11th – 12th Grade
Science and Technical Subjects

A Teacher's Guide to the Literacy Standards in Science and Technical Subjects

Model Content Frameworks

www.parcconline.org

Although PARCC has not designed Model Content Frameworks for History/Social Studies and Science/Technical Subjects, the following information will assist district staff in understanding the design of these tools. Illinois has chosen to move ahead with a teacher's guide for 6-12 Content Areas that compliments the 3rd – 11th grade teacher guides based on the PARCC information.

The Model Content Frameworks are voluntary resources offered by PARCC to help curriculum developers and teachers as they work to implement the standards in their states and districts. The Model Content Frameworks offer one way of organizing the standards — in this instance into quarterly modules. Equally successful models could be based around semesters, trimesters or other school schedules. Model Content Frameworks allow educators the flexibility to order the modules and the content within the modules in any way that suits their desired purposes. Because the knowledge and skills embedded across the four modules address all the standards for a given grade level, the order in which the four modules may be used is not critical. The Model Content Frameworks are designed with the following purposes in mind:

1. Supporting implementation of the Common Core State Standards, and
2. Informing the development of item specifications and blueprints for the **PARCC assessments** in grades 3–8 and high school.

The proposed **PARCC Assessment System** will be designed to measure knowledge, skills and understandings essential to achieving college and career readiness. In ELA/Literacy, these include the following areas as defined by the standards:

Reading complex texts:

1. This requires students to read and comprehend a range of grade-level complex texts, including texts from the domains of ELA, science, history/social studies, technical subjects and the arts.
2. Because vocabulary is a critical component of reading comprehension, it will be assessed in the context of reading passages.
3. Students are expected to conduct close, analytic readings as well as compare and synthesize ideas across texts.

Each module suggests both the number and types of texts that students read and analyze. Students then write about these texts either to express an opinion/make an argument or to inform/explain. In addition, research and narrative writing tasks appear in each module.

Writing effectively when using and/or analyzing sources:

This requires students to demonstrate the interrelated literacy activities of reading, gathering evidence about what is read, as well as analyzing and presenting that evidence in writing.

Conducting and reporting on research:

This expands on "writing when analyzing sources" to require students to demonstrate their ability to

1. gather resources,
2. evaluate their relevance, and
3. report on information and ideas they have investigated (i.e., conducting research to answer questions or to solve problems).

The importance of the above skills is reflected in the emphasis the Model Content Frameworks place on students' needing regular opportunities to grapple with the **close, analytic reading** of grade-level complex texts and to construct increasingly sophisticated **responses in writing**. The Model Content Frameworks therefore provide a helpful guide in preparing students for the future **PARCC assessments**.

11th – 12th Grade Model Curriculum for Science and Technical Texts

Optional model to consider when constructing a year long course of instruction.

1st Quarter-Length Module

Reading Science and Technical Texts

Strive to infuse as many of the following reading standards into each quarter as possible, making sure to amply cover them all to proficiency by the end of the 12th grade year.

Teach these skills with the content that students read.

- € Cite specific textual evidence to support analysis of science and technical texts attending to the important distinctions the author makes and to any gaps or inconsistencies
- € Determine the central ideas or conclusions of a text
- € Summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms
- € Follow precisely a complex multistep procedure when carrying out experiments, taking measurements or performing technical tasks; analyze the specific results based on explanations in the text
- € Determine the meanings of symbols, key terms, and other domain-specific words and phrases
- € Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas
- € Analyze the author's purpose in providing an explanation, describing a procedure or discussing an experiment in a tex**t,** identifying important issues that remain unresolved
- € Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem
- € Evaluate the hypothesis, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information
- € Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible

Writing About Texts

Write Routinely Over Extended Time Frames and for a Range of Discipline-Specific Tasks, Purposes and Audiences

- Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose and audience.
- Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience
- Use technology, including the internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information

Writing Arguments

- € Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons and evidence
- € Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases
- € Use words, phrases, and clauses as well as varied syntax to link the major sections of a text, create cohesion and clarify the relationships between claim(s), and reasons, between reasons and evidence, and between claim(s) and counterclaims
- € Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing
- € Provide a concluding statement or section that follows from or supports the argument presented

Writing Research Projects

- € Conduct short as well as more sustained research projects to answer a question (including a self-generated question)or solve a problem, narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation
- € Gather relevant information from multiple authoritative print and digital sources, using advance searches effectively
- € Assess the strengths and limitations of each source in terms of the specific task, purpose, and audience;
- € Integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation
- € Draw evidence from informational texts to support analysis, reflection and research

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2nd Quarter-Length Module

Reading Science and Technical Texts

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Writing About Texts

Write Routinely Over Extended Time Frames and for a Range of Discipline-Specific Tasks, Purposes and Audiences

- Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose and audience.
- With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
- Use technology, including the internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.

Writing Informative/Explanatory Texts, Including the Narration of Scientific Procedures/Experiments or Technical Processes

- € Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., heading), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension
- € Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic
- € Use varied transitions and sentence structures to link the major sections of the text, create cohesion and clarify the relationships among complex ideas and concepts
- € Use precise language and domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic and convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers
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11th – 12th Grade Model Curriculum

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3rd Quarter-Length Module

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11th – 12th Grade Samples of Text Exemplars and Performance Tasks for Science and Technical Subjects

Taken from www.corestandards.org

Innumeracy: Mathematical Illiteracy and Its Consequences, Paulos, John Allen

The Tipping Point: How Little Things Can Make a Big Difference, Gladwell, Malcolm

"Gravity in Reverse: The Tale of Albert Einstein's ,,Greatest Blunder'', Tyson, Neil deGrasse

Google Hacks: Tips & Tools for Smarter Searching, 2nd Edition, Calishain, Tara, and Rael Dornfest

Students *analyze the hierarchical relationships* between phrase searches and searches that use basic Boolean operators in Tara Calishain and Rael Dornfest's *Google Hacks: Tips &Tools for Smarter Searching, 2nd Edition*. [RST.11-12.5]

"The Mysteries of Mass", Kane, Gordon

Students *analyze* the concept of mass based on their close reading of Gordon Kane's "The Mysteries of Mass" and *cite specific textual evidence* from the text to answer the question of why elementary particles have mass at all. Students explain *important distinctions the author makes* regarding the Higgs field and the Higgs boson and their relationship to the concept of mass. [RST.11-12.1]

"Working Knowledge: Electronic Stability Control", Fischetti, Mark

Students determine the meaning of key terms such as hydraulic, trajectory, and torque as well as other domain-specific words and phrases such as actuators, antilock brakes, and traction control used in Mark Fischetti's "Working Knowledge: Electronic Stability Control." [RST.11-12.4]

Executive Order 13423: Strengthening Federal Environmental, Energy, and Transportation Management, U.S. General Services Administration

"The Coming Merger of Mind and Machine", Kurzweil, Ray

"Untangling the Roots of Cancer", Gibbs, W. Wayt

"The Cost Conundrum: Health Care Costs in McAllen, Texas", Gawande, Atul