



Science and Engineering Practices

Common Core Reading Anchors

Grades 6-12 Literacy in Science and Technical Subjects

SCIENCE AND ENGINEERING PRACTICE: OBTAINING, EVALUATING AND COMMUNICATING INFORMATION

Any education in science and engineering needs to develop students' ability to read and produce domain-specific text. As such, every science or engineering lesson is in part a language lesson, particularly reading and producing the genres of texts that are intrinsic to science and engineering.

(NRC *Framework*, 2012, p. 76)



Science and Engineering Practices Literacy in Science and Technical Subjects

OBTAINING, EVALUATING AND COMMUNICATION INFORMATION – CONTINUED

Supporting CCSS Literacy Anchor Standards and Relevant Portions of the Corresponding Stands for Science and Technical Subjects	Connection to Science and Engineering Practice	Connection to Eco-Schools USA Pathways
<p>CCR Reading Anchor #2: Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.</p> <ul style="list-style-type: none"> • RST.6-8.2: “...provide an accurate summary of the text distinct from prior knowledge or opinions.” • RST.9-10.2: “...trace the text’s explanation or depiction of a complex process, phenomenon, or concept...” • RST.11-12.2: “...summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.” 	<p>Part of the power of a scientific theory or engineering design is its ability to be cogently explained. That ability to determine and clearly state or summarize a salient scientific concept or phenomena lies at the heart of Reading Standard 2.</p>	<p>When addressing a pathway students must have the ability to conceptualize and summarize several texts’ overarching messages, especially important for our digital natives.</p>
<p>CCR Reading Anchor #7: Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words.</p> <ul style="list-style-type: none"> • RST.6-8.7: “Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).” • RST.9-10.7: “Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.” • RST.11-12.7: “...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.” 	<p>A key practice within scientific and engineering communities is communicating about data through the use of tables, diagrams, graphs and models. Reading Standard 7 speaks directly to the importance of understanding information that has been gathered by investigators in visual formats that reveal deeper explanations and analyses.</p>	<p>Students use a variety of methods to collect and disseminate data and transform various texts and technical information into formats that can be understood by a large audience. Students use both qualitative and quantitative methods to provide evidence to support their claims.</p>



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<p>CCR Reading Anchor #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.</p> <ul style="list-style-type: none"> • RST.6-8.9: “Compare and contrast the information gained from experiments, simulations, video or multimedia sources with that gained from reading a text on the same topic.” • RST.9-10.9: “Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.” • RST.11-12.9: “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.” 	<p>The end goal of these scientific and engineering practices is to position scientists and engineers to be able to evaluate the merit and validity of claims, methods, and designs. Reading Standard 9 identifies the importance of synthesizing information from a range of sources to the process of creating a coherent understanding of a phenomenon or concept.</p>	<p>The lens of sustainability provides students an excellent opportunity to compare literary styles and approaches and allows them to debate the information within and substantiate or refute their claims and evidence or the claims and evidence of others.</p>
<p>CCR Reading Anchor #10: Read and comprehend complex literary and informational texts independently and proficiently.</p> <ul style="list-style-type: none"> • RST.6-8.10: “By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.” • RST.9-10.10: “By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.” • RST.11-12.10: “By the end of grade 12, read and comprehend science/technical texts in the grades 11-CCR text complexity band independently and proficiently.” 	<p>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. Reading Standard 10 asks students to read complex informational texts in these fields with independence and confidence.</p>	<p>When addressing sustainability students are looking to expert sources to expand upon knowledge, develop Eco-Action Plans, and build evidentiary cases to support conclusions.</p>



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<p>CCR Writing Anchor #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.</p> <ul style="list-style-type: none"> • WHST.6-8.2: “...include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension...Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples...” • WHST.9-10.2: “...include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension...Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience’s knowledge of the topic...” • WHST.11-12.2: “...include formatting (e.g., headings), 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...” 	<p>The demand for precision in expression is an essential requirement of scientists and engineers, and using the multiple means available to them is a crucial part of that expectation. With a focus on clearly communicating complex ideas and information by critically choosing, arranging, and analyzing information—particularly through the use of visual means—Writing Standard 2 requires students to develop their claims with the end goal of explanation in mind.</p>	<p>Students transform data analyses, research, and student led actions into graphic organizers, written reports, and scripts for a variety of venues, such as morning announcements, a press release, the school paper, grants and completion and progress trackers.</p>



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<p>CCR Writing Anchor #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.</p> <ul style="list-style-type: none"> • WHST.6-8.8: "...using search terms effectively...quote or paraphrase the data and conclusions of others..." • WHST.9-10.8: "...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 ..." • WHST.11-12.8: "...using advanced 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 ..." 	<p>Collecting relevant data across a broad spectrum of sources in a systematic fashion is a key element of assessing the validity of claims, methods, and designs. Writing Standard 8 spells out the importance of gathering applicable information from multiple reliable sources so that information can be communicated accurately.</p>	<p>Addressing sustainability on campus and within the community requires students to use multiple resources from multiple sources in order to gather the data and evidence needed to draw conclusions, make informed decisions, fundraise, and facilitate service learning and community service opportunities.</p>



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<p>CCR Speaking & Listening Anchor #1: Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.</p> <ul style="list-style-type: none"> • SL.8.1: "... Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations, and ideas. Acknowledge new information expressed by others, and, when warranted, qualify or justify their own views in light of the evidence presented." • SL.9-10.1: "...actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented." • SL.11-12.1: "...Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task." 	<p>Reasoning and argument require critical listening and collaboration skills in order to evaluate the merit and validity claims, methods, and designs. Speaking and Listening Standard 1 speaks directly to the importance of comparing and assessing competing ideas through extended discussions grounded in evidence.</p>	<p>Eco-Action teams work with a wide range of people including, peers, teachers, facilities staff, and community partners, thus having the opportunity to build skills through meaningful, authentic learning experiences.</p>



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<p>CCR Speaking and Listening Anchor #4: Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.</p> <ul style="list-style-type: none"> • SL.8.4: “Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning...” • SL.9-10.4: “Present information, findings, and supporting evidence clearly, concisely, and logically...” • SL.11-12.4: “Present information, findings, and supporting evidence, conveying a clear and distinct perspective... alternative or opposing perspectives are addressed...” 	<p>Central to the professional activity of scientists and engineers alike is communicating their findings clearly and persuasively. Speaking and Listening Standard 4 stresses how the presentation of findings crucially relies on how the evidence is used to illuminate the line of reasoning embedded in the explanation offered.</p>	<p>Eco-Action teams and working groups rely on a dynamic skill set which includes, speaking and listening, to communicate the results and actions associated with the Seven Step Framework.</p>
<p>CCR Speaking and Listening #5: Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.</p> <ul style="list-style-type: none"> • SL.8.5: “Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence...” 	<p>Presenting data for the purposes of communication is essential for evaluating the merit and validity of claims, methods, and designs. Speaking and Listening Standard 5 stresses the importance of visual or digital displays of data within presentations in order to enhance understanding of the evidence. That way others can make critical decisions regarding what is being claimed based on the data.</p>	<p>All Eco-Schools USA pathways can be used in the dissemination of information using digital technology in a way that is appealing and easily understood and geared toward its intended audience.</p>