

From Research to Practice

Readability Levels Show that Social Studies Textbooks Are Written Above Grade Level Reading

Tamara Robison, Tracey Roden, Susan Szabo

Abstract: School districts spend millions of dollars on textbooks yearly, as this is the major source of content knowledge in the classroom. However, many teachers put these textbooks on the shelf and never use them, as they say the textbooks are too hard for their students to read and/or understand. The purpose of the study was to 1) explore how and why the Texas Education Agency (TEA) recommends certain textbooks and puts them on the state adopted list; 2) examine the readability of the adopted social studies textbooks in grades 3-6 to see if they are too hard for students to read; and 3) to talk about implications for Publishers, SBOE members, and Teachers.

The use of textbooks in schools has been mandatory reading in all content areas for years. However, several studies have shown that if learning is to occur while reading the textbook, the textbook should be reader-friendly (Britton & Braesser, 1996; Britton, Woodard, & Binkley, 2012; Chambliss & Calfee, 1998). There are several elements that can be used to determine if a textbook has reader considerateness:

- 1) appropriate level of readability;
- 2) adequate use and placement of illustrations;
- 3) use of prominent and numerous subtitles; and
- 4) use of words and phrases to provide connectedness of text (Armbruster & Anderson, 1988).

However, for this study, because appropriate level of readability is the number one issue, only the readability of social studies textbooks in grades 3-6 was explored.

This is an action research study, as it seeks to “intervene in a deliberate way in a situation in order to bring about understanding, change, and improvements in practice (Burns, 2010, p. 2). This study began because the 3rd author teaches a master level social studies course, and many of the master level students do not know how their districts social studies textbooks got on the state adopted list or about the importance of readability and its impact on their teaching. To make sure all the facts reported to the master students were correct, with the help of two doctoral students, this study was undertaken to answers the following questions :

1. What books are on the recommended lists for Social Studies grades 3-6?
2. What are the textbook approval procedures for Texas?
3. What are the criteria used by TEA to put textbooks on their recommended list?
4. What is the length of the textbook adoption cycles in TX?
5. What are the readability levels of each of the social studies books?

Theoretical Framework

Readability of a text matters. As Stonovich (1986) explained more than two decades ago, when he developed the idea of the Matthew Effect, reading begets reading. In addition, readability is a major hindrance in comprehension, as text-related variables such as sentence complexity and vocabulary load cause problems for many students (Fisher, Frey, & Lapp, 2012; Flesch, 1948; Fry, 1968; Gunning, 1952; McLaughlin, 1969). Thus, the readability of textbooks either support or hinder one's cognitive growth (Piaget, 1936; Vygotsky, 1986). Thus, readability, which measures the ease that text can be read, impacts one's ability to comprehend text.

Cognitive load theory provides a general framework and more specifically deals with extraneous cognitive load, as it deals with how the material or information is presented (Chandler & Sweller, 1991). If the text being read is too difficult, the reader spends more time reading and deciphering the words and less time on analysis, critical thinking and reflection. Therefore, instructional materials should be designed to lessen the extraneous cognitive load (Ginns, 2006).

Readability

Readability is what makes some texts easier to read than others. Klare (1963) felt readability dealt with the style of writing in order to promote comprehension. McLaughlin (1969) felt readability promoted comprehension if there was an interaction between the text and the readers reading skill, background knowledge and motivation to read. Entin and Klare (1985) study of readability and its link to comprehension had several interesting findings. First, it was found that the easier readability of a text benefited student's comprehension if they lacked background information or were not motivated to read the content text. Second, the study suggested that for those readers who are motivated to read, have background knowledge about the content, and are good readers found that reading easier books did not improve comprehension, as the easier text did not challenge the reader. Third, it was shown that comprehension of the reader was much improved if the text material being read was written at the reading level of the reader.

The research done on readability tests has shown that there are many factors that affect their successful reading by students, such as sentence length, word length, number of unfamiliar words and/or number of letters. However, if writers keep readability in mind as they write, comprehension of the text material will increase.

Readability Formulas

Various readability formulas were created to use to determine the ease at which a content area textbook could be read. Readability scores are designed to indicate the comprehension difficulty of print being read. Readability formulas are mathematical formulas that determine the difficulty of the text. The higher the readability and the farther away from a readers reading level, the harder it is for the reader to understand the text being read. Most readability scores are based on the number of syllables in 100 words, and on the number of sentences in 100 word sample from text placement that are at the beginning, middle and end of a book. The readability formulas that were used for this study are talked about below.

Gunning Fog Scale. This readability scale was developed by Robert Gunning (1952) who felt that reading materials were unnecessarily complex. He designed his formula to examine 100 words of text, number of sentences, and number of words that have three or more syllables. By using 100 words at the beginning of the book, the middle of the book and the end of the book, the formula calculates an average score that tells you how hard the text is to read. A Fog score of 5 is readable, 10 is hard, 15 is difficult, and 20 is very difficult.

Flesch-Kincaid Readability. This readability formula improved upon the Flesh Reading Ease Formula (1948), which is one of the oldest readability formulas and the most used. However, the Flesch-Kincaid Grade Level Readability Test (Flesh, 1949) was created to calculate the average number of words used per sentence and the average number of syllables per word. The calculation of 100 words at the beginning, middle and end of the text indicates that students in that grade level can read the text. Thus, a score of 6.5 indicates that the text should be understood by those sixth graders who are reading at a sixth grade level..

The Coleman-Liau Index. This readability formula was designed by Coleman & Liau (1975) for the purpose of calculating the readability of textbooks. The Coleman-Liau (1975) Index formula calculates the grade level of the text by examining the number of letters per 100 words found at the beginning, middle and end of the text.

The SMOG Index. This readability formula was developed by McLaughlin (1969). SMOG stands for Simple Measure of Goggedygoon. The emphasis of the SMOG is on comprehension, as it calculates the years of education the reader needs to understand the text being read. The formula examines 30 sentences (10 sentences at the beginning, middle and end of the text) and the words that have three or more syllables to determine the grade level of the text.

Automated Readability Index (ARI). This readability test counts the number of letters and the number of words per sentence and is designed to assess the understandability of the text by looking at 300 words (100 at the beginning, middle and end of the text). The score approximates the grade level needed to understand the text. Thus, a 10.6 means a student who is reading at the 10th grade level would understand the text being read.

Fry. The Fry (1968) formula collects a minimum of three samples per 100 words of text at the beginning, middle and end of the text. It looks at the average number of syllables per 100

words and plots it against the average number of sentences in 100 words. Where the two scores intersect is the approximate grade level of the text.

Raygor. The Raygor (1977) formula is calculated by counting the number of sentences and the number of words containing six or more letters in 100 words found at the beginning, middle and end of the text. The results are plotted on a graph, which determines the reading level of the text.

Social Studies Curriculum

In the 21st century it is important to prepare our children to live in a global community. However, with the passing of the No Child Left Behind Act (2002) the teaching of social studies has become marginalized, as teachers spend their time on teaching math and reading (Heafner & Fitchett, 2012, McCall, 2006; Olwell & Raphael, 2006). In addition, National Council of Social Studies (NCSS) expressed their belief that the importance of teaching social studies has eroded and stressed the importance that social studies remain a part of the core curriculum, as seen in a NCSS position statement (2007) below:

“NCSS is increasingly alarmed by the erosion of the importance of social studies in the United States. This erosion, in large part, is a consequence of the implementation of *No Child Left Behind* (NCLB). Since the introduction of NCLB, there has been a steady reduction in the amount of time spent in the teaching of social studies, with the most profound decline noticed in the elementary grades. In addition, anecdotal information indicates that many American children are receiving little or no formal education in the core social studies disciplines: civics, economics, geography, and history. That such a situation has evolved is untenable in a nation that prides itself on its history, its system of government and its place as a leader in the global community’ (pg. 1, para 1). “The National Council for the Social Studies believes that social studies is a core subject in American schools on an equal footing with reading, writing, mathematics and the sciences” (pg. 1, para 4).

Social Studies Knowledge and Skills

Social Studies knowledge should build a foundation in history, geography, economics, government, citizenship, culture, science, technology and society. The skills that are primary related to social studies include reading maps, globes, and charts along with directional and environmental terms. In addition, social studies help students to learn about chronological order, research skills, how to critically think while drawing inferences and/or making decisions. But the most important part of social studies in preparing students to be a responsible citizen who maintains and preserves a democratic society.

Methods

Study Procedure

First, a review of the literature and exploring of the state department's webpage, helped to answer questions 1-4. Second, to answer question 5, a readability of the social studies textbooks were completed. One hundred words from the beginning, middle and the end of each textbook was typed on a word document. The 100 words were then copied and pasted into the free readability formula online. This was done three times for one textbook and the scores were added and averaged to determine the readability of each social studies textbook.

Textbook Analysis

Social Studies grades 3-6 textbooks that have been adopted by the Texas Education Association (TEA) were examined to determine their readability. Two free readability websites were used, as the authors feel an average of all the readability scores gives a "truer" score of the text material being read.

- <http://www.readabilityformulas.com/free-readability-formula-tests.php>
- <http://www.readabilityformulas.com/free-fry-graph-test.php>

The first website used five readability formulas (Gunning Fog, Flesch-Kincaide, Coleman-Liau Index, SMOG and the ARI) while the second website used two readability formulas (Fry and Raygor) to calculate the different readability scores of each text. The social studies adoptions for each grade level were chosen to conduct three different readability tests. Three readability analyses were completed for each textbook using 100 words from the beginning (Chapter 1), middle (Chapter 5) and end (Chapter 10). The six readability scores were averaged to find the average 100 words from the beginning, middle, and end were placed into both free readability sites above. Thus, there were 6 scores that were averaged to find the average grade level and finally these three readability levels were averaged to give the textbook one readability level for each book (as seen in Table 2-6).

Results

Phase One: Textbook Approval List and Adoption Procedure

To answer questions 1-4, an exploration of the State Department webpage was completed. To answer question #1, the list of social studies books by grade level from Texas were compiled (see Table 1 below).

Table 1
Social Studies Textbooks on the Approved List

Grade Level	Approved in Texas
3 rd grade	<ol style="list-style-type: none"> 1. Macmillan/McGraw-Hill Social Studies 2. Harcourt Horizons Social Studies Houghton Mifflin Harcourt 3. Scott Foresman Social Studies Addison Wesley Longman Inc
4 th grade	<ol style="list-style-type: none"> 1. Macmillan/McGraw-Hill Social Studies 2. Harcourt Horizons Social Studies 3. Scott Foresman Social Studies
5 th grade	<ol style="list-style-type: none"> 1. Macmillan/McGraw-Hill Social Studies 2. Harcourt Horizons Social Studies 3. Scott Foresman Social Studies 4. History Alive! American's Past (Teachers Curriculum Institute)
6 th grade	<ol style="list-style-type: none"> 1. Holt People Places and Change: An Introduction to World Studies (Holt) 2. Our World Today: People Places and Issues (Glencoe/McGraw-Hill) 3. World Explorer: People, Places & Cultures (Pearson Education) 4. Harcourt Horizons Social Studies 5. World Cultures & Geography (McDougal Littell Inc)

To answer question #2, #3 and #4, What are Texas textbook approval procedures, What are the criteria used to put textbooks on their recommended list, and What is the length of the textbook adoption cycles, again the Texas Education Agency (TEA) State Department websites were explored. In Texas, the first step in the process is for the Texas State Board of Education (SBOE) to solicit bids for new instructional materials by issuing a proclamation. The proclamation identifies the subject areas scheduled for review and contains the content requirements outlined by the Texas Essential Knowledge and Skills (TEKS). After the proclamation is issued, publishers usually have one year to develop the materials that align with the requirements of the proclamation.

Next, the publishers submit samples of their instructional materials to TEA and each of the 20 regional Education Service Centers undergo thorough investigation by a state review panel to identify the Texas Essential Knowledge and Skills (TEKS), the English Language Proficiency Standards (ELPS), alignment to the College and Career Readiness Standards, and identify factual errors. To become eligible for adoption, textbooks must meet at least 50% of the standards of the Texas Essential Knowledge and Skills (TEKS) for the intended subject and grade level. This criterion is mandatory for both the student version and the teacher version of the instructional materials. This process is very similar in all states.

Finally, the State Board of Education uses all the summary reports and recommendations as a guide to decide which materials are adopted or rejected. Once the adopted list of textbooks is determined, each school district or charter school set their guidelines for selecting the most appropriate instructional materials for their students. Districts normally use one of the adopted books, as the TEA will pay 100 percent of the cost of textbooks, if they come from the approved list. The textbook adoption cycles for content area textbooks

in the foundation curriculum (English Language Arts, Mathematics, Science, and Social Studies) are reviewed at least once every eight years.

Phase Two: Textbook Readability

To answer research question 5, a free text readability online calculator was used to determine the readability of 100 words from the beginning, 100 words from the middle and 100 words from the end of the text, as required by the readability formulas. The three readability scores were then averaged giving one readability score per book. The readability results showed that all the state adopted social studies textbooks are written above grade level reading.

Third Grade. Third grade had three social studies textbooks that had been approved by TEA. The readability average ranged from 5.1 to 6.4. As seen in Table 2, only the Scott Foresman textbook had a readability that started at lower average and progressively got harder. This makes sense, as students should be improving their reading scores throughout the school year. Both Harcourt and McGraw-Hill showed a variety of readability levels from beginning to end of the text that did not have developmentally appropriated readability levels. Scott Foresman had the best overall readability level of 5.1 for their 3rd grade social studies textbook.

*Table 2
3rd Grade Readability Levels*

Scott Foresman				Harcourt			McGraw-Hill		
	Beg. 100	Mid 100	End 100	Beg. 100	Mid 100	End 100	Beg. 100	Mid 100	End 100
Gunning	5.5	6.1	8.5	6.6	9	7.9	8.6	5.4	6.2
Flesch-Kincaid	3.6	4.3	5.9	3.5	7.1	5.6	6.6	4.9	5.4
Coleman-Liau	5	7	8	6	9	8	9	9	8
Smog	4.6	5.4	7	5	7.7	6.5	7.4	4.4	5.6
Fry	4	5	7	5	11	8	9th	7th	6
Raygor	3	4	4	3	4	6	3	3	4
Average Grade Level	3.8	5.0	6.4	4.5	7.8	6.7	7.0	5.5	5.6
Book Average	5.1			6.4			6.1		

Fourth Grade. Fourth grade had three social studies textbooks on the approved adopted list from TEA. They had a readability average from 6.9 to 8.5. As seen in Table 3, all three textbooks showed a variety of readability levels from beginning to end of the text that did not have developmentally appropriated readability levels that gradually increased throughout the year. The Scott Foresman had the best overall readability level of 6.9 for their 4th grade social studies textbook.

Table 3
4th Grade Readability Levels

Scott Foresman				Harcourt			McGraw-Hill		
	Beg 100	Mid 100	End 100	Beg 100	Mid 100	End 100	Beg 100	Mid 100	End 100
Gunning	7.8	7.4	10	7.4	12.8	10.4	8	7.2	10
Flesch-Kincaid	6.7	8.2	5.7	8.3	11.5	7.6	7.3	4.7	10
Coleman-Liau	9	8	8	9	9	9	10	9	12
Smog	7.2	8.6	7.4	8.6	11.3	8.1	6.6	5.4	9.8
Fry	8	8	7	10	10	9	11	7	13
Raygor	3	5	5	4	4	5	5	4	6
Average Grade Level	6.8	7.2	6.7	7.7	9.7	8.1	8	6	10
Book Average	6.9			8.5			8.0		

Fifth Grade. Fifth grade had four social studies textbooks on the approved adopted list from TEA. They had a readability average from 7.6 to 9.3. As seen in Table 4, the first three textbooks had a variety of ups and downs in the readability scores while the Teacher’s Curriculum textbook had the highest readability level at the beginning of the textbook. Scott Foresman had the best overall readability at 7.6 for their 5th grade social studies textbook.

Table 4
5th Grade Readability Levels

Scott Foresman				Harcourt			McGraw-Hill			Teacher’s Curr. Institute		
	Beg 100	Mid 100	End 100	Beg 100	Mid 100	End 100	Beg 100	Mid 100	End 100	Beg 100	Mid 100	End 100
Gunning	7.8	10.4	6.6	8.4	10.9	9.9	8.4	8.3	8.8	10.2	9.7	7.3
Flesch-Kincaid	7.2	8.4	6.4	8.8	9.7	9	8.3	9.2	8.1	10	9	7.7
Coleman-Liau	8	10	9	11	11	10	10	11	10	12	9	10
Smog	7.7	8.9	6.9	7.8	9.7	8.3	7.2	9	8.4	10	8.6	8
Fry	8	9.5	8	11	13	10	11	10.5	11	14	8	8.5
Raygor	6.5	6	5	5	7	6	6.5	7	5	6	5.5	4.5
Average Grade Level	7.4	8.8	6.6	8.7	10	9	8.6	9.1	8.4	10	8	8
Book Average	7.6			9.3			8.7			8.7		

Sixth Grade. Sixth grade had five social studies textbooks on the approved adopted list from TEA. They had a readability average from 7.6 to 9.3. As seen in Table 5, only the Scott Foreman textbook had a readability that started at lower average and progressively got harder. This is developmentally appropriate, as students should be improving their reading scores throughout the school year. Both Harcourt and McGraw-Hill showed a variety of readability levels from beginning to end of the text that did not have developmentally appropriated readability levels.

Table 5
6th Grade Readability Levels

Glencoe/McGraw-Hill	Harcourt			Pearson			Holt			McDougal					
	Beg 100	Mid 100	End 100	Beg 100	Mid 100	End 100	Beg 100	Mid 100	End 100	Beg 100	Mid 100	End 100			
Gunning	12.8	7.7	8.8	6.8	6.7	9.7	7.3	9.7	6.9	7.8	8	7	12	13.6	9.6
Flesch-Kincaid	11.9	7.2	9.5	6.2	7.9	8.2	6.1	8.8	6.6	7.1	9	7	9	12	9
Coleman-Liau	11	10	12	11	11	10	10	13	9	9	12	10	12	14	15
Smog	9.7	6.7	8.3	4.9	7.4	8.5	6.2	8.1	6.2	6.6	8	7	8.8	11	8.5
Fry	12	9.5	10.5	10	9	10	8.0	13.0	7.0	9	11	12	11	7	7
Raygor	8	6	6	3.5	5	4	6	6	7	4	6	5	6.5	7	6
Average Grade Level	9.9	7.8	9.5	7.1	7.7	8.1	7.1	9.6	6.7	7.3	9	8	9.8	9	9
Book Average	9.1			7.6			7.8			8.1			9.3		

Discussion

More than fifteen years ago, the landmark school improvement act stated that a basic education should “provide students with the opportunity to become responsible and respectful global citizens, to contribute to their economic well-being and that of their families and communities, to explore and understand different perspectives, and to enjoy productive and satisfying lives” (RCW 28A.150.210). The social studies curriculum provides the opportunities for every student to develop the appropriate basic education, as a better understanding of current and past events helps one to form personal values, think critically, analyze societal happenings and keep pace with workplace changes and international economy. In addition, social studies content is responsible for teaching citizenship skills necessary to live in and maintain a democracy.

But, no matter which social studies textbook a district purchases from the TEA adopted list, the textbook was shown to be written above grade-level. Then again, even though the readability formulas are valid instruments, in reality only 300 words from each text were used to determine their readability level. Therefore, several implications should be considered to help students become active learners and readers.

Implications

If the purpose of social studies is to develop social understanding and civic efficacy, it is important that students develop social understanding, engagement, and civic identity (National Board for Professional Teaching Standards, 2011). Therefore, if we want to develop students who are willing to assume citizenship responsibilities and make informed decisions, several things need to be considered by various stakeholders: the Publishers, the State Board of Education (SBOE) Members, and the Teacher.

First, Publishers need to “take the bull by the horns” and start doing what is right for our children. We have known about readability issues for decades but this has largely been ignored by textbooks publishers. The No Child Left Behind Act of 2001 (2002) requires all students to read at grade level, so why aren’t the textbooks written at grade-level reading with a gradual increase from beginning, middle to end of the book? This has not happened yet and this issue won’t be resolved until knowledgeable SBOE members refuse to put the publishers textbooks on the state adopted list, as refusal to do so will cost the publishers lots of revenue.

Second, SBOE members, who are elected officials and not normally educators, need to change the textbooks approval system. Due to accountability issues, all students are required to only read at grade-level, so why should the State Department recommend books that are obviously written above grade level? This practice sets the majority of students up for failure and prevents their understanding of important social studies issues and concepts (McLaughlin, 1969; Piaget, 1936; Stonovich, 1986; Vygotsky, 1986). Therefore, SBOE members need to become more proactive in learning what makes a good textbook. Content is important but so is the readability of the textbooks being considered. This is an important issue if we want to have students who as adults are informed responsible citizens.

Third, the Teachers have to deal with the textbook readability issues when the Publishers and SBOE members don’t do their jobs wisely or well. Therefore, all teachers are encouraged to perform readabilities on their textbooks, as this will determine just how much scaffolding is needed to be done by the teacher so the students will learn the necessary social studies ideas and concepts. Then no matter how hard the textbook is, the textbook should not be put on the shelf, but instead be used to help our students become Career and College Ready (Texas Legislature, House Bill 1, 2007). Teachers need to model and purposefully plan before-during-after (BDA) strategies so students learn how to read difficult text. Thus, teachers should purposefully include in their lesson plans the following: 1) provide a variety of texts written at different reading levels on the same concept (children’s literature, primary sources, newspapers, etc.), which helps to provide differentiated instruction; 2) provide before lesson activities, such as virtual tours, pictures, scanning the chapter looking at titles, subheadings, graphs, maps and/or captions to activate schema, set a purpose for reading, and creating questions; 3) provide during the lesson activities, such as graphic organizers, mind maps, journal writing, and class discussion (Paratore & Robertson, 2013) to help students “read like a detective” (Fisher, Frey & Lapp, 2012, p.1); in addition, during reading, teachers should have students follow the close reading format so students think deeply and critically about what is being read (Cummins, 2013); and 4) teachers need to provide after activities, such as concept poems, ABC books, and/or PowerPoint presentations, which allow students to visually display what they have

read which helps them to retain information. In addition, creating these projects collaboratively allows students to have strategic talk about what they have learned, which supports both the metacognitive and critical thinking processes, as students are learning by doing (Dewey, 1933; Paratore, J. & Robertson, D., 2013). These activities promote the idea of problem-based learning, project-based learning and inquiry-based learning, as all three approaches promote collaboration, questioning, information processing, and critical thinking in order to answer questions and/or solve problems (Bruner, 1965; Collins, Brown, & Newman, 1989; Reiser, 2004).

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ABOUT THE AUTHORS

Tamara Robison is a Doctoral Student at Texas A&M University – Commerce.

Tracey Roden is a Doctoral Student at Texas A&M University – Commerce.

Susan Szabo is an Associate Professor at Texas A&M University-Commerce.