“Each discipline has unique ways of asking questions and solving problems. Similarly, each discipline has unique expectations for the types of claims that are made and the way those claims are supported. These differences play out in the ways that texts are written and in the demands those texts place on the readers. For these reasons, we can say that each discipline has its own discourse community, a shared way of using language and constructing knowledge.”

Although there is much debate about the purpose or primary job of schools, most of us who work in education would agree that an important purpose of education is to develop literate individuals. The Common Core State Standards for English Language Arts identify the capacities of a literate individual as follows:

1. They demonstrate independence.
2. They build strong content knowledge.
3. They respond to the varying demands of audience, task, purpose, and discipline.
4. They comprehend as well as critique.
5. They value evidence.
6. They use technology and digital media strategically and capably.
7. They come to understand other perspectives and cultures.

These broad statements about what it means to be literate led the authors of the Common Core State Standards to decide that developing literacy in students is a joint responsibility that English Language Arts (ELA) teachers share with content area teachers. And while the foundational skills associated with literacy are infused in the K-5 ELA standards, the more specialized disciplinary literacy skills are listed in the Grades 6-12 Literacy in History/Social Studies, Science, and Technical Subjects. The standards that ELA...
teachers are responsible for teaching are listed under the following headings:

- **Reading: Literature**
- **Reading: Informational Text**
- **Writing**
- **Speaking and Listening**
- **Language**

Content area teachers are also expected to teach standards related to reading informational text and standards related to writing. Because research has shown that experts in a field have specialized ways of thinking, talking, and writing about information that separate insiders within the field from the general public, the authors of the standards want content area teachers to teach students the specialized knowledge and skills that readers and writers use within the content area or discipline. In an article in the Harvard Educational Review, Cynthia and Timothy Shanahan present a model of literacy development that includes three stages.

- **Basic Literacy**: literacy skills such as decoding and knowledge of high-frequency words that underlie virtually all reading tasks.
- **Intermediate Literacy**: literacy skills common to many tasks, including generic comprehension strategies, common word meanings, and basic fluency.
- **Disciplinary Literacy**: literacy skills specialized to history, science, mathematics, literature, or other subject matter.

They argue that until recently, secondary (grades 6-12) educators have not focused enough attention on helping students master the discipline-specific ways of reading and writing that are characteristic of the content area that the teacher is teaching. Instead the literacy focus in secondary classrooms remained on the intermediate literacy skills that are common to many disciplines, such as previewing the text, activating prior knowledge, using graphic organizers, and summarizing the text. While these skills are necessary and have a definite place in the secondary classroom, literacy instruction that fully prepares students for college, careers, and adult life also includes a focus on the more specialized literacy skills of each discipline. When students are asked to think, read, write, speak, and listen like an expert in the field, they develop the insider knowledge needed to succeed with intellectually challenging tasks.

By studying professionals working within a discipline, researchers recognized that the way historians read, write, and think is different from the way scientists or mathematicians use literacy skills within their work. A broad body of research on adolescent literacy development suggests that while the literacy demands of school and the workplace have increased over time, the way we approach teaching literacy skills has not changed enough. The thinking and reasoning skills that individuals need to thrive in 21st century daily life and professional careers are developed as content area teachers focus on teaching both the content of the field of study and the specialized literacy skills associated with the discipline.

The standards for Grades 6-12 Literacy in History/Social Studies, Science, and Technical Subjects do not replace subject area standards, but instead complement them. These standards require teachers to use their content area expertise to help students master the challenges of thinking, reading, writing, speaking, and listening in the various subject areas.

In keeping with the standards, the focus of disciplinary reading should be on the following:

- **Key Ideas and Details**
  - Citing Evidence from Text
  - Central Ideas, Details, and Summary
- **Craft and Structure**
  - Vocabulary
  - Text Structure
- **Integration of Knowledge and Ideas**
  - Text Features
  - Author’s Point of View, Fact or Opinion
  - Comparison

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Disciplinary writing should focus on:

- **Range of Reading and Level of Text Complexity**
- **Text Types and Purposes**
  - Argument Writing
  - Informational/Explanatory Writing
- **Production and Distribution of Writing**
  - Clarity and Coherence; Attention to Task, Purpose, and Audience
  - Writing Process and Revision
  - Use of Technology
- **Research to Build and Present Knowledge**
  - Generating Questions and Conducting Research
  - Gathering Relevant Information
  - Drawing Evidence
- **Range of Writing**

Let’s take a brief look at the literacy demands of selected subject areas outside of English Language Arts and think about how teachers develop students’ thinking, reasoning, and communication skills by emphasizing the specialized way that experts in that subject area approach some of the focus areas listed above.

**Thinking, Reading, Writing, Speaking, and Listening in Social Studies**

Extensive work has been done on elucidating the skills historians and other social scientists use to do their work. Broadly speaking, historians study documents and other artifacts from the past to develop and communicate an understanding of what was occurring at a particular time in history. They are keenly aware that documents:

- present an incomplete picture of an actual event
- represent a particular point of view, and
- reflect the thinking and perspective of the author.

Historians want to know more than what happened in the past. They also want to understand why certain events happened. Why did people do what they did? How does what happened in the past connect to and inform the present? What does the past tell us about what might happen in the future?

Key ideas in the *Grades 6-12 Literacy in History/Social Studies* standards for reading include:

- Analysis and Summary of Primary and Secondary Sources
- Meaning of History/Social Studies Words and Phrases
- Description and Analysis of Text Structure
- Identification, Comparison, and Evaluation of Aspects of Text that Reveal Author’s Point of View
- Integration of Visual Information, Quantitative and Qualitative Information, and Multiple Sources
- Analysis of Author’s Claims
- Comparison of Treatment of Topic in Primary and Secondary Sources

The writing standards do not differ by content area, but assume that the writing will be specific to the content of the discipline. The following is a sample of expectations from the writing standards. These examples are for students in grades 6 to 8.

- Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.
- Develop a topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.
- Conduct short research projects to answer a question (including a self-generated question) drawing on several sources and generating related, focused questions that allow for multiple avenues of exploration.

Many social studies teachers address the literacy standards as they teach social studies content by structuring their classes with a focus on social science inquiry and asking questions. They present students with primary source materials and guide students to ask important questions related to the documents they are reading. The Stanford History Education Group has developed a free online curriculum entitled, “Reading Like a Historian.”

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A major strength of the Stanford materials is that they provide a model that school districts and individual teachers are using to develop additional instructional materials.

Each lesson in the curriculum is focused on a central question and includes a set of primary source documents. Students are expected to investigate the set of documents using the following historical thinking skills:

- **Sourcing** – Who wrote this? What is the author’s point of view? Why was it written? When was it written (a long or short time after the event)? Is this source believable? Why? Why Not?
- **Contextualizing** – What else was going on at the time this was written? What was it like to be alive at this time? What things were different back then? What things were the same? What would it look like to see this event through the eyes of someone who lived back then?
- **Close Reading** – What claims does the author make? What evidence does the author use? What language (words, phrases, images, symbols) does the author use to persuade the document’s audience? How does the document’s language indicate the author’s perspective?
- **Corroboration** – What do other documents say? Do the documents agree? If not, why? What are other possible documents? What documents are most reliable?

Students using the Stanford materials improved their reading comprehension, historical reasoning skills, and factual recall. A major strength of the Stanford materials is that they provide a model that school districts and individual teachers are using to develop additional instructional materials. The historical thinking skills listed above certainly help students who wish to become historians, but they also provide students with reasoning skills that serve them well in a wide range of situations.

Thinking, Reading, Writing, Speaking, and Listening in Science

The traditional science class has included a number of assignments that appear on the surface to replicate the kinds of reading and writing that scientists do. Students read laboratory investigations to prepare for labs. They develop lab reports to tell about laboratory experiments they conducted in class. However, in the past, many science educators have worked to eliminate the need for students to struggle with the literacy demands of science laboratory work because they wanted to focus on laboratory skills and the science content.

Well-taught science classes have always emphasized collecting and analyzing data. Students have been taught that scientists respect data; they spend time developing powerful representations of data such as graphs and charts; and they value being able to replicate an experiment and get data that is similar to the data collected by other scientists who did the same experiment. However, science classrooms have not always emphasized the literacy skills that are an integral part of the work of scientists.

In their professional work, scientists…

- Read research reports that include abstracts, section headings, figures, tables, diagrams, drawings, photographs, reference lists, and endnotes. Often scientists do not read the entire document, but only the parts of the report that are of special interest.
- Use technical vocabulary which often contain Latin or Greek roots. The vocabulary terms sometimes have one meaning in everyday discourse and a different and highly specialized meaning in science.
- Use categories and taxonomies that represent abstract ways of thinking that

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are not typically captured in everyday thinking.

- Analyze research reports of scientific findings through the lens of scientific reasoning. Key questions they consider include the following:
  - What are the functions of the investigation—to explore, check previous results, test the explanatory power of a theory? The functions of the investigation will influence how the reader evaluates the evidence presented.
  - What data has been collected and how has it been analyzed? Is the data appropriate to the questions and conclusions reached?
  - What are the trade-offs of the research design, weighing what we can learn from experiments with controlled conditions versus what we can learn from naturalistic or direct observations?
  - What are the logical links between data, findings, previously related research and widely accepted theory?
  - What are potential sources of bias that may influence the findings and recommendations?  

Key ideas in the Grades 6-12 Literacy in Science and Technical Subjects standards for reading include the following:

- Analysis and Summary of Science and Technical Texts
- Following a Multistep Procedure
- Understanding Symbols and Key Terms
- Analysis of Text Structure
- Purpose of Explanations and Procedures
- Integration of Information Presented in Diverse Formats
- Analysis and Evaluation of Reasoning and Evidence Presented in Text
- Comparison of Findings from Varied Sources

Although the writing standards are the same as for history/social studies, they assume that the writing will be specific to science and technical content. The following is a sample of expectations from the writing standards. These examples are for students in grades 9 to 10.

- Develop claim(s) and counterclaims fairly supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience’s knowledge level and concerns.
- Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
- Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.
- Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.

Engaging students in well-designed scientific inquiry in the classroom, including developing scientific explanations after completing experiments, allows them to develop the skills and the habits and thought processes of scientists. Teaching students how to question evidence and the logic of others helps them develop a set of skills that serve them well in any number of settings. For example, these same reasoning skills can be used in making personal health decisions, in making financial decisions, as well as in making decisions related to civic and political issues.

A major goal of the Common Core State Standards for Mathematics is to ensure that students spend time thinking about and solving worthwhile mathematics problems.

**Thinking, Reading, Writing, Speaking, and Listening in Mathematics**

During the first year of their Carnegie-sponsored research on disciplinary literacy, the Shanahans (see footnote on page 1) worked with experts in history, mathematics, and chemistry to understand more about the specialized literacy skills of each discipline. The mathematicians in the study emphasized the importance of reading and re-reading text. They spoke to the importance of specialized vocabulary and understanding that the meaning of symbols may change depending on the context. Mathematicians also spend much of their professional time reading and interpreting graphs, charts, and tables.

A major goal of the Common Core State Standards for Mathematics is to ensure that students spend time thinking about and solving worthwhile mathematics problems. The goal is to have students develop the habits of mind of the mathematician. The Standards for Mathematical Practice identify eight skills that teachers at all levels should seek to develop in students. The standards are as follows:

Mathematically proficient students

1. Make sense of problems and persevere in solving them
2. Reason abstractly and quantitatively
3. Construct viable arguments and critique the reasoning of others
4. Model with mathematics
5. Use appropriate tools strategically
6. Attend to precision
7. Look for and make use of structure
8. Look for and express regularity in repeated reasoning

In the mathematics classroom, students should have opportunities to address the standards for Grades 6-12 Literacy in Science and Technical Subjects, but the emphasis should be on the mathematics practices. Mathematics educators see practices 1 and 6 as reflecting overarching habits of mind of the mathematician. Many see practices 2 and 3 as practices that all contributing members of the mathematics community use on a regular basis as they communicate with others. They see practices 4 and 5 as being particularly relevant to how people use mathematics in many work settings, while practices 7 and 8 relate more closely to the work of theoretical mathematicians.

When students work with rich, real-world problems, they have the opportunity to use and develop many of the mathematics practices. The modern mathematics class requires students to collaborate and work with others to solve problems. Teachers give students opportunities to discuss different approaches to the same problem and ask them to think and talk about whether the answer makes sense in a real-world setting. Students also discuss whether or not their approach yielded a correct answer. Was the approach efficient? Is it generalizable and will it work for all numbers? Why or why not? Through rich discussion, students develop mathematical thinking and reasoning skills as well as the ability to critique their own reasoning and the reasoning of others. Again, the reasoning and thinking skills serve students well in a wide range of settings and situations.

**Thinking, Reading, Writing, Speaking, and Listening in Other Subject Areas**

Although researchers have not shared in-depth studies related to the disciplinary literacy skills of artists, musicians, athletes, chefs, and a variety of other professionals,

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Intertwining a focus on disciplinary literacy skills with well-designed content instruction has the potential to engage and empower a wide range of students. Educators in many places are working to apply the principles of disciplinary literacy to the secondary subject areas that they teach. Teachers of art, music, physical education, career and technology education, and other subject area classes recognize the applicability of the general concepts of disciplinary literacy to the work they do with students and they also recognize that they have a role to play in developing literate graduates.

When asked what disciplinary literacy looks like in music, Tim Shanahan replied:

Some fields draw from one or more disciplines and that means their reading and writing experience will be similar to the reading and writing routines, language, and insights of those related to those fields. I think that is something to be candid about with students: musical scholarship requires the ability to handle technical materials like a scientist, historical materials like a historian, and criticism in the fashion of a music critic; and students would necessarily have to recognize the diversity of those demands and adjust accordingly. 10

Some educators working within the arts, however, feel strongly that there are ways of thinking and communicating that are specialized to their subject areas and feel that articulating these specialized skills and developing them within students will enrich how students approach problem solving. The Wisconsin Department of Public Instruction suggests the following eight steps to building knowledge in the arts through literacy:

- Build prior knowledge.
- Build specialized vocabulary.
- Learn to deconstruct complex visual representation of ideas.
- Use knowledge of artistic elements and genres to identify main and subordinate ideas within the piece.
- Articulate what the graphic representations mean within a work or ideas to support its main components.
- Pose discipline-relevant questions.
- Compare artistic elements of the work to other artwork.
- Use reasoning within the discipline (What counts as evidence to evaluation claims?) 11

As educators continue to work with students on disciplinary literacy, it will become clearer what literacy means within each subject area. It will also become clearer which skills are most important to emphasize while teaching secondary students. Intertwining a focus on disciplinary literacy skills with well-designed content instruction has the potential to engage and empower a wide range of students. Developing within students the thinking, reasoning, and communication skills used by subject area experts prepares them well for the challenges of our ever-changing world.

Why Disciplinary Literacy?
If we want students to learn biology, why not teach them to think, read, and write like biologists? If we want them to learn history, shouldn’t they be able to think, read, and write like historians?

Approaching core subjects from this perspective is at the heart of disciplinary literacy. Now more than ever, it’s become vital that educators instill literacy skills grounded in real careers, creating students with an expert’s eye for real-world materials, regardless of the medium.

Content-area reading uses generic reading strategies, regardless of the text that’s being read. But disciplinary literacy is a way of approaching text with the reading strategies employed by experts in a given field — experts have specialized ways of researching, questioning, analyzing, and reporting.

Historians require the lens of multiple perspectives, reading between the lines of several writers to arrive at their conclusions. Mathematicians seek absolute answers, first and foremost, using abstract reasoning and pattern recognition to make their findings.


Scientists employ analytical skills to parse the validity of data in research reports, finding logical links between various findings before formulating their hypotheses.

These experts don’t just rely on one source. Their expertise is contingent on their own observations, along with the perspectives of others, expressed across several media types. Likewise, the days of using a single textbook as a teaching resource are over. Educators must begin using new types of resources in the classroom, including digital content and media to immerse students in real-world reading, writing and thinking.

Discovery Education Techbook provides students with primary sources and video, showing actual footage of events that can engage students in reading texts — often these are the same materials that experts in their field read and use. Techbook allows students to utilize tools like highlighting and text annotating to decipher content-rich texts and interact with a glossary that utilizes not only the definition of a word, but also a video, an animation and an image. One of the core elements of disciplinary literacy is honing the ability to read, write and speak fluently using the vocabulary of the field.

The disciplinary literacy approach to reading reinforces the new era of teaching, which welcomes multiple resources and multiple media types, to help students form a grounded understanding of a subject that even experts would respect. Just recently, a superintendent said, “the combination of media integrated into the informational text makes students want to read.”

The hallmark of any focus on literacy — disciplinary or otherwise — is instilling the need and the desire to want to read.

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**About the Author**

Dr. Karen Beerer  
**Discovery Education Vice President, Learning & Development**

Dr. Karen Beerer has more than 30 years of experience in education. Beginning as a second-grade teacher, she has also taught the fifth and seventh grades, as well as graduate-level courses. In addition, Dr. Beerer has served as a Reading Specialist and an Elementary Principal as well as a Supervisor of Curriculum and Professional Development. Prior to joining Discovery Education, she served for eight years as the Assistant Superintendent for Curriculum, Instruction and Assessment in Pennsylvania’s Boyertown Area School District. Dr. Beerer has a passion for professional development, specifically helping educators utilize research-based practices in instruction to ensure the achievement of all students. She has provided professional development to teachers and administrators throughout the country on a multitude of topics such as the Common Core State Standards, effective literacy instruction, and leading change in the 21st century. She received her Ed.D. from Lehigh University where she studied Curriculum and Instruction and published several pieces.

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