could be easier to identify, problem and solution, cause and effect, and comparison texts were suggested as more logically organized structures that promoted students' cognitive development (Ghaith and Harkouss 2003; Meyer and Freedle 1984). In experimental studies, Meyer and colleagues (e.g., Meyer and Freedle 1984; Meyer and Ray 2011) found that, compared to description texts, reading comparison texts benefited more on readers' accuracy of identifying main ideas and summarization.

In the C–I process, readers should construct corresponding schemata based on the TLS to precisely capture the main idea (Kintsch and Van Dijk 1978). Due to the lack of comparison text structure, students may not have sufficient experience in constructing comparison schemata and may hinder the readiness for reading future comparison texts or being able to compare people or ideas across texts. From a cross-disciplinary perspective, incorporating comparison structures in reading textbooks may help students' practice the comparison schemata starting from early grades. Later, when students come across such structure in social studies and science classes, they will be ready to use the TLS to organize information for learning new information (Meyer et al. 2018; Williams 2005) and proceed to argumentation. Therefore, future textbooks should consider adding more comparison structures.

4.2 Word-Comprehension in the C–I Process

This study found that among the 125 activities, only 10 involved explicit (written) word comprehension instruction, and five of them encouraged students to apply words into situational context. Word knowledge plays a critical role in both the construction and integration process during reading comprehension, and word comprehension activities also need to activate students' situational thinking skills (Jian and Ko 2014; Perfetti and Stafura 2014). However, skilled and poor readers differ in their abilities to integrate information into updating or deepening the understanding of a word (Apthorp et al. 2012; Wright and Cervetti 2017). Skilled readers adjust knowledge of a word based on the situation conveyed by the text, but poor readers typically lack such ability (Perfetti 2007; Perfetti and Stafura 2014). As Cobb and Blachowicz (2014) suggested, effective instruction should encourage students to use words in context rather than in an isolated setting (e.g., look up the word list). Empirical studies have suggested that explicit situation-based word comprehension instruction can facilitate students' reading comprehension (Apthorp et al. 2012; Cervetti et al. 2016). This analysis showed that the Grade 4 reading textbooks in Mainland China did not emphasize the role of situation-based word comprehension. Thus, teachers may have to find additional resources to support their word comprehension instruction (Wright and Cervetti 2017).

4.3 The Role of Textbook Activities in a C–I Framework

Reading activities need to be aligned with the mental process of how students read texts. In the C–I model, students store linguistic information in memory (surface-level), understand the propositions at a sentence- (micro proposition) and paragraph-level (macro-proposition), and integrate prior knowledge to facilitate inferencing (Kintsch 1988, 2005; Pearson and Cervetti 2015). As students enter Grade 4, the first step into adolescent literacy, the instructional focus should shift from the surface and literal understanding of propositions to inferring implicit messages (Chall 1983). Therefore, we anticipated that textbooks would support such transition, and at Grade 4, the activities should tap into the situation model of reading to foster integration skills. However, only 20% of the activities tapped into a situation model, but most of the activities focused on literal understanding.

As an ecological component of reading comprehension, textbooks should support teachers in instruction and student independent practice. Therefore, we encourage curriculum designers to consider adding activities that promote the integration of prior knowledge. Meanwhile, teachers should plan activities that can activate situational thinking to aid in higher-order comprehension, as teacher-directed, situation-based reading activities have shown to be effective in improving reading comprehension in previous studies (Bos et al. 2016; de Koning et al. 2017).

4.4 The Alignment of the TLS and Activities

Our analysis also found an inconsistency between problem and solution and cause and effect structures and their activities. In specific, 26% of the problem and solution texts did not have activities that encouraged students to examine the problems and solutions, and 33% of activities in the cause and effect texts did not ask students to identify the causes or the effects in the situation. These results were comparable with Beerwinkle et al.'s (2018) study, which suggested that the U.S. textbooks' activities did not adequately involve the TLS.

A TLS is seen as an important component in the C–I process (Bogaerds-Hazenberg et al. 2020; Wijekumar et al. 2012, 2020). In this process, a TLS provides a logically organized skeleton for students to select important ideas and generate the main idea. As noted by Bogaerds-Hazenberg et al. (2020) and Schmalhofer et al. (2002), the main idea generation is a situation-based, higher-order thinking skill, and Wijekumar and colleagues found TLS interventions can help students to accurately identify and generate main ideas (e.g., Wijekumar et al. 2012). Meanwhile, readers should differentiate the essential and extraneous details for less effortful working memory processing and focus on relevant inferencing (Bogaerds-Hazenberg et al. 2020; Kintsch and van Dijk 1978; Meyer et al. 1980). We found that despite many texts in the two Grade 4 textbooks utilized the problem and solution and cause and effect structures, the activities did not prompt students to use the TLS knowledge to identify the important information, generate main ideas, or to make relevant inferences. We suggest that textbook designers, teachers, and researchers need to work together to enhance their awareness of the role of TLS in students' reading comprehension development.

4.5 Limitations and Future Directions

The current study is not without limitations. First, our focus was on textbook analysis but did not involve how teachers use textbooks. Future researchers may conduct in-class observations to study how teachers teach reading comprehension based on textbooks. Also, this study focused on Grade 4 but did not analyze textbooks of other grade levels. Future studies may cover multiple grade levels to present longitudinal points of view. Moreover, our analysis did not use an empirical study to investigate how readers transact with different text structures, which should be examined in future experimental studies. Lastly, we adopted the C–I process as the theoretical framework for the analyses but acknowledged that this model was more well researched in alphabetic orthographies than in other orthographies. Based on the Orthographic Depth Hypothesis, Chinese is a morpho-syllabic orthography, which means each character contains meaning in addition to its sound and is visually complex (e.g., some characters have many strokes that interfere with word comprehension; McBride 2016). Therefore, the C–I procedure in Chinese and alphabetic orthographies may vary due to orthographic differences. Future researchers are suggested to conduct experimental studies to examine how the C–I process differs in Chinese versus in alphabetic orthographies and whether the integration process is interfered with by Chinese characters' semantic properties and visual complexity.

5 Conclusion and Implications

Using the C–I as the theoretical framework, the study concludes that the Grade 4 reading textbooks have not conformed to this theoretical model of reading comprehension. Considering the importance of textbooks in classroom instruction, we suggest textbook designers consider a balanced representation of genre categories and TLS types. Also, textbook activities need to focus on helping students address the TLS so that the integration process can occur under appropriate schemata. Due to the limitations of the textbooks, teachers will need to design supplementary activities that can guide students to identify the TLS, generate the TLS-driven main idea, and make relevant inferences under the appropriate schemata. Future researchers need to make endeavors to investigate the relative contributions of text features, instructional activities, and student ability differences in the C–I process and test the validity of the C–I model in Chinese orthography. As Grade 4 is the first step into adolescent literacy (Kamil et al. 2008), textbook designers, teachers, and researchers need to work collaboratively to foster students' higher-order reading comprehension skills using theory-driven approaches.

6 Appendix 1: Coding Matrix

Unit	Passage number	Passage title	Genre (Coding Domain 1)	Top-level structure (Coding Domain 2)	Reading activities	C–I in a passage comprehension activity (Coding Domain 3)	C–I in a word comprehension activity (Coding Domain 4)	Do activities address the top-level structure? (Coding Domain 5)
Fall version, Grade 4								
Unit 1	1	The Tide	Informational	Sequence	Recite paragraphs 3–4	Surface model	n.a	Yes
Unit 1	1				Describe the sequence of the tides: What do you see in your imagination and discuss them with your peers	Situation model	n.a	
Unit 1	1				Read the below poem, compare it with the text	Textbase model (macro)	n.a	
Unit 1	2	The Moon	Realistic fiction	Description	Read and Recite paragraph 4	Surface model	n.a	Yes
Unit 1	2				What do you see in your imagination when you read the below section	Situation model	n.a	
Unit 1	2				(Writing) Copy the sentences	n.a	n.a	
Unit 1	2				(Writing) Reread Paragraph 6 and write a passage in a similar style	n.a	n.a	

Unit	Passage number	Passage title	Genre (Coding Domain 1)	Top-level structure (Coding Domain 2)	Reading activities	C–I in a passage comprehension activity (Coding Domain 3)	C–I in a word comprehension activity (Coding Domain 4)	Do activities address the top-level structure? (Coding Domain 5)
Unit 1	3	Night of Autumn; Chant Of Ox	Modern poetry	Description	Read the two poems and retell what was described in these poems	Surface model	n.a	Yes
Unit 1	4	Stars	Realistic fiction	Description	none	n.a	n.a	No
Unit 2	5	Five Peas In A Pod	Modern fantasy	Problem–solution	After reading, generate questions by yourselves	Surface model	n.a	Yes
Unit 2	5				(oral) combine your questions and discuss with your peers	n.a	n.a	
Unit 2	5				The girl watched the pea grow, and she became better because of that. Use your knowledge, describe why this happened	Situation model	n.a	
Unit 2	6	Bats and Radar	Informational	Comparison	After reading, generate questions	Surface model	n.a	No

Unit	Passage number	Passage title	Genre (Coding Domain 1)	Top-level structure (Coding Domain 2)	Reading activities	C–I in a passage comprehension activity (Coding Domain 3)	C–I in a word comprehension activity (Coding Domain 4)	Do activities address the top-level structure? (Coding Domain 5)
Unit 2	6				(oral) combine your questions and discuss with your peers	n.a	n.a	
Unit 2	6				Compare the text with the below paragraph, and discuss with your peers	Textbase model (macro)	n.a	
Unit 2	7	A Century of Significant Changes	Informational	Cause and effect	As a group, after reading, design questions and classify the questions with your peers	Textbase model (macro)	n.a	No
Unit 2	7				(Oral) Discuss your questions with your peers. What do you find?	n.a	n.a	
Unit 2	7				Recall your personal experience; what parts of the story can you find relatable? Explain	Situation model	n.a	
Unit 2	8	Home of Butterflies	Informational	Problem and Solution			n.a	No

Unit	Passage number	Passage title	Genre (Coding Domain 1)	Top-level structure (Coding Domain 2)	Reading activities	C–I in a passage comprehension activity (Coding Domain 3)	C–I in a word comprehension activity (Coding Domain 4)	Do activities address the top-level structure? (Coding Domain 5)
Unit 3	9	Chant by The River at Dark;	Poetry	Description	Recite the poems	Surface model	n.a	No
Unit 3	10	Inscription on The Wall Of Xilin Temple	Poetry	Description	Read the verse…, relate to your experience, and paint a picture for us using your own words	Situation model	n.a	No
Unit 3	9/10				What can you conclude from the second poem? Explain	Textbase model (macro)	n.a	
Unit 3	11	The Feet of Ivy	Informational	Problem and Solution	Describe the evidence that the author was a detailed observer. Explain	Situation model	n.a	No
Unit 3	11				Fill in the blank to complete the sequence of the ivy's crawling	Surface model	n.a	
Unit 3	11				(Writing) Find vivid expressions and copy them to your journal	n.a	n.a	

Unit	Passage number	Passage title	Genre (Coding Domain 1)	Top-level structure (Coding Domain 2)	Reading activities	C–I in a passage comprehension activity (Coding Domain 3)	C–I in a word comprehension activity (Coding Domain 4)	Do activities address the top-level structure? (Coding Domain 5)
Unit 3	12	Crickets' Houses	Informational	Problem and solution (with comparison text structure embedded)	Retell the process of the construction of the houses	Textbase model (macro)	n.a	Yes
Unit 3	12				What are two major aspects essential for the construction of the houses?	Textbase model (macro)	n.a	
Unit 3	12				The text compared crickets' houses and people's houses. Describe them	Textbase model (macro)	n.a	
Unit 4	13	Story of Pan'Gu	Folklore	Cause and Effect	Describe PanGu	Textbase model (micro)	n.a	No
Unit 4	13				Describe Pangu's creation of the world	Textbase model (macro)	n.a	
Unit 4	14	Jingwei Tries to Fill the Sea	Folklore	Problem and Solution	Recite the story	Surface model	n.a	No
Unit 4	14				Retell the story	Textbase model (macro)	n.a	

Unit	Passage number	Passage title	Genre (Coding Domain 1)	Top-level structure (Coding Domain 2)	Reading activities	C–I in a passage comprehension activity (Coding Domain 3)	C–I in a word comprehension activity (Coding Domain 4)	Do activities address the top-level structure? (Coding Domain 5)
Unit 4	14				In what situation would people refer to Jingwei as a respectful figure? Explain	Situation model	n.a	
Unit 4	15	Prometheus	Folklore	Problem and Solution	Read the passage and pay close attention to the pronunciations of the gods' names	Surface model	n.a	No
Unit 4	15				Retell the story by beginning, middle, and end	Textbase model (macro)	n.a	
Unit 4	15				Which plot from the story can you find relatable to your experience? Why?	Situation model	n.a	
Unit 4	16	Nüwa Mends the Heavens	Folklore	Problem and Solution	Interpret the following words and think about which folklore figures can you relate	Situation model	Situation model	No

Unit	Passage number	Passage title	Genre (Coding Domain 1)	Top-level structure (Coding Domain 2)	Reading activities	C–I in a passage comprehension activity (Coding Domain 3)	C–I in a word comprehension activity (Coding Domain 4)	Do activities address the top-level structure? (Coding Domain 5)
Unit 4	16				Explain the below excerpt from the story	Textbase model (micro)	n.a	
Unit 5	17	Kite	Realistic fiction	Sequence	Retell the story	Textbase model (macro)	n.a	Yes
Unit 5	17				Describe the author's crafts when describing the process of flying a kite?	Textbase model (micro)	n.a	
Unit 5	18	Sparrow	Realistic fiction	Problem and solution	Retell the beginning, middle, and end	Textbase model (macro)	n.a	No
Unit 5	18				What was the author's crafts in the following phrases: "The Old Dog's attachment"; "the desperate young sparrow"; "the brave mother sparrow"	Textbase model (micro)	n.a	
Unit 6	19	Ox and Goose	Realistic fiction	Problem and solution	When reading, feel the emotions of the author	Surface model	n.a	No

Unit	Passage number	Passage title	Genre (Coding Domain 1)	Top-level structure (Coding Domain 2)	Reading activities	C–I in a passage comprehension activity (Coding Domain 3)	C–I in a word comprehension activity (Coding Domain 4)	Do activities address the top-level structure? (Coding Domain 5)
Unit 6	19				Why can the author still remember the words of his uncle?	Situation model	n.a	
Unit 6	20	A Coward Tiger	Realistic fiction	Cause and Effect	Mark the places where you find it difficult to understand	Surface model	n.a	Yes
Unit 6	20				Fill in the cause and effect chart	Textbase model (macro)	n.a	
Unit 6	20				Based on your experience, describe if the author's performance was indeed a coward or not. What would you tell the author to make him feel happier?	Situation model	n.a	
Unit 6	20				Mark the places where you find it difficult to understand	Surface model	n.a	

Unit	Passage number	Passage title	Genre (Coding Domain 1)	Top-level structure (Coding Domain 2)	Reading activities	C–I in a passage comprehension activity (Coding Domain 3)	C–I in a word comprehension activity (Coding Domain 4)	Do activities address the top-level structure? (Coding Domain 5)
Unit 6	21	Spinning Top	Realistic fiction	Sequence	Read the following sentences and describe the emotional changes of the author	Textbase model (micro)	n.a	Yes
Unit 6	21				"You can't judge a person by his appearance," describe what does this idiom mean	Textbase model (micro)	n.a	
Unit 6	22	Ancient Poem 1-Out for Battle	Poetry	Cause and Effect	Recite the poems	Surface model	n.a	No
Unit 6	23	Ancient Poem 2-Liangzhou Poem	Poetry	Cause and Effect	Explain the meaning of the poems	Textbase model (micro)	n.a	No
Unit 6	24	Ancient Poem 3-Short Poem Written in Summer	Poetry	Cause and Effect				No
Unit 6	25	We Read for The Rise of China	Biography	Cause and Effect	Retell the major events	Textbase model (micro)	n.a	No

Unit	Passage number	Passage title	Genre (Coding Domain 1)	Top-level structure (Coding Domain 2)	Reading activities	C–I in a passage comprehension activity (Coding Domain 3)	C–I in a word comprehension activity (Coding Domain 4)	Do activities address the top-level structure? (Coding Domain 5)
Unit 6	25				Look up the following words, situate yourself into the historical situation, and describe the meaning of these words	Situation model	Situation model	
Unit 7	26	Mei Lanfang's Mustache	Biography	Problem and Solution	No questions	n.a	n.a	No
Unit 7	27	Poem of Yan'an	Poetry	Cause and Effect	Read the following words and think: What type of people can you relate to these words	Situation model	Situation model	No
Unit 7	27				Read the following sentences and adapt them to the following oral situations	Situation model	n.a	
Unit 8	28	Wang Rong Refused to Take the Plums off The Road	Biography	Cause and Effect	Recite the story	Situation model	n.a	No
Unit 8	28				Retell the story	Textbase model (macro)	n.a	

Unit	Passage number	Passage title	Genre (Coding Domain 1)	Top-level structure (Coding Domain 2)	Reading activities	C–I in a passage comprehension activity (Coding Domain 3)	C–I in a word comprehension activity (Coding Domain 4)	Do activities address the top-level structure? (Coding Domain 5)
Unit 8	28				Why Rong said these plums must be bitter?	Textbase model (macro)	n.a	
Unit 8	29	Ximen Bao Manages the City of Ye	Biography	Problem and solution	Based on the story map, retell the content of the text	Textbase model (micro)	n.a	Yes
Unit 8	29				Find sentences from Paragraphs 10–14, explain why their methods were better?	Situation model	n.a	
Unit 8	30	Story 1: Bian Que Treats Cai Huan Gong	Historical fiction	Cause and Effect	Copy the following words (writing)	n.a	n.a	No
Unit 8	31	Story 2: Ji Chang Learns to Shoot Arrows	Historical fiction	Problem and solution	Compare and contrast the way the following two sentences differ in craft moves	Textbase model (micro)	n.a	No
Spring version, Grade 4								
Unit 1	1	Ancient Poem 1-City of Su Xin And Country Of Xu Gong	Poetry	Description	Recite the first poem	Surface model	n.a	No
Unit 1	2	Ancient Poem 2-A Poem Written with Aesthetic Emotions	Poetry	Description	Retell the scenes from the descriptions	Situation model	n.a	Yes

Unit	Passage number	Passage title	Genre (Coding Domain 1)	Top-level structure (Coding Domain 2)	Reading activities	C–I in a passage comprehension activity (Coding Domain 3)	C–I in a word comprehension activity (Coding Domain 4)	Do activities address the top-level structure? (Coding Domain 5)
Unit 1	3	Ancient Poem 3-Life in Villiage	Poetry	Description			n.a	No
Unit 1	4	A Household in The Countryside	Realistic fiction	Description	Visualize the story by drawing pictures, then label each picture	Situation model	n.a	Yes
Unit 1	4				Which scene do you like the most?	Surface model	n.a	
Unit 1	4				Find vivid expressions and copy them. Explain	Textbase model (micro)	n.a	
Unit 1	5	The Roof Window	Poetry	Description	Read and describe the role of roof windows in a house	Situation model	n.a	Yes
Unit 1	5				In what circumstance did the roof window become the only consonance?	Textbase model (micro)	n.a	
Unit 1	5				What kind of feeling does "sweeping" give to you in the story context?	Situation model	Situation model	

Unit	Passage number	Passage title	Genre (Coding Domain 1)	Top-level structure (Coding Domain 2)	Reading activities	C–I in a passage comprehension activity (Coding Domain 3)	C–I in a word comprehension activity (Coding Domain 4)	Do activities address the top-level structure? (Coding Domain 5)
Unit 1	5				Based on the text, how did the kids examine the connection between reality and phony	Textbase model (micro)	n.a	
Unit 1	6	"Peach Blossom Water" Of March	Poetry	Cause and Effect	Read the entire passage, explain why the authors described the water as "peach blossom water"?	Textbase model (macro)	n.a	Yes
Unit 2	7	Amber	Science fiction	Cause and Effect	Why can we tell the story behind the amber?	Textbase model (micro)	n.a	Yes
Unit 2	7				Retell the process of how the amber was formed	Textbase model (macro)	n.a	
Unit 2	7				What does "speculation" mean in this story?	Textbase model (micro)	Textbase model	
Unit 2	7				What's the proof of such speculation?	Textbase model (micro)	n.a	

Unit	Passage number	Passage title	Genre (Coding Domain 1)	Top-level structure (Coding Domain 2)	Reading activities	C–I in a passage comprehension activity (Coding Domain 3)	C–I in a word comprehension activity (Coding Domain 4)	Do activities address the top-level structure? (Coding Domain 5)
Unit 2	8	Dinosaur to Bird	Informational	Cause and Effect	Read the passage and generate questions on your own	Textbase model (micro)	n.a	No
Unit 2	8				Describe the process of dinosaurs becoming birds	Textbase model (macro)	n.a	
Unit 2	8				Find sentences that described the above process	Surface model	n.a	
Unit 2	9	Nanotechnology Is Around Us	Informational	Problem and Solution	Pay attention to the pronunciations of the technical terms	Surface model	n.a	No
Unit 2	9				Describe your understanding of "Nanotechnology is around us."	Textbase model (macro)	n.a	
Unit 2	10	Human Spacecrafts: From Early Attempts to Final Success	Informational	Sequence	No questions	n.a	n.a	No
Unit 3	11	A Poem of Stars	Poetry	Description	Recite the poem	Textbase model (macro)	n.a	Yes

Unit	Passage number	Passage title	Genre (Coding Domain 1)	Top-level structure (Coding Domain 2)	Reading activities	C–I in a passage comprehension activity (Coding Domain 3)	C–I in a word comprehension activity (Coding Domain 4)	Do activities address the top-level structure? (Coding Domain 5)
Unit 3	11				Read the following version; what thoughts do you have related to the situation it described	Textbase model (micro)	n.a	
Unit 3	11				Feel the author's feelings and discuss them with your peers	Situation model	n.a	
Unit 3	11				The below two verses both used the words "Wind and Rain," what's the difference between the two pairs of words in these two verses?	Textbase model (micro)	n.a	
Unit 3	12	Green	Poetry	Description	Recite the poem	Surface model	n.a	Yes

Unit	Passage number	Passage title	Genre (Coding Domain 1)	Top-level structure (Coding Domain 2)	Reading activities	C–I in a passage comprehension activity (Coding Domain 3)	C–I in a word comprehension activity (Coding Domain 4)	Do activities address the top-level structure? (Coding Domain 5)
Unit 3	12				This poem describes green as a natural phenomenon and the feeling of the author. Based on this statement, express your feelings and reactions	Situation model	n.a	
Unit 3	12				Compare this poem with the following poem, describe the differences in "Green" between these two poems	Textbase model (macro)	n.a	
Unit 3	13	White Birch	Poetry	Description	Read and think about the emotion of the author	Surface model	n.a	No
Unit 3	13				Reread the following words; what's your understanding of them?	Textbase model (micro)	Textbase model	

Unit	Passage number	Passage title	Genre (Coding Domain 1)	Top-level structure (Coding Domain 2)	Reading activities	C–I in a passage comprehension activity (Coding Domain 3)	C–I in a word comprehension activity (Coding Domain 4)	Do activities address the top-level structure? (Coding Domain 5)
Unit 3	14	When Sunny	Poetry	Description	Read the following verses and find other verses that have similar craft moves	Surface model	n.a	No
Unit 3	14				Read the following words	Surface model	Surface model	
Unit 4	15	Cats	Realistic fiction	Description	Find proofs of the author's fondness for cats	Textbase model (micro)	n.a	Yes
Unit 4	15				How many layers of meanings does the first paragraph have? Name them	Textbase model (micro)	n.a	
Unit 4	16	Hens	Realistic fiction	Cause and Effect	What did my attitude about hens change?	Textbase model (macro)	n.a	Yes
Unit 4	16				Why the author described hens as "brave, hard-working, diligent, and responsible?"	Textbase model (micro)	n.a	

Unit	Passage number	Passage title	Genre (Coding Domain 1)	Top-level structure (Coding Domain 2)	Reading activities	C–I in a passage comprehension activity (Coding Domain 3)	C–I in a word comprehension activity (Coding Domain 4)	Do activities address the top-level structure? (Coding Domain 5)
Unit 4	16				Compare "cats" and "hens" and describe their differences and similarities	Textbase model (macro)	n.a	
Unit 4	17	Geese	Realistic fiction	Cause and Effect	Read and feel the entertaining expressions in the text	Surface model	n.a	
Unit 4	17				Find the words in the text that are synonyms of "proud."	Surface model	Surface model	Yes
Unit 4	17				In the following sentence, why the authors were comparing the walking pace of ducks and geese?	Textbase model (micro)	n.a	

Unit	Passage number	Passage title	Genre (Coding Domain 1)	Top-level structure (Coding Domain 2)	Reading activities	C–I in a passage comprehension activity (Coding Domain 3)	C–I in a word comprehension activity (Coding Domain 4)	Do activities address the top-level structure? (Coding Domain 5)
Unit 4	17				Based on this sentence from the text, why the authors described the goose as "bossy"? What did you infer about the author's personality from this sentence expression	Situation model	Situation model	
Unit 5	18	Sunrise at Sea	Poetry	Sequence	Retell the text	Textbase model (macro)	n.a	Yes
Unit 5	18				Describe the author's move in the following sentence	Textbase model (micro)	n.a	
Unit 5	19	A Tour to The Double Dragon Cave	Informational	Sequence	Describe the sequence of the trip to the cave	Textbase model (macro)	n.a	Yes

Unit	Passage number	Passage title	Genre (Coding Domain 1)	Top-level structure (Coding Domain 2)	Reading activities	C–I in a passage comprehension activity (Coding Domain 3)	C–I in a word comprehension activity (Coding Domain 4)	Do activities address the top-level structure? (Coding Domain 5)
Unit 5	19				Describe the author's crafts when he describes his feelings when entering the cave through a narrow opening	Textbase model (micro)	n.a	
Unit 6	20	A Little Hero–Yu Lai	Biography	Cause problem and solution	Why Yu Lai is a hero?	Textbase model (macro)	n.a	Yes
Unit 6	20				Based on your understanding of each section, give an appropriate heading for each	Textbase model (macro)	n.a	
Unit 6	20				Why did the author describe the views of the river?	Textbase model (macro)	n.a	
Unit 6	21	A Manly Guy in My Family	Realistic fiction	Cause and Effect	Why is the little guy "manly"? Find the clues from the text	Textbase model (macro)	n.a	Yes
Unit 6	22	Shoes Made of Reed's Flowers	Realistic fiction	Problem and solution	Read each section and give appropriate headings	Textbase model (macro)	n.a	No

Unit	Passage number	Passage title	Genre (Coding Domain 1)	Top-level structure (Coding Domain 2)	Reading activities	C–I in a passage comprehension activity (Coding Domain 3)	C–I in a word comprehension activity (Coding Domain 4)	Do activities address the top-level structure? (Coding Domain 5)
Unit 7	23	Ancient Poem 1: Farewell to Xin Jian	Poetry	Cause and Effect	Recite the three poems	Surface model	n.a	No
Unit 7	24	Ancient Poem 2: Chant at The Frontier	Poetry	Cause and Effect	Reread the following verses and describe what spiritual characteristics were described	Textbase model (micro)	n.a	No
Unit 7	25	Ancient Poem 3: Blackberry	Poetry	Cause and Effect				No
Unit 7	26	Ancient Chinese Prose 1	Historical fiction	Problem and solution	Read the annotates and comprehend the meaning of each sentence	Textbase model (micro)	n.a	No
Unit 7	27	Ancient Chinese Prose 2	Historical fiction	Problem and solution	Explain the meaning of the underscored words	Surface model	Surface model	No
Unit 7	28	The SS.S.Normandie experiences difficulties	Historical fiction	Cause and Effect	Read the above passage and try to comprehend the conversations	Textbase model (micro)	n.a	No
Unit 7	28				What did the Captain do when the ship started sinking	Textbase model (micro)	n.a	

Unit	Passage number	Passage title	Genre (Coding Domain 1)	Top-level structure (Coding Domain 2)	Reading activities	C–I in a passage comprehension activity (Coding Domain 3)	C–I in a word comprehension activity (Coding Domain 4)	Do activities address the top-level structure? (Coding Domain 5)
Unit 7	28				After reading the story, what's your feeling about life?	Situation model	n.a	
Unit 7	29	Huang Ji'guang	Biography	Problem and solution	Find the words and sentences in the text that described Huang's reaction, and then explain why he was considered a hero	Textbase model (macro)	n.a	No
Unit 8	30	The Secret of a Magical Bottle Gourd	Realistic fiction	Cause and Effect	Why the main character wanted a magical bottle gourd?	Textbase model (macro)	n.a	Yes
Unit 8	30				Based on the story, make another story of the magical bottle gourd	Situation model	n.a	

Unit	Passage number	Passage title	Genre (Coding Domain 1)	Top-level structure (Coding Domain 2)	Reading activities	C–I in a passage comprehension activity (Coding Domain 3)	C–I in a word comprehension activity (Coding Domain 4)	Do activities address the top-level structure? (Coding Domain 5)
Unit 8	31	Garden of The Giants	Modern fantasy	Problem and Solution	Find the words and sentences that describe the view of the garden, and then explain the author's purpose	Situation model	n.a	Yes
Unit 8	31				What changes did the Giant make after meeting the little boy?	Textbase model (macro)	n.a	
Unit 8	32	The Little Mermaid (Excerpt)	Folklore	Problem and Solution	Read this excerpt for leisure and discuss with your peer about this story	Surface model	n.a	No

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: An alternative to the discrepancy model of LL. *Journal of Learning Disabilities, 41,* 67–84.

Akins, M., Tichenor, M., Heins, E., & Piechura, K. (2018). Teachers' knowledge of children's literature: What genres do teachers read? *Reading Improvement, 55,* 63–68.

Apthorp, H., Randel, B., Cherasaro, T., Clark, T., McKeown, M., & Beck, I. (2012). Effects of a supplemental vocabulary program on word knowledge and passage comprehension. *Journal of Research on Educational Effectiveness, 5,* 160–188.

Basaraba, D., Yovanoff, P., Alonzo, J., & Tindal, G. (2013). Examining the structure of reading comprehension: do literal, inferential, and evaluative comprehension truly exist? *Reading and Writing: An Interdisciplinary Journal, 26,* 349–379.

Beerwinkle, A. L., Owens, J., & Hudson, A. (2020). An analysis of comprehension strategies and skills covered within grade 3–5 reading textbooks in the United States. *Technology, Knowledge and Learning.* https://doi.org/10.1007/s10758-020-09484-0.

Beerwinkle, A. L., Wijekumar, K., Walpole, S., & Aguis, R. (2018). An analysis of the ecological components within a text structure intervention. *Reading and Writing: An Interdisciplinary Journal, 31,* 2041–2064.

Berkeley, S., King-Sears, M. E., Hott, B. L., & Bradley-Black, K. (2014). Are history textbooks more "considerate" after 20 years? *The Journal of Special Education, 47,* 217–230.

Berkeley, S., King-Sears, M. E., Vilbas, J., & Conklin, S. (2016). Textbook characteristics that support or thwart comprehension: The current state of social studies texts. *Reading and Writing Quarterly, 32,* 247–272.

Best, R. M., Floyd, R. G., & Mcnamara, D. S. (2008). Differential competencies contributing to children's comprehension of narrative and expository texts. *Reading Psychology, 29,* 137–164.

Bogaerds-Hazenberg, S. T., Evers-Vermeul, J., & van den Bergh, H. (2020). A meta-analysis on the effects of text structure instruction on reading comprehension in the upper elementary grades. *Reading Research Quarterly.* https://doi.org/10.1002/rrq.311.

Bos, L. T., De Koning, B. B., Wassenburg, S. I., & van der Schoot, M. (2016). Training inference making skills using a situation model approach improves reading comprehension. *Frontiers in Psychology: Educational Psychology, 7,* 116.

Bowyer-Crane, C., & Snowling, M. J. (2005). Assessing children's inference generation: What do tests of reading comprehension measure? *British Journal of Educational Psychology, 75,* 189–201.

Cai, D. (2017). 探讨提高小学四年级语文阅读教学效率的策略 [Exploring methods of improving Grade 4 Chinese reading instruction]. Retrieved from http://www.ckni.net/

National Governors Association Center for Best Practices & Council of Chief State School Officers. (2010). *Common Core State Standards for English language arts and literacy in history/social studies, science, and technical subjects.* Washington, DC: Authors.

Cervetti, G. N., & Hiebert, E. H. (2018). Knowledge at the center of english/language arts instruction. *The Reading Teacher, 72,* 499–507.

Cervetti, G. N., Wright, T. S., & Hwang, H. (2016). Conceptual coherence, comprehension, and vocabulary acquisition: A knowledge effect? *Reading and Writing: An Interdisciplinary Journal, 29,* 761–779.

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

Cheng, I. N. Y., & So, W. W. M. (2015). Teachers' environmental literacy and teaching–stories of three Hong Kong primary school teachers. *International Research in Geographical and Environmental Education, 24*(1), 58–79.

Cobb, C., & Blachowicz, C. (2014). *No more "look up the list" vocabulary instruction.* Portsmouth: Heinemann.

Curdt-Christiansen, X. L. (2020). Environmental literacy: raising awareness through Chinese primary education textbooks. *Language, Culture and Curriculum.* https://doi.org/10.1080/07908318.2020.1797078.

de Koning, B. B., Wassenburg, S. I., Bos, L. T., & Van der Schoot, M. (2017). Size does matter: Implied object size is mentally simulated during language comprehension. *Discourse processes, 54,* 493–503.

Dello-Iacovo, B. (2009). Curriculum reform and "quality education" in China: An overview. *International Journal of Educational Development, 29,* 241–249.

Elleman, A. M. (2017). Examining the impact of inference instruction on the literal and inferential comprehension of skilled and less skilled readers: A meta-analytic review. *Journal of Educational Psychology, 109,* 761–781.

Elleman, A. M., & Oslund, E. L. (2019). Reading comprehension research: Implications for practice and policy. *Policy Insights From the Behavioral and Brain Sciences, 6*(1), 3–11.

Expertgroep Doorlopende Leerlijnen Taal en Rekenen. (2009). *Referentiekader taal en rekenen: De referentieniveaus [Framework of reference for language and arithmetic: The reference levels].* Enschede: Doorlopende Leerlijnen Taal en Rekenen.

Francis, D. J., Kulesz, P. A., & Benoit, J. S. (2018). Extending the simple view of reading to account for variation within readers and across texts: The complete view of reading (CVR i). *Remedial and Special Education, 39,* 274–288.

Gavaler, C., & Johnson, D. (2017). The genre effect: A science fiction (vs. realism) manipulation decreases inference effort, reading comprehension, and perceptions of literary merit. *Scientific Study of Literature, 7,* 79–108.

Ghaith, G. M., & Harkouss, S. A. (2003). Role of text structure awareness in the recall of expository discourse. *Foreign Language Annals, 36,* 86–96.

Government Report of People's Republic of China. 2016. 我国国家财政性教育经费占GDP比例连续4年超4% [China's National Fiscal Education Funds Accounted for More Than 4% Of GG.D.P. For Four Consecutive Years] http://www.chce.org.cn/News_info.asp?ID=2691&BoardID=70.

Guthrie, J. T., Hoa, A. L. W., Wigfield, A., Tonks, S. M., Humenick, N. M., & Littles, E. (2007). Reading motivation and reading comprehension growth in the later elementary years. *Contemporary Educational Psychology, 32,* 282–313.

Hebbecker, K., Förster, N., & Souvignier, E. (2019). Reciprocal effects between reading achievement and intrinsic and extrinsic reading motivation. *Scientific Studies of Reading, 23,* 419–436.

Jian, Y. C., & Ko, H. W. (2014). Investigating the effects of background knowledge on Chinese word processing during text reading: Evidence from eye movements. *Journal of Research in Reading, 37*(S1), S71–S86.

Jin, L., & Cortazzi, M. (2002). English language teaching in China: A bridge to the future. *Asia Pacific Journal of Education, 22,* 53–64.

Kamil, M. L., Borman, G. D., Dole, J., Kral, C. C., Salinger, T., & Torgesen, J. (2008). *Improving adolescent literacy: Effective classroom and intervention practices: A practice guide* (NCEE #2008-4027). National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education.

Kintsch, W. (1988). The role of knowledge in discourse comprehension: A construction–integration model. *Psychological Review, 95,* 163–182.

Kintsch, W. (2005). An overview of top-down and bottom-up effects in comprehension: The CI perspective. *Discourse Processes, 39,* 125–128.

Kintsch, W., & van Dijk, T. A. (1978). Toward a model of text comprehension and production. *Psychological Review, 85,* 363–394.

Kritzer, J. B. (2014). A four-country comparison: special education in the United States, China, India and Thailand. *Current Journal of Applied Science and Technology, 4,* 3370–3382.

Li, J. (2017). Educational policy development in china for the 21st century: Rationality and challenges in a globalizing age. *Chinese Education & Society, 50,* 133–141.

McBride, C. A. (2016). Is Chinese special? Four aspects of Chinese literacy acquisition that might distinguish learning Chinese from learning alphabetic orthographies. *Educational Psychology Review, 28,* 523–549.

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

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

Meyer, B. J. F., & Freedle, R.O. (1979). *Effects of discourse type on recall* (Prose Learning Series Research Report No. 6). Tempe, Ariz.: Arizona State University.

Meyer, B. J. F., & Freedle, R. O. (1984). Effects of discourse type on recall. *American Educational Research Journal, 21,* 121–143.

Meyer, B. J., & Poon, L. W. (2001). Effects of structure strategy training and signaling on recall of text. *Journal of Educational Psychology, 93,* 141–159.

Meyer, B. J. F., & Ray, M. N. (2011). Structure strategy interventions: Increasing reading comprehension of expository text. *International Electronic Journal of Elementary Education, 4,* 127–152.

Meyer, B. J., Wijekumar, K., & Lei, P. (2018). Comparative signaling generated for expository texts by 4th–8th graders: Variations by text structure strategy instruction, comprehension skill, and signal word. *Reading and Writing: An Interdisciplinary Journal, 31,* 1937–1968.

Ministry of Education. (1985). 中共中央关于教育体制改革的决定 [Decision of the CC.C.P. Central Committee on the Reform of the Educational System]. Beijing: MM.O.E.

Ministry of Education. (2001). 教育部关于印发《义务教育课程设置实验方案》的通知 *[Notice of the Ministry of Education on Printing and Distributing the Experimental Program for Compulsory Education Curriculum Setting].* Beijing: MM.O.E.

Ministry of Education. (2001). 教育课程改革纲要–试行版 *[Program for Course Reform of Basic Education (Trial)].* Beijing: MM.O.E.

Ministry of Education. (2011). 中共中央关于深化素质教育改革的决定 [Decision of the CC.C.P.Central Committee on Strengthening the Quality Education Reform]. Beijing: MM.O.E.

Ministry of Education. (2019). 部编版教材九月启用 [Decision on using People's Education Press's version of Textbooks starting from September]. Retrieved from http://www.moe.gov.cn/fbh/live/2019/51084/mtbd/201908/t20190828_396253.html.

Nelson, J. R., & Stage, S. A. (2007). Fostering the development of vocabulary knowledge and reading comprehension though contextually-based multiple meaning vocabulary instruction. *Education and Treatment of Children, 30,* 1–22.

Pearson, P. D., & Cervetti, G. G. N. (2015). Fifty years of reading comprehension theory and practice. In P. D. Pearson & E. H. Hiebert (Eds.), *Research-based practices for teaching Common Core literacy* (pp. 1–24). New York, NY: Teacher College Press.

Perfetti, C. (2007). Reading ability: Lexical quality to comprehension. *Scientific Studies of Reading, 11,* 357–383.

Perfetti, C., & Stafura, J. (2014). Word knowledge in a theory of reading comprehension. *Scientific Studies of Reading, 18,* 22–37.

Roehling, J. V., Hebert, M., Nelson, J. R., & Bohaty, J. J. (2017). Text structure strategies for improving expository reading comprehension. *The Reading Teacher, 71,* 71–82.

Schmalhofer, F., McDaniel, M. A., & Keefe, D. (2002). A unified model for predictive and bridging inferences. *Discourse Processes, 33,* 105–132.

Tunnell, M., Jacobs, J., Young, T., & Bryan, G. (2000). *Children's literature, briefly*. Boston, MA: Pearson Education.

Van den Broek, P., Rapp, D. N., & Kendeou, P. (2005). Integrating memory-based and constructionist processes in accounts of reading comprehension. *Discourse Processes, 39,* 299–316.

Wang, D. (2011). The new curriculum and the urban-rural literacy gap: The case of one county in western China. *Chinese Education and Society, 44,* 87–101.

Wijekumar, K., Beerwinkle, A., McKeown, D., Zhang, S., & Joshi, R. M. (2020). The "GIST" of the reading comprehension problem in grades 4 and 5. *Dyslexia, 26,* 323–340.

Wijekumar, K. K., Meyer, B. J., & Lei, P. (2012). Large-scale randomized controlled trial with 4th graders using intelligent tutoring of the structure strategy to improve nonfiction reading comprehension. *Educational Technology Research and Development, 60,* 987–1013.

Wijekumar, K., Meyer, B. J., Lei, P., Cheng, W., Ji, X., & Joshi, R. M. (2017). Evidence of an intelligent tutoring system as a mindtool to promote strategic memory of expository texts and comprehension with children in grades 4 and 5. *Journal of Educational Computing Research, 55,* 1022–1048.

Wijekumar, K., Meyer, B. J., Lei, P., Hernandez, A. C., & August, D. L. (2018). Improving content area reading comprehension of Spanish speaking English learners in Grades 4 and 5 using web-based text structure instruction. *Reading and Writing: An Interdisciplinary Journal, 31,* 1969–1996.

Williams, J. P. (2005). Instruction in reading comprehension for primary-grade students: A focus on text structure. *The Journal of Special Education, 39,* 6–18.

World Bank (2013). *World Development Indicators 2013*. https://datacatalog.worldbank.org/dataset/world-development-indicators

Wright, T. S., & Cervetti, G. N. (2017). A systematic review of the research on vocabulary instruction that impacts text comprehension. *Reading Research Quarterly, 52,* 203–226.

Xie, Q. (2015). 浅谈小学低年级识字教学的方法 [A brief discussion on word recognition instruction in primary grades]. *New Curriculum in Elementary School, 1,* 128–128.

Ye, Y. (2020). 探讨提高小学四年级语文阅读教学效率的策略 [An exploration of the methods of improving Grade 4 reading instruction in Chinese language arts classes]. *Course Education Research., 42,* 100–101.

Zhong, Q. (2005). Reconceptualization and curriculum innovation in China. *Peking University Education Review, 3,* 48–57.

Zhong, Q. (2006). Curriculum reform in China: Challenges and reflections. *Frontiers of Education in China, 1,* 370–382.

Zhu, J., & Wang, X. C. (2005). Contemporary early childhood education and research in China. In B. Spodek & O. N. Saracho (Eds.), *Contemporary perspectives in early childhood education: International perspectives* (Vol. 7, pp. 55–77). Greenwich, CT: Information Age.