



What the
**Science
of Reading
Says**
about



Reading Comprehension and Content Knowledge

Jennifer Jump and Kathleen Kopp

Table of Contents

Introduction	7
Welcome from Jen Jump	7
What Is the Science of Reading?	9
Seminal Works to Build Understanding	11
The Focus on Comprehension	16
Settled Science	18
From the Classroom	20
Navigating This Book	21
Chapter 1: Building Content Knowledge	23
From the Classroom	23
Background Information and Research	23
Implications for Teaching and Learning	25
Key Terms for Teacher Understanding	31
Research in Action	34
Moving Forward: Top Must-Dos	46
Further Considerations	47
My Teaching Checklist	48
Chapter Summary	49
Chapter 2: All about Vocabulary	51
From the Classroom	51
Background Information and Research	52
Implications for Teaching and Learning	54
Key Terms for Teacher Understanding	59
Research in Action	61
Moving Forward: Top Must-Dos	70
Further Considerations	71
My Teaching Checklist	72
Chapter Summary	73

Table of Contents *(cont.)*

Chapter 3: Literacy Knowledge: Print Concepts to Genre Study	75
Background Information and Research	75
Implications for Teaching and Learning	80
Key Terms for Teacher Understanding	83
Research in Action	85
Moving Forward: Top Must-Dos	95
Further Considerations	97
My Teaching Checklist	98
Chapter Summary	99
Chapter 4: Language Structures: Syntax and Semantics	101
Background Information and Research	101
Implications for Teaching and Learning	109
Key Terms for Teacher Understanding	112
Research in Action	113
Moving Forward: Top Must-Dos	122
Further Considerations	124
My Teaching Checklist	124
Chapter Summary	125
Chapter 5: Text Structures and Verbal Reasoning	127
From the Classroom	127
Background Information and Research	128
Implications for Teaching and Learning	136
Key Terms for Teacher Understanding	138
Research in Action	140
Moving Forward: Top Must-Dos	148
Further Considerations	150
My Teaching Checklist	151
Chapter Summary	152

Table of Contents *(cont.)*

Chapter 6: Reading Comprehension Strategies	153
From the Classroom	153
Background Information and Research	154
Implications for Teaching and Learning	165
Key Terms for Teacher Understanding	167
Research in Action	168
Moving Forward: Top Must-Dos	176
Further Considerations	177
My Teaching Checklist	178
Chapter Summary	179
Chapter 7: Selecting Relevant Texts: Find the Mirrors and Windows	181
Considerations for Choosing Relevant Texts	182
Developing Literacy with Relevant Texts	183
Next Steps	185
References	187
Glossary	197
Index	200

Introduction

Welcome from Jen Jump

The Hippocratic oath is powerful. Most of us have heard it spoken of, usually in passing, perhaps while watching a medical drama on television. We often think of the oath in terms of the simple phrase “Do no harm.” The reality is that the oath is much more substantive. The language is intense, lofty, and powerful. According to tradition, medical professionals have been swearing some form of the Hippocratic oath since the fourth century BCE. Without parsing out the implications and utility of the oath to modern-day medicine, most people know its purpose and relevance.

The current version of the oath (revised in 1964) articulates several thoughtful tenets that stand out:

- 1. I will respect the hard-won scientific gains of those physicians in whose steps I walk, and gladly share such knowledge as is mine with those who are to follow.**

Yes! I want every doctor I meet to listen to the knowledge gained from the physicians who went before them. I want my medical professionals to share what they learn from diagnosing and treating me. In the same way, I want that for my educator friends. I want us each to remember that the successes and failures of the educators who have gone before us, the hard research studies undertaken, and the seminal understandings gained pave the way for us. Many scholars have shown us the way over the years, with the goal of ensuring that we use these bodies of knowledge and understanding to provide the best for our students.

- 2. I will remember that there is art to medicine as well as science, and that warmth, sympathy, and understanding may outweigh the surgeon’s knife or the chemist’s drug.**

While medicine is largely clinical (the science), there is an art to it that includes listening, considering, and understanding. Realizing there is an art to teaching creates the possibility of joy and passion, along with challenge and precision. It is the art, when matched with the science in education, that ensures that students are considered first. It ensures that families and caregivers are seen as partners and that the classroom is a dynamic place for all.

3. I will not be ashamed to say, “I know not,” nor will I fail to call in my colleagues when the skills of another are needed for a patient’s recovery.

It is my hope that a doctor, when stymied by a condition or illness, will be open to the support of a colleague, optimally one who has researched the condition or has a deeper understanding based on experience. Educators, too, should strive for the candor of asking for help and for the willingness to listen. As professionals, each time we open a professional resource, read a research article, or engage in professional learning, we are acknowledging that there is more to know.

In essence, the oath speaks to us, as educators. We can align our professionalism to that of medical professionals. We, too, consistently promise to “do no harm.” We create classrooms filled with joy and learning, love and laughter, and rigor and challenge. While there is no formal oath for teachers, each day upon beginning class, we promise to listen to the wisdom of the research, to remember the art and science of the work we do, and to be unafraid of requesting help when needed. We are dedicated.

It is not always easy. Sometimes, the research is complex, confusing, or seems contradictory. Education can be a whirlwind. Standards change. Curriculum changes. Expectations change. Legislation changes. And lately, these changes are compounded by added pressures. But the need for young people to develop literacy skills does not waiver. Reading, writing, speaking, and listening consistently reign as must-have skills.

Several years ago, I stood on a stage in front of eager educators, ready to begin the new year. We were talking about literacy, engaged in the conversation around the importance of reading challenging texts. Education was in the midst of change, and for many, it was an intense, scary change. The research (what we now call “the science”) was indicating the need for systemic change. We needed then, as

educators need now, to be ready, willing, and able to heed the research and orchestrate instructional change within our classrooms. The purpose of this book is to support that goal.

What Is the Science of Reading?

This book is one in a series of professional resources that provides a close look at the discussion around the Science of Reading (SOR). What exactly does that mean? The term *the Science of Reading* pervades the national conversation around the best literacy instruction for all students. The purpose of this series is to close the gap between the knowledge and understanding of what

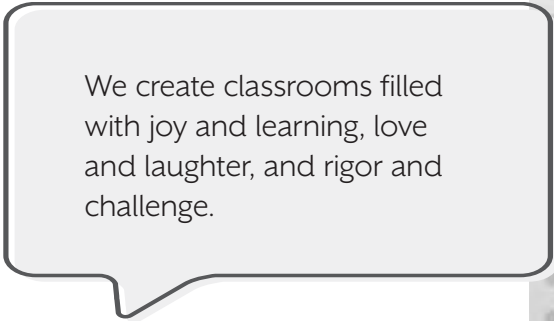
students need to become literate humans and the instructional practices in our schools. This gap is widely acknowledged yet remains largely intact. While research is available, journals are not easy to navigate. “It would be the proverbial needle in a haystack problem trying to find the most relevant information” (Kilpatrick 2015, 6). With concise resources that build understanding of the body of research, however, teachers can be equipped with the logical steps to find success. Mark Seidenberg notes, “A look at the basic science suggests specific ways to promote reading success” (2017, 9).

The great news is that this book will help you navigate the important research that informs the Science of Reading conversations. Let’s begin by quickly breaking down the words behind the hype: the *Science of Reading*.

Science: a branch of knowledge or study dealing with a body of facts or truths systematically arranged and showing the operation of general laws *or* systematic knowledge of the physical or material world gained through observation and experimentation

Read[ing]: looking at carefully so as to understand the meaning of (something written, printed, etc.) (dictionary.com 2022)

Bottom line? The Science of Reading is the collection of excellent research that leads to the understanding of how students learn to read. What are the best ways to support students as they break down the code of the English language? How can teachers provide the best instruction for developing fluency? What are the



We create classrooms filled with joy and learning, love and laughter, and rigor and challenge.

structures within text and embedded within instruction that will best support students as they decipher text and develop the skills to understand a range of genres in various contexts and content areas? Which strategies will best help students develop the ability to write with adequate voice, grammatical control, and knowledge? The answers are found in the collection of research, studies, and experiences (the ultimate educators of the universe) known as the Science of Reading. Many of the research studies have been duplicated, reinforcing the understanding of how students learn to read.

To be clear, nothing about this body of work is brand new. There are ebbs and flows within any conversation, and while some of the conversations around the SOR have resurfaced in recent times with great enthusiasm and debate, the basic components of this body of research have been discussed among literacy researchers and educators for many years.

Figure I.1—Components of Literacy

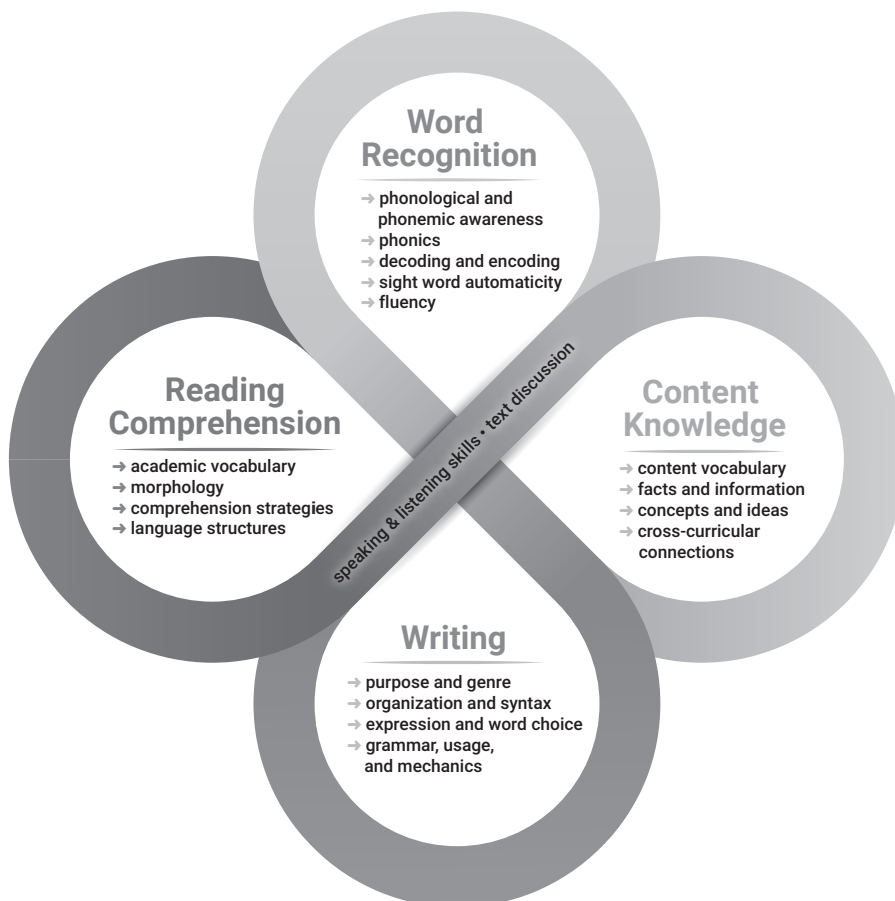


Figure I.1 demonstrates an approach to linking the research-based components of the Science of Reading, highlighting word recognition, reading comprehension, content knowledge, and writing. A very intentional decision has been made to include the science of *literacies*, including reading and writing as well as recognizing the power of speaking and listening, in this series. Each book will explore instructional implications, best practices, and things to look for in classrooms, as well as identify educational practices to reconsider. (To best incorporate pedagogical practices, reading comprehension and content knowledge are presented in one book.) These books were developed to support professional growth, enhance engagement, and provide support in designing instruction that uses the best research-based strategies.

This research base and understanding are integral to instruction in today's classrooms. Yet, despite a general knowledge of these ideas, many students continue to be plagued by inadequate literacy skills. Pulling from the work of educators, psychologists, neurologists, special educators, and more, our hope is that a renewed focus on the science ("body of facts or truths") of literacy will support a change in instructional practices and lead to higher literacy achievement.

“

Being an expert reader doesn't make you an expert about reading. That is why there is a science of reading: to understand this complex skill at levels that intuition cannot easily penetrate.

—Mark Seidenberg (2017, 4)

”

Seminal Works to Build Understanding

Foundational works set the tone for understanding how research illuminates the pathway for instruction within the classroom. These seminal, theoretical pieces of research are widely recognized and serve as the guides to the books in this series. We will begin the journey with research and theories from the mid-1980s. Philip B. Gough and William E. Tunmer's seminal model of how young people learn to read, the Simple View of Reading (SVR), builds our understanding in a simple and usable manner. This widely used model has been manipulated to support new models since its origination. The Simple View of Reading (figure I.2) articulates the basic components of how people become comprehenders of text.

Navigating This Book

Each of the first six chapters of this book showcases important research that supports the instruction of reading comprehension in the classroom. This includes literacy, mathematics, science, and social studies classrooms.

Chapter 1	Building Content Knowledge
Chapter 2	All about Vocabulary
Chapter 3	Literacy Knowledge: Print Concepts to Genre Study
Chapter 4	Language Structures: Syntax and Semantics
Chapter 5	Text Structures and Verbal Reasoning
Chapter 6	Reading Comprehension Strategies

These chapters are structured to bridge the gap between the science of literacy instruction and classroom practice. Each chapter begins by examining the research with a thoughtful and critical eye. Following the research, you will find instructional implications. These implications identify how the research should impact the work of educators in classrooms today. Next, you will find key terms for teacher understanding. Each of these terms is defined and showcased in a classroom example.

Each chapter also includes research-based instructional strategies. These strategies are aligned to grade-level bands: K–1, 2–3, 4–5, and secondary. However, many of these strategies have utility across grade levels and can be modified to support students beyond the bands suggested. Each chapter closes with the following sections:

- **Top Must-Dos:** A summary of research implications, the must-do list supports all teachers as they navigate taking the science of reading directly into their classrooms.
- **Further Considerations:** Offering additional insights about effective instruction, this section also includes (as appropriate) guidance for moving away from practices that are not supported by research.

- **Reflection Questions:** A short list of questions to use as conversation starters for professional learning or for self-reflection.

The final chapter in this book, written by guest author Carrie Eicher, explores the importance of culturally responsive texts in literacy instruction to help students make connections between what they read and what they already know, and to think deeply about what they have read. She examines the power of using such texts to open up new understandings and possibilities for students.

Take a deep breath. While we educators do not have a Hippocratic oath, we know the great responsibility we face each day. Louisa Moats (2020) said it best: “Teaching reading *is* rocket science” (para. 7). Let’s build the literacy rocket together.

video form. Poetry includes several types of poems: narrative, lyrical, free-verse, sonnets, odes, ballads, and epics.

Informational texts are predominantly expository texts with print features such as captions, a table of contents, an index, diagrams, a glossary, and tables. Informational texts include biographies and autobiographies; books and articles about specific topics in history, economics, science, and the arts; technical texts including directions and forms; information in graphs, charts, and maps; and digital sources about specific topics. Students may also encounter expositions, arguments, personal and factual essays, speeches, opinions or op-eds, and memoirs, which can all be informational texts.

Building students' understanding of the nuances of different genres provides them knowledge to navigate different text types. This insight will support them as they read more than one text about a topic. In a blog post from *The Classroom Nook*, Rachael Parlett (n.d.) discusses how utilizing different genres has several advantages for students. First, students encounter a wide variety of vocabulary. In content areas, the key terms may be similar, but their explanations or uses may vary among texts. This provides students several opportunities to read and learn academic and domain-specific words. Second, students encounter different text structures. Each genre has its own organizational style, tone, and purpose. When students identify how different texts are structured, they may begin to make connections within and among texts. This concept is explored at length in Chapter 5. Also, students deepen their knowledge and understanding of the concepts under study when they read content presented in different genres.

Implications for Teaching and Learning

Print awareness is a foundational skill students must develop for success in navigating print. Teachers can model and instruct students for mastery in concepts of print in several ways. Students should learn that text features from a variety of genre types give valuable hints about a text's content and that they have important information that may not be expressed in the main text. It is imperative that students are exposed to and taught with a wide assortment of genres throughout their school experience. Using different genres of texts has far-reaching benefits for students, including that they may develop more knowledge and vocabulary and better comprehend content by reading various genres about related topics.

Promote Print Awareness

Since print awareness is an integral piece of literacy knowledge, ensuring students have adequate opportunities to develop their understanding of the functions and conventions of text is a foundational part of literacy work. There are myriad ways to enhance print awareness. It is imperative that instruction is intentional and designed for student mastery. Teachers begin promoting print awareness by labeling objects in the classroom. Further, teachers allow students to engage with texts, letter tiles or letter stamps, and sentence frames. Using predictable or pattern books provides students with practice mastering print concepts they have been taught through read-alouds and read-alongs.

“Big Books” are ideal for teaching print awareness. These oversized books allow for easy access by both teachers and students and offer ample modeling opportunities. Teachers may choose to read Big Books aloud, or, as students become more confident in their own reading, teachers may invite students to read the text to the group or class. Using the Big Book, the teacher models how to hold a book, turn the pages, and recognize the directionality of text. The teacher may also model effective fluency, pausing with punctuation or phrasing, and demonstrating prosody by changing inflection. Reading aloud also provides teachers opportunities to model print awareness concepts such as identifying letters, words, sentences, and punctuation. “Read-alouds help emergent and beginning readers gain understanding of book handling, print conventions, story structure, literacy syntax, expressive language, and text organizational structures” (International Literacy Association 2018, 3).

Additionally, students may read along with the teacher since the print in Big Books is large enough for them to see from a distance. This strategy still allows for modeling of reading techniques and concepts of print. However, students have the opportunity to try reading *with* the teacher in a non-threatening environment.

Both reading aloud and reading along show students that print is what we read. The teacher, when discussing pictures or other visuals on the pages, may explain how these features support the

“Read-alouds help emergent and beginning readers gain understanding of book handling, print conventions, story structure, literacy syntax, expressive language, and text organizational structures.
—International Literacy Association (2018, 3)”

fiction and *fantasy*. As students rise through the grades, teachers can add to students' understanding of more genres. National and state reading standards list specific genres students should learn about and read.

Teachers can plan lessons to specifically teach each genre. One way teachers can help students keep track of the genres they learn is to begin and add to an anchor chart listing the genres, the characteristics, and text titles as students learn about them. Students can collaborate in small groups to sort books based on the genres they have learned. Teachers in upper grades may consider creating a genre scavenger hunt by listing the genres students need to explore and leaving room for students to list the titles they discover.

Teach Text Features

Be sure students read the obvious! Text features such as headers and sidebars are quite valuable in helping students comprehend complex text, and they are usually prominently displayed on the page. Kelley and Clausen-Grace (2010) suggest conducting a “Text Feature Walk” to introduce new informational text. This process is similar to conducting a picture walk, but instead students preview text features they will encounter during reading. Students can see how information is “chunked,” a supportive reading strategy. Students can make predictions about the content and discuss how the features support the main ideas and details. After reading, they may reflect on how attending to the text features supported their understanding of the content.

Key Terms for Teacher Understanding

Term and Definition	Example
genre —category or type of text differentiated by format, style, and topic	Mrs. Ling introduces the term <i>biography</i> . After a brief discussion about what students know about this term, she provides small groups of students several examples of biographies. Students collaborate to identify characteristics of these texts, which the class uses to develop a student-friendly definition of the term.

Term and Definition	Example
<p>informational text—one category of nonfiction that informs readers about a particular topic</p>	<p>At the start of the school year, Mr. Phillips sends his students on a scavenger hunt for different informational texts they will use during the school year. He has them identify the titles of specific chapters, definitions of specific words in glossaries, and the topics supported by charts and other diagrams.</p>
<p>literature—text in the form of fictional prose, drama, or poetry</p>	<p>Once a month, Ms. Fields has a “Book Club Lunch” with students who are all reading the same piece of literature. The group discusses different scenes and what aspects resonated with students.</p>
<p>print awareness—also referred to as <i>concepts of print</i>; beginning reading skills related to how books are organized and how text within books shares a message</p>	<p>Mr. Popp introduces a Big Book about insects. He calls on students to identify the front and back covers and the title and author (which he reads aloud). After reading the text through once, he revisits pages to have students point to the text and show how to read the words across the page.</p>
<p>read-along—instructional strategy where the teacher guides students to read aloud with them (choral read)</p>	<p>During small-group instruction, the students in Mr. Andrews’ small group will reread a text they read yesterday. Students point to the words as they read them aloud. Mr. Andrews makes note of words students stumble over to practice as part of a phonics lesson or to add to their sight vocabulary.</p>
<p>read-aloud—instructional strategy where the teacher reads text aloud to students to model appropriate reading skills</p>	<p>Mrs. Bond chooses a short picture book about friendship to read aloud to students. She jots notes to herself and places them on the pages where she wants to stop and model how she can use her own thinking and the text to make inferences.</p>

Genre Wheel

Grades: 2–3

Description

A Genre Wheel is a circle divided into sections, with each section listing a different genre, including fiction and nonfiction. Students use the wheel to track the genre types they have engaged with during independent reading.

Rationale

A Genre Wheel provides students with a tangible reminder to choose different types of text during independent reading. This strategy supports students in discovering, identifying, and reading different genres.

Roles and Responsibilities

Teacher: Wheel Maker

- Provides a Genre Wheel for each student to keep with their reading log.

Student: Decider

- Uses the wheel to identify which genre to read next during independent reading.

Process

Create a Genre Wheel using paper, and provide a copy to each student. Each student can independently select their reading choice from one of the genres and mark the wheel to indicate which genre they have selected. Students select their next reading choices from one of the remaining genres.

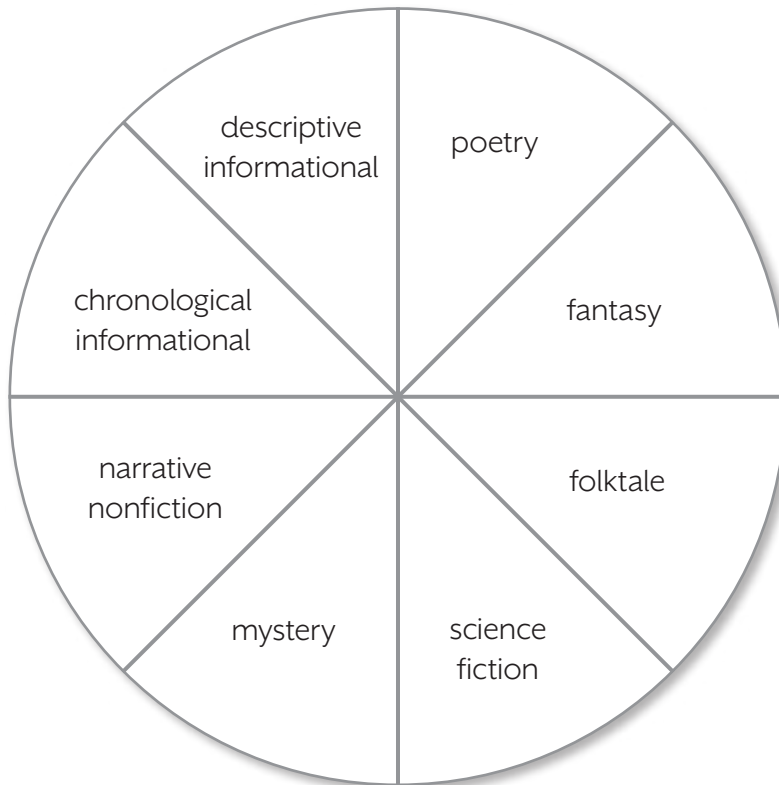
Differentiation

Students may color in the space on the wheel to indicate that they have read that genre. For a game of chance, add spinners to the Genre Wheels so students can spin their wheels to allow chance to determine their next genre type. Set clear expectations for the number of genres students should read in a given amount of time. Another option is a Genre Tic-Tac-Toe board. Students must read the



Research in Action

three different genres listed in one row, column, or diagonal on the board. A third option is to find a tool online that students may access, such as one from Wheel Decide (wheeldecide.com) or Wordwall (wordwall.net).



Genre Study

Grades: 4–5

Description

Throughout the year, students engage with a series of lessons to help them identify characteristics of different genres. During a Genre Study, students compare and contrast texts within the same genre. These texts may be collated from a unit of study to reinforce genre instruction.

Rationale

A Genre Study explicitly teaches students to compare and contrast ideas within the same genre to build understanding. In working with literature, students often analyze emotions, perspectives, and themes. Similarly, students use different informational texts to ascertain varying accounts, perspectives, and additional information.

Roles and Responsibilities

Teacher: Lesson Developer

- Plans lessons and activities to have students compare and contrast texts within the same genre, with similar themes or topics.
- Makes a class chart of information gathered in the comparison of the various texts or has students record it in their reader notebooks.

Student: Reader

- Reads books or texts in the genre being compared and contrasted.
- Records evidence from the book or text to demonstrate the characteristics of that particular genre.

Process

Provide multiple texts within the same genre. Provide organizers such as Venn diagrams for students to use to showcase similarities and differences between the texts.



Differentiation

Support multiple modalities by having students listen to audio recordings, such as songs, speeches, or interviews of the people they are reading about. Encourage students to look for other texts (besides books) related to their topics, such as magazine articles or blog posts. Use this opportunity to identify first- and third-person points of view.



My Teaching Checklist

Are you ready to develop students' literacy knowledge so they may be successful readers of complex texts? Use this checklist to help you get started!

Developing Literacy Knowledge	
Look Fors	Description
Students are immersed in print and texts.	<ul style="list-style-type: none">• Label items and pictures that support learning.• Display a number of different genres and text types.• Provide a multitude of reading and writing experiences.
Read-alouds are used to teach concepts of print.	<ul style="list-style-type: none">• Select books to teach concepts of print. (Upper-grade teachers can teach text features.)• Ask relevant questions to develop concepts of print (or identify how text features support information).
Students have opportunities to read and learn about different genres.	<ul style="list-style-type: none">• Teach students specific characteristics of different genres.• Have students read, analyze, and evaluate different genres.• Upper-grade students may begin to make connections among texts.