Introduction

The Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects ("the Standards") are the culmination of an extended, broad-based effort to fulfill the charge issued by the states to create the next generation of K–12 standards in order to help ensure that all students are college and career ready in literacy no later than the end of high school.

The present work, led by the Council of Chief State School Officers (CCSSO) and the National Governors Association (NGA), builds on the foundation laid by states in their decades-long work on crafting high-quality education standards. The Standards also draw on the most important international models as well as research and input from numerous sources, including state departments of education, scholars, assessment developers, professional organizations, educators from kindergarten through college, and parents, students, and other members of the public. In their design and content, refined through successive drafts and numerous rounds of feedback, the Standards represent a synthesis of the best elements of standards-related work to date and an important advance over that previous work.

As specified by CCSSO and NGA, the Standards are (1) research and evidence based, (2) aligned with college and work expectations, (3) rigorous, and (4) internationally benchmarked. A particular standard was included in the document only when the best available evidence indicated that its mastery was essential for college and career readiness in a twenty-first-century, globally competitive society. The Standards are intended to be a living work: as new and better evidence emerges, the Standards will be revised accordingly.

The Standards are an extension of a prior initiative led by CCSSO and NGA to develop College and Career Readiness (CCR) standards in reading, writing, speaking, listening, and language as well as in mathematics. The CCR Reading, Writing, and Speaking and Listening Standards, released in draft form in September 2009, serve, in revised form, as the backbone for the present document. Grade-specific K–12 standards in reading, writing, speaking, listening, and language translate the broad (and, for the earliest grades, seemingly distant) aims of the CCR standards into age- and attainment-appropriate terms.

The Standards set requirements not only for English language arts (ELA) but also for literacy in history/social studies, science, and technical subjects. Just as students must learn to read, write, speak, listen, and use language effectively in a variety of content areas, so too must the Standards specify the literacy skills and understandings required for college and career readiness in multiple disciplines. Literacy standards for grade 6 and above are predicated on teachers of ELA, history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6–12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them. States may incorporate these standards into their standards for those subjects or adopt them as content area literacy standards.

As a natural outgrowth of meeting the charge to define college and career readiness, the Standards also lay out a vision of what it means to be a literate person in the twenty-first century. Indeed, the skills and understandings students are expected to demonstrate have wide applicability outside the classroom or workplace. Students who meet the Standards readily undertake the close, attentive reading that is at the heart of understanding and enjoying complex works of literature. They habitually perform the critical reading necessary to pick carefully through the staggering amount of information available today in print and digitally. They actively seek the wide, deep, and thoughtful engagement with high-quality literary and informational texts that builds knowledge, enlarges experience, and broadens worldviews. They reflexively demonstrate the cogent reasoning and use of evidence that is essential to both private deliberation and responsible citizenship in a democratic republic. In short, students who meet the Standards develop the skills in reading, writing, speaking, and listening that are the foundation for any creative and purposeful expression in language.

June 2, 2010

Key Design Considerations

CCR and grade-specific standards

The CCR standards anchor the document and define general, cross-disciplinary literacy expectations that must be met for students to be prepared to enter college and workforce training programs ready to succeed. The K–12 grade-specific standards define end-of-year expectations and a cumulative progression designed to enable students to meet college and career readiness expectations no later than the end of high school. The CCR and high school (grades 9–12) standards work in tandem to define the college and career readiness line—the former providing broad standards, the latter providing additional specificity. Hence, both should be considered when developing college and career readiness assessments.

Students advancing through the grades are expected to meet each year's grade-specific standards, retain or further develop skills and understandings mastered in preceding grades, and work steadily toward meeting the more general expectations described by the CCR standards.

Grade levels for K–8; grade bands for 9–10 and 11–12

The Standards use individual grade levels in kindergarten through grade 8 to provide useful specificity; the Standards use two-year bands in grades 9–12 to allow schools, districts, and states flexibility in high school course design.

A focus on results rather than means

By emphasizing required achievements, the Standards leave room for teachers, curriculum developers, and states to determine how those goals should be reached and what additional topics should be addressed. Thus, the Standards do not mandate such things as a particular writing process or the full range of metacognitive strategies that students may need to monitor and direct their thinking and learning. Teachers are thus free to provide students with whatever tools and knowledge their professional judgment and experience identify as most helpful for meeting the goals set out in the Standards.

An integrated model of literacy

Although the Standards are divided into Reading, Writing, Speaking and Listening, and Language strands for conceptual clarity, the processes of communication are closely connected, as reflected throughout this document. For example, Writing standard 9 requires that students be able to write about what they read. Likewise, Speaking and Listening standard 4 sets the expectation that students will share findings from their research.

Research and media skills blended into the Standards as a whole

To be ready for college, workforce training, and life in a technological society, students need the ability to gather, comprehend, evaluate, synthesize, and report on information and ideas, to conduct original research in order to answer questions or solve problems, and to analyze and create a high volume and extensive range of print and nonprint texts in media forms old and new. The need to conduct research and to produce and consume media is embedded into every aspect of today's curriculum. In like fashion, research and media skills and understandings are embedded throughout the Standards rather than treated in a separate section.

Shared responsibility for students' literacy development

The Standards insist that instruction in reading, writing, speaking, listening, and language be a shared responsibility within the school. The K–5 standards include expectations for reading, writing, speaking, listening, and language applicable to a range of subjects, including but not limited to ELA. The grades 6–12 standards are divided into two sections, one for ELA and the other for history/social studies, science, and technical subjects. This division reflects the unique, time-honored place of ELA teachers in developing students' literacy skills while at the same time recognizing that teachers in other areas must have a role in this development as well.

Part of the motivation behind the interdisciplinary approach to literacy promulgated by the Standards is extensive research establishing the need for college and career ready students to be proficient in reading complex informational text independently in a variety of content areas. Most of the required reading in college and workforce training programs is informational in structure and challenging in content; postsecondary education programs typically provide students with both a higher volume of such reading than is generally required in K–12 schools and comparatively little scaffolding.

The Standards are not alone in calling for a special emphasis on informational text. The 2009 reading framework of the National Assessment of Educational Progress (NAEP) requires a high and increasing proportion of informational text on its assessment as students advance through the grades.

How to Read This Document

Overall Document Organization

The Standards comprise three main sections: a comprehensive K–5 section and two content area-specific sections for grades 6–12, one for ELA and one for history/social studies, science, and technical subjects. Three appendices accompany the main document.

Each section is divided into strands. K–5 and 6–12 ELA have Reading, Writing, Speaking and Listening, and Language strands; the 6–12 history/ social studies, science, and technical subjects section focuses on Reading and Writing. Each strand is headed by a strand-specific set of College and Career Readiness Anchor Standards that is identical across all grades and content areas.

Standards for each grade within K–8 and for grades 9–10 and 11–12 follow the CCR anchor standards in each strand. Each grade-specific standard (as these standards are collectively referred to) corresponds to the same-numbered CCR anchor standard. Put another way, each CCR anchor standard has an accompanying grade-specific standard translating the broader CCR statement into grade-appropriate end-of-year expectations.

Individual CCR anchor standards can be identified by their strand, CCR status, and number (R.CCR.6, for example). Individual grade-specific standards can be identified by their strand, grade, and number (or number and letter, where applicable), so that RI.4.3, for example, stands for Reading, Informational Text, grade 4, standard 3 and W.5.1a stands for Writing, grade 5, standard 1a. Strand designations can be found in brackets alongside the full strand title.

Who is responsible for which portion of the Standards

A single K–5 section lists standards for reading, writing, speaking, listening, and language across the curriculum, reflecting the fact that most or all of the instruction students in these grades receive comes from one teacher. Grades 6–12 are covered in two content area-specific sections, the first for the English language arts teacher and the second for teachers of history/social studies, science, and technical subjects. Each section uses the same CCR anchor standards but also includes grade-specific standards tuned to the literacy requirements of the particular discipline(s).

Key Features of the Standards

Reading: Text complexity and the growth of comprehension

The Reading standards place equal emphasis on the sophistication of what students read and the skill with which they read. Standard 10 defines a grade-by-grade "staircase" of increasing text complexity that rises from beginning reading to the college and career readiness level. Whatever they are reading, students must also show a steadily growing ability to discern more from and make fuller use of text, including making an increasing number of connections among ideas and between texts, considering a wider range of textual evidence, and becoming more sensitive to inconsistencies, ambiguities, and poor reasoning in texts.

Writing: Text types, responding to reading, and research

The Standards acknowledge the fact that whereas some writing skills, such as the ability to plan, revise, edit, and publish, are applicable to many types of writing, other skills are more properly defined in terms of specific writing types: arguments, informative/explanatory texts, and narratives. Standard 9 stresses the importance of the writing-reading connection by requiring students to draw upon and write about evidence from literary and informational texts. Because of the centrality of writing to most forms of inquiry, research standards are prominently included in this strand, though skills important to research are infused throughout the document.

Speaking and Listening: Flexible communication and collaboration

Including but not limited to skills necessary for formal presentations, the Speaking and Listening standards require students to develop a range of broadly useful oral communication and interpersonal skills. Students must learn to work together, express and listen carefully to ideas, integrate information from oral, visual, quantitative, and media sources, evaluate what they hear, use media and visual displays strategically to help achieve communicative purposes, and adapt speech to context and task.

Language: Conventions, effective use, and vocabulary

The Language standards include the essential "rules" of standard written and spoken English, but they also approach language as a matter of craft and informed choice among alternatives. The vocabulary standards focus on understanding words and phrases, their relationships, and their nuances and on acquiring new vocabulary, particularly general academic and domain-specific words and phrases.

Appendices A, B, and C

Appendix A contains supplementary material on reading, writing, speaking and listening, and language as well as a glossary of key terms. Appendix B consists of text exemplars illustrating the complexity, quality, and range of reading appropriate for various grade levels with accompanying sample performance tasks. Appendix C includes annotated samples demonstrating at least adequate performance in student writing at various grade levels.

College and Career Readiness Anchor Standards for Reading

The grades 6–12 standards on the following pages define what students should understand and be able to do by the end of each grade span. They correspond to the College and Career Readiness (CCR) anchor standards below by number. The CCR and grade-specific standards are necessary complements—the former providing broad standards, the latter providing additional specificity—that together define the skills and understandings that all students must demonstrate.

Key Ideas and Details

1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
3. Analyze how and why individuals, events, or ideas develop and interact over the course of a text.

Craft and Structure

4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.
5. Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole.
6. Assess how point of view or purpose shapes the content and style of a text.

Integration of Knowledge and Ideas

7. Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words.*
8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.
9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.

Range of Reading and Level of Text Complexity

10. Read and comprehend complex literary and informational texts independently and proficiently.

*Please see "Research to Build and Present Knowledge" in Writing for additional standards relevant to gathering, assessing, and applying information from print and digital sources.

Note on range and content of student reading

Reading is critical to building knowledge in history/social studies as well as in science and technical subjects. College and career ready reading in these fields requires an appreciation of the norms and conventions of each discipline, such as the kinds of evidence used in history and science; an understanding of domain-specific words and phrases; an attention to precise details; and the capacity to evaluate intricate arguments, synthesize complex information, and follow detailed descriptions of events and concepts. In history/social studies, for example, students need to be able to analyze, evaluate, and differentiate primary and secondary sources. When reading scientific and technical texts, students need to be able to gain knowledge from challenging texts that often make extensive use of elaborate diagrams and data to convey information and illustrate concepts. Students must be able to read complex informational texts in these fields with independence and confidence because the vast majority of reading in college and workforce training programs will be sophisticated nonfiction. It is important to note that these Reading standards are meant to complement the specific content demands of the disciplines, not replace them.

College and Career Readiness Anchor Standards for Writing

The grades 6–12 standards on the following pages define what students should understand and be able to do by the end of each grade span. They correspond to the College and Career Readiness (CCR) anchor standards below by number. The CCR and grade-specific standards are necessary complements—the former providing broad standards, the latter providing additional specificity—that together define the skills and understandings that all students must demonstrate.

Text Types and Purposes*

1. Write arguments to support claims in an analysis of substantive topics or texts using valid reasoning and relevant and sufficient evidence.
2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.
3. Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details and well-structured event sequences.

Production and Distribution of Writing

4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.
6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

Research to Build and Present Knowledge

7. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.
8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.
9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

Range of Writing

10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

*These broad types of writing include many subgenres. See Appendix A for definitions of key writing types.

Note on range and content of student writing

For students, writing is a key means of asserting and defending claims, showing what they know about a subject, and conveying what they have experienced, imagined, thought, and felt. To be college and career ready writers, students must take task, purpose, and audience into careful consideration, choosing words, information, structures, and formats deliberately. They need to be able to use technology strategically when creating, refining, and collaborating on writing. They have to become adept at gathering information, evaluating sources, and citing material accurately, reporting findings from their research and analysis of sources in a clear and cogent manner. They must have the flexibility, concentration, and fluency to produce high-quality first-draft text under a tight deadline and the capacity to revisit and make improvements to a piece of writing over multiple drafts when circumstances encourage or require it. To meet these goals, students must devote significant time and effort to writing, producing numerous pieces over short and long time frames throughout the year.

COMMON CORE
STATE STANDARDS INITIATIVE
PREPARING AMERICA'S STUDENTS FOR COLLEGE & CAREER

An Overview of the Big Shifts in the Common Core State Standards for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects

February 14, 2012

Appropriate Text Complexity	Students have extensive opportunities to engage with complex texts. Teachers consider qualitative and quantitative measures as well as reader and task when selecting texts.
Increased Reading of Informational Texts	Throughout the school day, students at K-5 read a balance of 50% literature and 50% informational texts. By grade 12, at least 70% of texts read throughout the day should be informational texts. ELA classrooms at grades 6-12 will focus on literary nonfiction. At the secondary level, texts shift from narrative structures to those written to convey information, explanation, and points of view.
Disciplinary Literacy	Students read, write, and speak about discipline-related topics to build content knowledge. In the early grades, students read informational texts that include historical, scientific, and technical texts to prepare for the demands of reading discipline-specific texts in later grades. At grades 6-12, students grapple with discipline-specific complex texts that deepen their understanding of a topic and develop an understanding of the norms and conventions of each discipline; they demonstrate mastery by applying that knowledge when writing or speaking.
Close Reading	Students should read and reread texts of sufficient complexity to draw meaning from them. After students fully understand the text, they will be able to make appropriate connections and/or comparisons to other texts. For younger students or those needing additional help, the first reading of a text may be done by the teacher.
Text-dependent Questions	To gain deeper understanding of a text, students respond to high-quality questions about its content, structure, and language, including questions that ask students to make inferences and draw conclusions based on textual evidence. At least 80%-90% of questions about a text should be text-dependent.
General Academic and Domain-specific Vocabulary	Students acquire general academic vocabulary (Tier Two words) to comprehend complex texts that cross disciplines and domain-specific vocabulary (Tier Three words) that enables students to comprehend language specific to a discipline. Students demonstrate mastery by using both types of vocabulary when speaking and writing.
Argumentative Writing	Throughout the school day, all students write about topics or texts, some of which have differing viewpoints. In grades K-5, 30% of student writing should be writing opinions. In grades 6-8, 35% of student writing should be writing arguments in which they support claims with reasons and evidence. In grades 9-12, 40% of student writing should be well-developed arguments.
Short and Sustained Research Projects	Students conduct research, both short and long term, in which they synthesize information from many sources, construct knowledge, use technology when appropriate, and present findings in a variety of formats.

COMMON CORE
STATE STANDARDS INITIATIVE
PREPARING AMERICA'S STUDENTS FOR COLLEGE & CAREER

Understanding the Big Shifts in the Common Core State Standards

English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects

Alignment of Arkansas's Big Shifts to PARCC's Key Instructional Shifts

*PARCC's Key Instructional Shifts	Arkansas's Big Shifts
COMPLEXITY Regular practice with **complex text** and its **academic vocabulary**	• Appropriate Text Complexity • Increased Reading of Informational Texts • Disciplinary Literacy • Close Reading • General Academic and Domain-specific Vocabulary
EVIDENCE Reading and writing grounded in **evidence from text**	• Increased Reading of Informational Texts • Disciplinary Literacy • Close Reading • Text-dependent Questions • Argumentative Writing • Short and Sustained Research Projects
KNOWLEDGE **Building knowledge** through **content-rich nonfiction** and **informational texts**	• Appropriate Text Complexity • Increased Reading of Informational Texts • Disciplinary Literacy • Close Reading • Text-dependent Questions • Short and Sustained Research Projects

*For more information on PARCC's Key Instructional Shifts, see *A Strong State Role in Common Core State Standards Implementation: Rubric and Self-Assessment Tool, p. 6, at* http://www.parcconline.org/sites/parcc/files/CCSS%20rubric%20and%20state%20planning%20tool%20-%203%202%2012.pdf.

Students Who are College and Career Ready in Reading, Writing, Speaking, Listening, and Language

The descriptions that follow are not standards themselves but instead offer a portrait of students who meet the standards set out in this document. As students advance through the grades and master the standards in reading, writing, speaking, listening, and language, they are able to exhibit with increasing fullness and regularity these capacities of the literate individual.

They demonstrate independence.

Students can, without significant scaffolding, comprehend and evaluate complex texts across a range of types and disciplines, and they can construct effective arguments and convey intricate or multifaceted information. Likewise, students are able independently to discern a speaker's key points, request clarification, and ask relevant questions. They build on others' ideas, articulate their own ideas, and confirm they have been understood. Without prompting, they demonstrate command of standard English and acquire and use a wide-ranging vocabulary. More broadly, they become self-directed learners, effectively seeking out and using resources to assist them, including teachers, peers, and print and digital reference materials.

They build strong content knowledge.

Students establish a base of knowledge across a wide range of subject matter by engaging with works of quality and substance. They become proficient in new areas through research and study. They read purposefully and listen attentively to gain both general knowledge and discipline-specific expertise. They refine and share their knowledge through writing and speaking.

They respond to the varying demands of audience, task, purpose, and discipline.

Students adapt their communication in relation to audience, task, purpose, and discipline. They set and adjust purpose for reading, writing, speaking, listening, and language use as warranted by the task. They appreciate nuances, such as how the composition of an audience should affect tone when speaking and how the connotations of words affect meaning. They also know that different disciplines call for different types of evidence (e.g., documentary evidence in history, experimental evidence in science).

They comprehend as well as critique.

Students are engaged and open-minded—but discerning—readers and listeners. They work diligently to understand precisely what an author or speaker is saying, but they also question an author's or speaker's assumptions and premises and assess the veracity of claims and the soundness of reasoning.

They value evidence.

Students cite specific evidence when offering an oral or written interpretation of a text. They use relevant evidence when supporting their own points in writing and speaking, making their reasoning clear to the reader or listener, and they constructively evaluate others' use of evidence.

They use technology and digital media strategically and capably.

Students employ technology thoughtfully to enhance their reading, writing, speaking, listening, and language use. They tailor their searches online to acquire useful information efficiently, and they integrate what they learn using technology with what they learn offline. They are familiar with the strengths and limitations of various technological tools and mediums and can select and use those best suited to their communication goals.

They come to understand other perspectives and cultures.

Students appreciate that the twenty-first-century classroom and workplace are settings in which people from often widely divergent cultures and who represent diverse experiences and perspectives must learn and work together. Students actively seek to understand other perspectives and cultures through reading and listening, and they are able to communicate effectively with people of varied backgrounds. They evaluate other points of view critically and constructively. Through reading great classic and contemporary works of literature representative of a variety of periods, cultures, and worldviews, students can vicariously inhabit worlds and have experiences much different than their own.

Shanahan Article Excerpt (Slide 14)

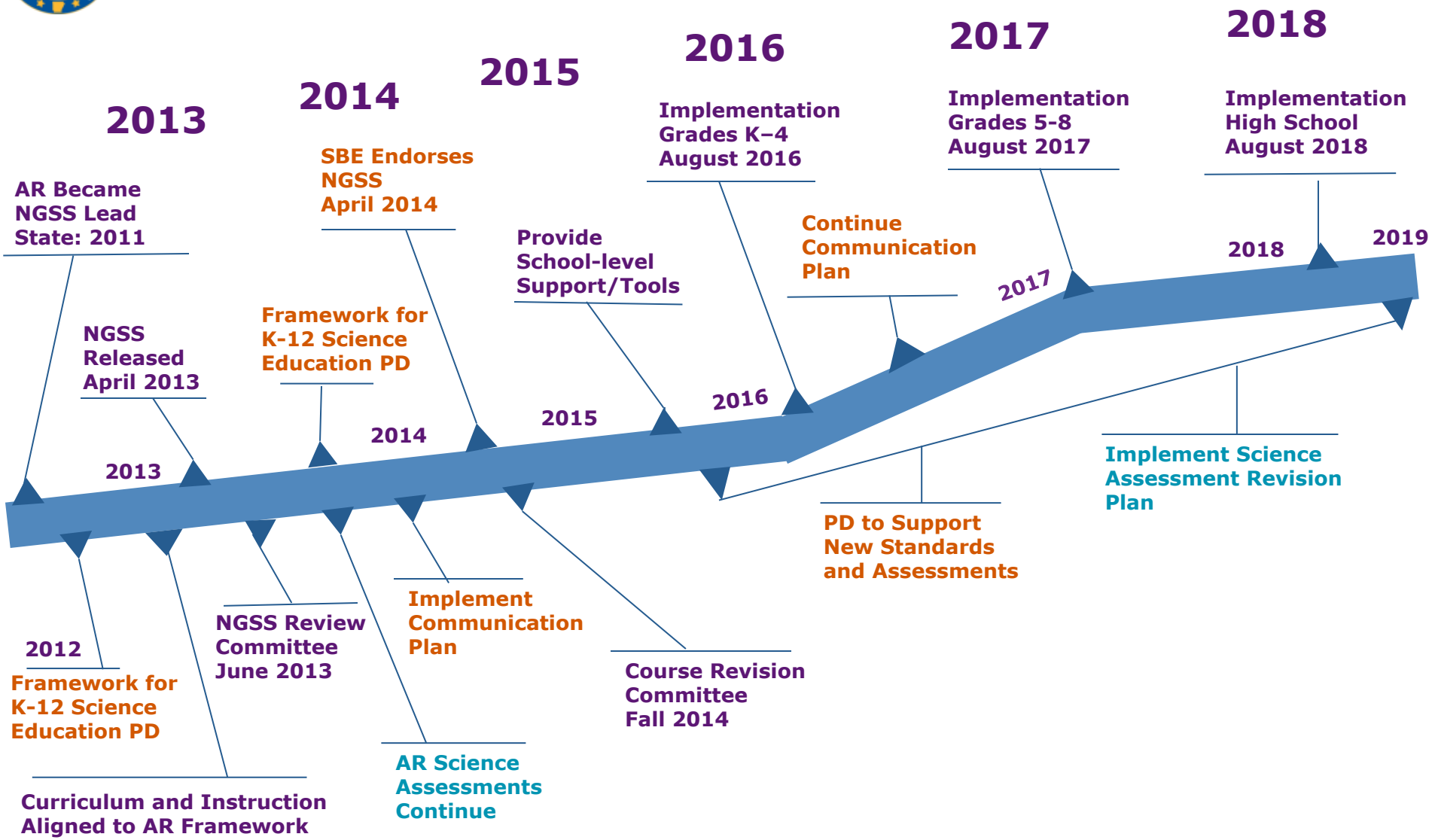
Harvard Educational Review

Spring 2008 Issue

"Teaching Disciplinary Literacy to Adolescents: Rethinking Content-Area Literacy"

"In this article, Timothy and Cynthia Shanahan argue that "disciplinary literacy" — advanced literacy instruction embedded within content-area classes such as math, science, and social studies — should be a focus of middle and secondary school settings. Moving beyond the oft-cited "every teacher a teacher of reading" philosophy that has historically frustrated secondary content-area teachers, the Shanahans present data collected during the first two years of a study on disciplinary literacy that reveal how content experts and secondary content teachers read disciplinary texts, make use of comprehension strategies, and subsequently teach those strategies to adolescent readers. Preliminary findings suggest that experts from math, chemistry, and history read their respective texts quite differently; consequently, both the content-area experts and secondary teachers in this study recommend different comprehension strategies for work with adolescents. This study not only has implications for which comprehension strategies might best fit particular disciplinary reading tasks, but also suggests how students may be best prepared for ***the reading, writing, and thinking required by advanced disciplinary coursework"*** (italicized preface of document, page 40).

Science Standards Timeline



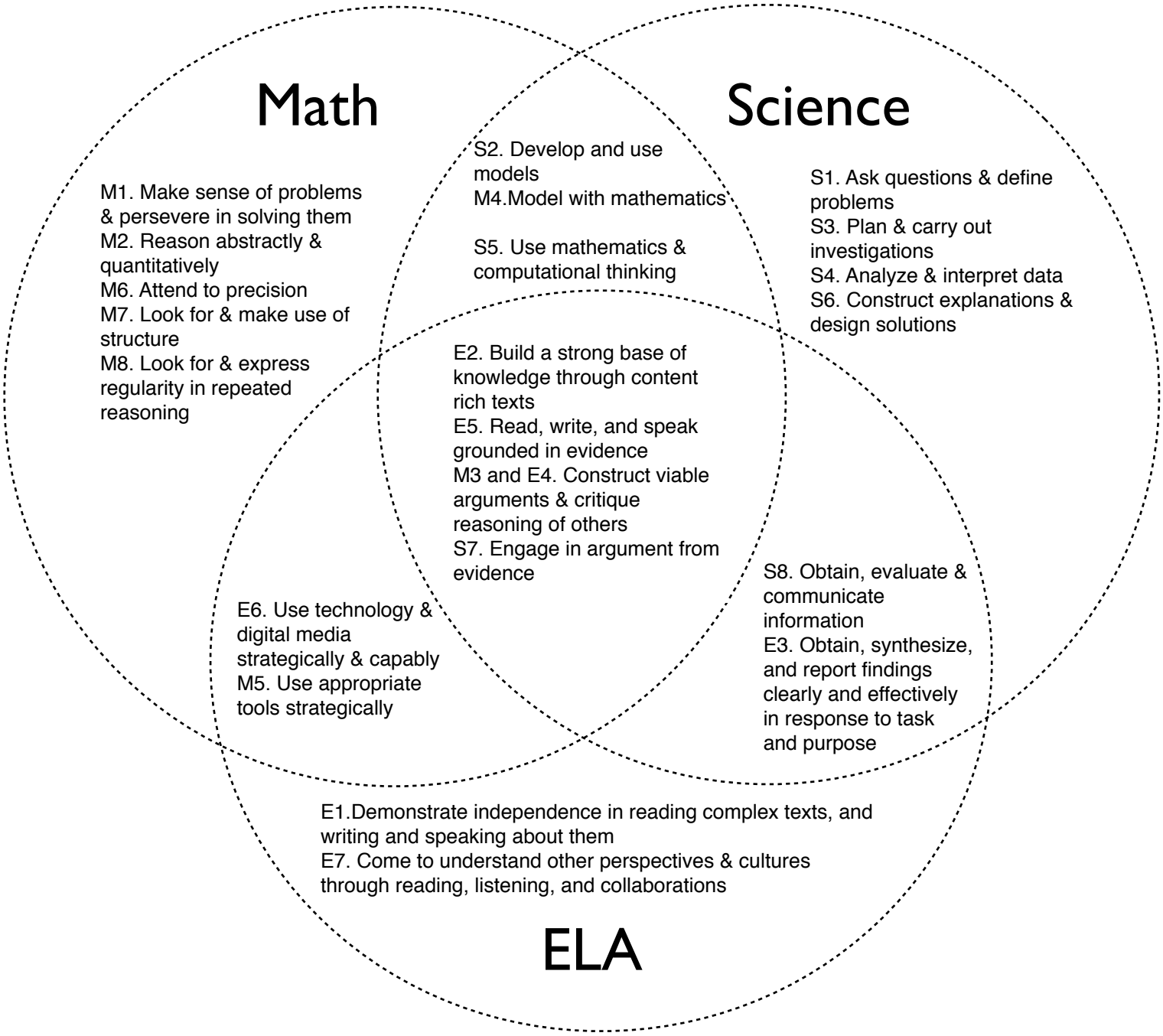
Curriculum and Instruction **Assessment** **Professional Development**

Science and Engineering Practices for K-12 Classrooms

1. Asking questions (science) and defining problems (engineering)
2. Design and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Developing explanations (science) and designing solutions (engineering)
7. Engaging in argument
8. Obtaining, evaluating, and communicating information

Relationships and Convergences Found in the Common Core State Standards in Mathematics (practices), Common Core State Standards in ELA/Literacy*(student portraits), and A Framework for K-12 Science Education (science & engineering practices)

These student practices and portraits are grouped in a Venn diagram. The letter and number set preceding each phrase denotes the discipline and number designated by the content standards or framework.
The Science Framework will be used to guide the production of the Next Generation Science Standards.



Sources:
Common Core State Standards for English Language Arts & Literacy* in History/Social Studies, Science, and Technical Subjects, p7.
Common Core State Standards for Mathematical Practice p6-8.
A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas, chapter 3: 41-82.

Citation:
Cheuk, T. (2012). Relationships and Convergences Found in the Common Core State Standards in Mathematics (practices), Common Core State Standards in ELA/Literacy*(student portraits), and A Framework for K-12 Science Education (science & engineering practices).

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Stanford
GRADUATE SCHOOL OF
EDUCATION

CCSS Literacy in Science: Example A
7th Grade Text Types and Purposes

ELA	Literacy in Science
Text Type and Purposes 1.Write arguments to support claims with clear reasons and relevant evidence. a. Introduce claim(s), acknowledge **and address** alternative or opposing claims, and organize the reasons and evidence logically. b. Support claim(s) or **counterarguments** with logical reasoning and relevant evidence, using accurate, credible sources and demonstrating an understanding of the topic or text. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), reasons, and evidence. d. Establish and maintain a formal style. e. Provide a concluding statement or section that follows from and supports he argument presented.	**Text Type and Purposes** 1.Write arguments focused on *discipline-specific content.* a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternative or opposing claims, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant, accurate data and evidence, that demonstrate an understanding of the topic or text, using credible sources. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. d. Establish and maintain a formal style. e. Provide a concluding statement or section that follows from and supports the argument presented.
2. Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. a. Introduce a topic **or thesis statement**; clearly previewing what is to follow; organize ideas, concepts, and information, using strategies such as definition, classification, comparison/contrast, and cause/effect; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples. c. Use appropriate transitions to create cohesion and clarify the relationships among ideas and concepts. d. Use precise language and domain specific vocabulary to inform about or explain the topic. e. Establish and maintain a formal style. f. Provide a concluding statement or section that follows from the information or explanation presented.	2. Write informative/explanatory texts including the narration of historical event, scientific procedures/experiments, or technical processes. a. Introduce a topic clearly; previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with relevant facts, well-chosen facts, concrete details, quotations, or other information and examples. c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts. d. Use precise language and domain specific vocabulary to inform about or explain the topic. e. Establish and maintain a formal style and objective tone. f. Provide a concluding statement or section that follows from and supports the information or explanation presented.
3. Write narratives to develop real or imagined experiences or events using effective technique, relevant descriptive details, and well-structured event sequence. a. Engage and orient the reader by establishing a context and point of view and introducing a narrator and /or characters; organize an event sequence that unfolds naturally and logically. b. Use narrative techniques, such as dialogue, pacing, and description, to develop experiences, events, and/or characters. c. Use a variety of transition words, phrases, and clauses to convey sequence and signal shifts from one time frame or setting to another. d. Use precise words and phrases, relevant descriptive details, and sensory language to capture the action and convey experiences and events. e. Provide a conclusion that follows from the narrated experiences or events.	3. (See note; not applicable as a separate requirement) Note: Students' narrative skills continue to grow in these grades. The Standards require that students be able to incorporate narrative elements effectively in arguments and informative/explanatory texts. In science and technical subjects, students must be able to write precise enough descriptions of the step-by-step procedures they use in investigations or technical work so that others can replicate them and (possibly) reach the same results.

Science Lesson Planning Template

What's the Big Idea or Main Concept? Write this critical concept of the lesson as a sentence.
Standard(s) addressed:
Where does this Big Idea or Main Concept fit into the Big Picture of your course? Of the unit? What must come before? What will come after? (Frame the lesson.)
What should students know and/or be able to do when they have completed this lesson?

Developed by: _____ Revised on: _____

Sacramento Area Science Project
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http://sasp.ucdavis.edu

Sacramento Area Science Project

Science Literacy Lesson Model

Engaging Science Experience

Interact with data – Hands-on – Lab Activity – Inquiry

Purposeful Reading

Productive Dialogue

Meaningful Writing

The lesson incorporates the four parts of the Science Literacy Cycle – Reading, Writing, Inquiry and Dialogue. They can occur in any order. On the diagram above, number in sequence each part of the cycle you plan to use, and draw arrows to show the flow of the lesson. Add a brief summary in each area you plan to use to describe that part of the lesson cycle.

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Sacramento Area Science Project

Science Lesson Planning Template

Cycle Part: (circle one)	Reading	Writing	Science	Dialogue
Describe the assignment:				
Cycle Part: (circle one)	Reading	Writing	Science	Dialogue
Describe the assignment:				
Cycle Part: (circle one)	Reading	Writing	Science	Dialogue
Describe the assignment:				

Cycle Part: (circle one)	Reading	Writing	Science	Dialogue
Describe the assignment:				

Anticipatory Set

Respond to the following statements by either agreeing with them or disagreeing with them. In the space provided put either and **A** if you agree or a **D** if you disagree.

____Only four chemicals make up our genetic code.

____Everything we are and will be is carried in our genes.

____Dead bacteria can "give" their genes to live bacteria.

____Even though we knew about DNA, it took more than 40 years to figure out how it worked.

____Viruses are made of DNA.

____DNA is made up of five basic parts.

____The most important thing about DNA is the order of the base pairs.

____A woman scientist did some of the most important work on DNA.

____We can see DNA.

____It is only the attraction between oxygen and hydrogen that holds two strands of DNA together.

Teacher Background Information

Rationale: Just 4 letters?

How can four letters make something as complicated as a human body? Let us take a trip back to my favorite childhood toy - Lego.

Give a child 80 lego pieces of one color and ask them to build a tower. No matter how they try, they can only make one possible combination of colors.

Now give a child a box of lego with 20 lots of 4 different colors and ask them to make a tower. The size is still the same, but the combination and order of colors is different each time they build. The possibilities are endless...well not quite, but still quite large.

Remember it is the sequence of letters (order of the colors in this analogy) that stores the information. Each set of 3 letters is a word. With four different letters, there are 64 possible three-letter-words. Imagine how many combinations of these words there are in a sentence just 100 letters long!

DNA Possible Combinations Activity

Objective:
Students will be able to understand:

- DNA is composed of only 4 bases: A, T, G, C
- Every organisms' DNA is unique because of the different combinations created by those 4 bases

Materials:
Per groups of 2-3 students

- A bag of Legos containing 6 blocks of the same size of 4 different colors (24 total)

Procedure:

1. Build a Lego tower that is 6 blocks tall.
2. Use only the four colors you have been given.
3. Use at least one of each color of the blocks in your bag.
4. Make as many different combinations as you can.
5. Write out the different combinations of colors in the table below.

Data/Results:
Table 1.1 Different Combinations of Colored Blocks

Combination #1	R Y G B R Y	**Combination #2**	R G B Y G B

KEY: R= Red Y=Yellow G=Green B=Blue

Analysis Questions:

1. How many possible combinations were you able to make?

2. Is there a mathematical way to calculate the different combinations of colors? How would you do this?
3. Writing to Explain: How can DNA store so much information with just 4 letters in its alphabet? (answer in complete sentences)

Summary Protocol

1. Form groups of three or four. One person is chosen to keep the group on-task.
2. Read one paragraph silently (leader makes sure all group members know where paragraphs start and end).
3. After everyone in the group is finished reading the paragraph, the group discusses the main idea(s).
4. The group comes to consensus about one (or two) main idea(s).
5. The group talks about how to write the main idea(s).
6. Each group member writes down the main idea(s).
7. Repeat steps 2-6 for each paragraph of the reading.

Science Literacy Lesson Model

Engaging Science Experience

Interact with data – Hands-on – Lab Activity – Inquiry

DNA Lego activity. How many combos can you make based on base pair rules?

Purposeful Reading

Middle School text: *Decoding DNA*

Summary Protocol

Productive Dialogue

Think Pair Share-after each activity students make thinking visible to solidify their "stance"

Meaningful Writing

Compose an email to a classmate who is absent and explain the structure of DNA and how bases pair with each other.

Decoding your DNA: it's becoming easier to unravel a person's entire genetic code. What will this information reveal about you?

Back in 1990, biologists began an epic task. They set out to decode the entire human genome--the blueprint of life encoded in molecules of DNA. DNA is the hereditary material found in every one of our cells. The Human Genome Project cost $3 billion and took more than a decade for scientists to complete. 1

Although the project was a great success, science has come a long way since then. Now, a machine about the size of a computer printer can sequence, or translate, a person's genome in a single day for an estimated $1,000. 2

Your genome is like your own personal instruction manual: It carries the directions that determine almost everything about you, from the color of your eyes to your blood type. With access to your complete genetic code, you can learn about not only these types of traits, but also about your ancestry--and, perhaps most important, your health. 3

"Today, sequencing is being used to better understand diseases, their treatment, and their prevention," says Bob Fulton, a molecular biologist at the Genome Institute at Washington University in St. Louis, Missouri. 4

CRACKING THE CODE

DNA is made up of four building blocks called bases: adenine (A), thymine (T), guanine (G), and cytosine (C). A molecule of DNA looks like a twisted ladder (see The Human Genome, right). The ladder's rungs are the bases from each of the ladder's strands, or sides, that have paired up--A always with T and G always with C. 5

Sequencing a person's genetic code means figuring out the order of the 3 billion bases along one of the strands. Written out, a chunk of a translated genome would look something like this: ACGACTTAAGTAGTACATG. An entire human genome contains enough letters to fill roughly 400 paperback books, each 500 pages. 6

Within a genome's sequence are sections that form genes. Genes carry the directions to make proteins. These molecules have many jobs in the body. Proteins guide how cells function and ultimately determine a person's different traits. It's estimated that humans have about 25,000 genes. 7

Sometimes mistakes can crop up in the DNA sequence that codes for a gene. These errors are called mutations. Single altered genes cause some illnesses, like the lung disease cystic fibrosis. But others, like diabetes, are the result of multiple mutated genes working together--along with factors like diet, lifestyle, and the environment. 8

For the most part, people's genetic codes are pretty similar. "Between any two individuals, about one in 1,000 bases will be different," says Fulton. He and other scientists use genome sequencing to compare the genetic codes of people who have a certain disease with those who don't. Where the genomes vary could indicate a mutation linked to that disease. 9

http://www.thefreelibrary.com/Decoding+your+DNA%3a+it's+becoming+easier+to+unravel+a+person's+entire...-a0299886116

Scoring Rubric

Your score reflects an evaluation of three aspects of your work: reasoning, readability and structure. The characteristics of these three aspects are listed below. Each paper is scored on a 1-5 scale with 5 being the highest. Papers are scored twice and the final score is the sum of both scores divided by 2. A final score of 4 is considered to be passing or proficient.

Reasoning	Readability	Structure
Clearly states a position (thesis statement). Scientific approach with logical inferences and conclusions. Argument based on evidence from multiple sources (prompt, article, observation, prior knowledge, scientific principles). Demonstrates understanding of topic, prompt or scientific concepts. Shows application of scientific principles. Is scientifically accurate.	• Proper grammar • Correct spelling and word usage • Legibility • Flow: Information is presented coherently with smooth transitions • Engaging (maintains interest)	• Written in proper format, includes any or all of the following: • Appropriate title • Takes a clear stance presented in a thesis • Includes an introduction & conclusion • Proper paragraphs

*A paper with **the score of 5** has the following characteristics:*

- Has a clear thesis
- Provides scientific evidence from a variety of sources with reasonable conclusions and/or inferences
- Demonstrates critical or creative application of evidence
- Holds the readers interest
- No noticeable readability or structural issues
- Follows proper format

*A paper with **the score of 4** has the following characteristics:*

- Thesis is recognizable (not necessarily completely clear)
- Provides multiple examples and scientific evidence from the passage or other sources
- Draws reasonable scientific conclusions from evidence presented
- No factual problems that significantly impact accuracy or meaning
- Few readability issues — not enough to impact understanding
- Majority of appropriate structural features

*A paper with **the score of 3** has the following characteristics:*

- Thesis is not easily recognizable
- Misuse of evidence, or argument rests more on opinion than evidence
- Some insight into issues or principles but shows scientific reasoning errors
- Noticeable readability and/or structural issues

*A paper with **the score of 2** has the following characteristics:*

- No clear thesis statement (weak stance or no position taken)
- Rests argument primarily on opinion — limited scientific evidence or support provided
- Factually incorrect or misinterpreted statements from the prompt (or reading)
- Serious readability issues that significantly impact meaning
- Incomplete or incorrect structure

*A paper with **the score of 1** has the following characteristics:*

- No thesis, no use of scientific evidence
- Response not tied directly to prompt
- Severe readability issues (can't be read)
- Brief and undeveloped (too short)

Resources to Support Reading and Writing in the Science Classroom

Source	Web address	Description
The American Association for the Advancement of Science (AAAS)	http://news.sciencemag.org/	Daily news about research and science. Highlights the news and features published each week in *Science* magazine.
The American Association for the Advancement of Science (AAAS)	www.eurekalert.org	Online, global news service for scientific topics
AlphaGalileo Foundation	www.alphagalileo.org	Search the online database of thousands of press releases and other material on recent European developments in science, technology, health and other fields.
Arkansas State Library - Arkansas Traveler	www.library.arkansas.gov/traveler	Online database search engine provide by the Arkansas State Library. Traveler databases offer magazines, books, encyclopedias, and other resources to all Arkansas residents. Research current events, science, business, health, notable people, hobbies, and much more. *Contact your school's library/media specialist for your username and password.*
Britannica Images	http://quest.eb.com/	Access more than two million rights-cleared images from over 50 of the best collections in the world.
Britannica School Edition	http://school.eb.com/	Thousands of articles, downloadable videos, online lessons correlated to CCSS, STEM resources, journal and magazine articles. *Contact your school's library/media specialist for your username and password.*
Britannica Pathways: Science	http://pathways.eb.com	A new standards-correlated online tool that uses a "probe" framework to target commonly held misconceptions within the context of the existing science curriculum for grades 6, 7, and 8.- This is a brand new tool that the ADE technology unit has paid for all teachers to be able to access this year. – *Contact your school's library/media specialist for your username and password.*
British Broadcasting Corporation (BBC)	http://www.bbc.co.uk/news/science_and_environment/	The BBC News website is the internet arm of the biggest broadcasting news-gatherer in the world. It launched in November 1997 and has since published approaching one and a half million full multi-media news pages, all but a handful of which are still available from the site's search engine (top right of almost every page).
Centers for Disease Control (CDC) - Resources for Education	http://www.cdc.gov/education/	Sections about health topics for parents, teachers and students K-12
Chemical Heritage Foundation	http://www.chemheritage.org/discover/collections/collection-items/rare-books/index.aspx	Archive of primary source texts related to chemistry.
Cornell Lab of Ornithology	http://www.birds.cornell.edu/birdsleuth	Grades pre-K-8 Birdsleuth curriculum is a series of inquiry-based units for elementary and middle school students who learn to identify birds and submit data to a national online database, all the while helping scientists to better understand birds. Access to the online magazine which features research done by children for children.
Directory of Open Access Journals	www.doaj.org	Many open access journals can be searched and accessed
Discovery	http://news.discovery.com/	News stories for Earth, space, tech and gadgets, animals, history, adventure, human and auto.
E! Science News	http://esciencenews.com/sources/science.daily	Daily news stories on astronomy and space, biology and nature, environment and climate, health and medicine, economics and math, paleontology and archaeology, physics and chemistry, psychology and sociology from more than 40 science news sources.
Futurity - University of Rochester, NY	http://www.futurity.org/	Futurity features the latest discoveries by scientists at top research universities in the US, UK, Canada, and Australia. Tends to be higher reading level – appropriate for junior high and high school

Resources to Support Reading and Writing in the Science Classroom

Source	Web address	Description
The Journal of Emerging Investigators	http://emerginginvestigators.org/	Online site for middle and high school students to publish their scientific investigations.
The Journal of Experimental Biology	http://jeb.biologists.org/content/by/year	The Journal of Experimental Biology (JEB) is the leading journal in comparative animal physiology and is published by The Company of Biologists, a not-for-profit charitable organization run by biologists for the benefit of the biological community.
National Aeronautics and Space Administration (NASA) – News and Features	http://www.nasa.gov/news/index.html	News Topics: • Station & Shuttle • Solar System • Universe • Aeronautics • Earth • Technology • NASA in Your Life • NASA History & People
NASA for Kids	http://www.nasa.gov/audience/forstudents/index.html	Earth and space science news stories sorted by grade levels: K-4, 5-8, and 9-12.
National Broadcasting Corporation (NBC)	http://www.nbclearn.com/portal/site/learn	NBC Learn, the educational arm of NBC News, is dedicated to making historic stories, images and primary source documents available on-demand to teachers, students, and parents.
National Oceanographic and Atmospheric Administration (NOAA) Education Resources	http://www.education.noaa.gov/index.html	A portal designed to assist educators in accessing materials across NOAA and on NOAA partner websites. **Types of Content:** Multimedia, Lessons & Activities, Real World Data.
National Public Radio (NPR)	http://www.npr.org/sections/science/	News stories, interviews, audio stories, special series on animals, environment, cosmos, culture, health, energy
National Science Foundation (NSF)	http://www.nsf.gov/news/	The National Science Foundation (NSF) is an independent federal agency created by Congress in 1950 "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense…"
National Science Foundation (NSF)	http://news.science360.gov/files/	Sponsored by the National Science Foundation, Science360 is an up-to-date view of breaking science news from around the world. Tends to be higher reading level – appropriate for junior high and high school
National Science Foundation (NSF)	http://www.nsf.gov/news/classroom/	A collection of lessons and web resources for classroom teachers, students, and families. Materials are arranged by subject area. Most of the resources come from the National Science Digital Library (NSDL). NSDL is the National Science Foundation's online library of resources for science, technology, engineering, and mathematics education. It was established by the National Science Foundation to capture improvements in science, technology, engineering, and mathematics education and organize them into one point of online access.
National Science Foundation: National Science Digital Library	https://nsdl.org	Online library of resources for science, technology, engineering, and mathematics education has a collection of lessons and web resources aimed at classroom teachers, their students, and students' families
NOVA –Public Broadcasting	http://www.pbs.org/wgbh/nova	Articles as well as audio and video about science topics

Resources to Support Reading and Writing in the Science Classroom

Source	Web address	Description
System (PBS)	/	
PLOS	http://www.plos.org	PLOS is a nonprofit Open Access publisher, innovator and advocacy organization with a mission to lead a transformation in research communication. Source for research journal articles.
Primary Sources and Science - Library of Congress	http://www.loc.gov/teachers/tps/quarterly/science/article.html	Selected Science Resources from the Library of Congress
Project Gutenberg	http://www.gutenberg.org	Project Gutenberg offers over 42,000 free ebooks: choose among free epub books, free kindle books, download them or read them online.
National Science Teachers Association (NSTA)	http://www.nsta.org/publications/	Interactive Resources
Newsela	http://newsela.com	Access to articles written at multiple levels of text complexity. Requires registration.
PBS	http://www.pbs.org/newshour/extra/tag/science/	Grades 7-12 Students can check out the "Daily Buzz." Teachers can check out the "Featured Lesson Plan." Teachers can sign up their class for a free discussion board "Newz Crew."
PLOS Biology	http://www.ploscollections.org/static/pbioCollections	An open-access, peer-reviewed general biology journal
Scholastic News	http://teacher.scholastic.com/activities/scholasticnews/index.html	Scholastic News Online is the place for kid news with games and quizzes, debate topics, and in-depth reports. Use our teacher and parent guides to help your student benefit fully from our great source of information. Includes materials from Scholastic News classroom magazine.
Scientific American	http://www.scientificamerican.com/	News stories in health, technology, science, mind and brain, evolution, Earth, space
Society for Science and the Public (SSP)	http://www.sciencenewsforkids.org/	Recommended ages 9-13 •timely, news stories and longer in-depth articles about a wide variety of science topics •suggestions and resources for hands-on activities, books, articles, and web resources •coverage of the world's leading science, engineering, math, and technology competitions for young people Many articles in SNK include resources to help students learn more about the topic covered, including: Going Deeper, Power Words, Related Articles, Teachers Questions, and Word Find.
Springdale, AR School District Strategy Cards	http://springdale.sharpschool.net/cms/One.aspx?portalId=2943042&pageId=5230189	These cards contain instructional strategies for teacher use within the Gradual Release of Responsibility model (see graphic on back of card). Each card contains a brief description of the strategy and steps to follow when implementing in a lesson. On the backside of the card, ideas are provided to differentiate the strategy to meet the needs of a variety of learners, as well as variations of the strategy.
Time	http://www.timeforkids.com/news-archive/science	News articles written specifically for students –*access to quizzes, worksheets, etc. requires a paid subscription*
US Dept. of Education (USDOE) - Federal Resources for Educational Excellence	http://www.free.ed.gov/subjects.cfm?subject_id=41	Provides links to hundreds of teaching and learning resources from federal agencies in categories such as Applied Sciences, Earth Sciences, Life Sciences, Physical Sciences, and Space Sciences.
Vision Learning	http://www.visionlearning.com/	Using science news in teaching

Resources to Support Reading and Writing in the Science Classroom

Source	Web address	Description
	library/module_viewer.php?mid=105	
World Book Kids	http://www.worldbookonline.com/kids/home	Elementary Level - Available through Arkansas Traveler
World Book Student	http://www.worldbookonline.com/student/home?gr=Welcome+Arkansas+State+Library%21	Elementary/Middle School - Available through Arkansas Traveler
World Book Advanced	http://www.worldbookonline.com/advanced/home?gr=Welcome+Arkansas+State+Library%21	Junior High and High School - - Available through Arkansas Traveler

Charlotte Danielson's FRAMEWORK FOR TEACHING

DOMAIN 1: Planning and Preparation

1a Demonstrating Knowledge of Content and Pedagogy
- Content knowledge • Prerequisite relationships • Content pedagogy

1b Demonstrating Knowledge of Students
- Child development • Learning process • Special needs
- Student skills, knowledge, and proficiency
- Interests and cultural heritage

1c Setting Instructional Outcomes
- Value, sequence, and alignment • Clarity • Balance
- Suitability for diverse learners

1d Demonstrating Knowledge of Resources
- For classroom • To extend content knowledge • For students

1e Designing Coherent Instruction
- Learning activities • Instructional materials and resources
- Instructional groups • Lesson and unit structure

1f Designing Student Assessments
- Congruence with outcomes • Criteria and standards
- Formative assessments • Use for planning

DOMAIN 2: The Classroom Environment

2a Creating an Environment of Respect and Rapport
- Teacher interaction with students • Student interaction with students

2b Establishing a Culture for Learning
- Importance of content • Expectations for learning and achievement
- Student pride in work

2c Managing Classroom Procedures
- Instructional groups • Transitions
- Materials and supplies • Non-instructional duties
- Supervision of volunteers and paraprofessionals

2d Managing Student Behavior
- Expectations • Monitoring behavior • Response to misbehavior

2e Organizing Physical Space
- Safety and accessibility • Arrangement of furniture and resources

DOMAIN 4: Professional Responsibilities

4a Reflecting on Teaching
- Accuracy • Use in future teaching

4b Maintaining Accurate Records
- Student completion of assignments
- Student progress in learning • Non-instructional records

4c Communicating with Families
- About instructional program • About individual students
- Engagement of families in instructional program

4d Participating in a Professional Community
- Relationships with colleagues • Participation in school projects
- Involvement in culture of professional inquiry • Service to school

4e Growing and Developing Professionally
- Enhancement of content knowledge and pedagogical skill
- Receptivity to feedback from colleagues • Service to the profession

4f Showing Professionalism
- Integrity/ethical conduct • Service to students • Advocacy
- Decision-making • Compliance with school/district regulations

DOMAIN 3: Instruction

3a Communicating With Students
- Expectations for learning • Directions and procedures
- Explanations of content • Use of oral and written language

3b Using Questioning and Discussion Techniques
- Quality of questions • Discussion techniques • Student participation

3c Engaging Students in Learning
- Activities and assignments • Student groups
- Instructional materials and resources • Structure and pacing

3d Using Assessment in Instruction
- Assessment criteria • Monitoring of student learning
- Feedback to students • Student self-assessment and monitoring

3e Demonstrating Flexibility and Responsiveness
- Lesson adjustment • Response to students • Persistence