Curriculum Unit of Study Assessment Tool

Operational Inquiry Definitions quoted from Martin-Hansen (2002) *The Science Teacher*

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| Structured Inquiry | Students follow teacher directions to come up with a specific end point or product. (Student behavior is focused on following teacher-derived instructions.) |
| Guided Inquiry | The teacher chooses the question for investigation. Students…may then assist the teacher with deciding how to proceed with the investigation.  Teachers find that this is a time when specific skills…can be taught within context. |
| Open Inquiry | A student-centered approach that begins with a student’s question, followed by the student (or groups of students) designing and conducting an investigation or experiment and communicating results (National Research Council, 1996; Colburn, 2000). |

Key Overarching Questions for Evaluating Units from Finley (2014) *Edutopia*

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| Question | Evidence |
| Is the unit aligned with standards, objectives, and guidelines? |  |
| Is there a balance of teaching strategies, learning strategies, and authentic tasks that engage and meet the needs of diverse learners? |  |
| Are the activities sequenced clearly? |  |
| Do the formative and summative assessments measure the **knowledge** and **skills** identified in the objectives? |  |

Examining Skills from LaBanca (2011)

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| Skill | Evidence | Non | Strcted | Guided | Open |
| Unit includes opportunities for students to engage in information literacy learning activities. |  |  |  |  |  |
| Unit includes opportunities for students to engage in collaboration activities. |  |  |  |  |  |
| Unit includes opportunities for students to engage in communication (written, oral, digital media) activities. |  |  |  |  |  |
| Unit includes opportunities for student to engage in creativity/innovation/problem finding activities. |  |  |  |  |  |
| Unit includes opportunities for students to engage in problem solving activities. |  |  |  |  |  |
| Unit includes opportunities for student to engage in activities that demonstrate responsible citizenship. |  |  |  |  |  |

Eight practices of science and engineering from *NGSS*

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| Practice | Clarifying Statement | Evidence | Non | Strctd | Guidd | Open |
| 1. Asking questions (for science) and defining problems (for engineering) | Asking questions and defining problems also involves asking questions about data, claims that are made, and proposed designs. |  |  |  |  |  |
| 2. Developing and using models | Models include diagrams, physical replicas, mathematical representations, analogies, and computer simulations. |  |  |  |  |  |
| 3. Planning and carrying out investigations | Scientific investigations may be undertaken to describe a phenomenon, or to test a theory or model for how the world works. The purpose of engineering investigations might be to find out how to fix or improve the functioning of a technological system or to compare different solutions to see which best solves a problem. |  |  |  |  |  |
| 4. Analyzing and interpreting data | Students are expected to interpret data by identifying significant features and patterns, use mathematics to represent relationships between variables, and take into account sources of error |  |  |  |  |  |
| 5. Using mathematics and computational thinking | Students use mathematics to represent physical variables and their relationships, and to make quantitative predictions, use logic, geometry, and at the highest levels, calculus. Technology may be used to automate calculations, approximating solutions, and analyze data sets available to identify meaningful patterns. |  |  |  |  |  |
| 6. Constructing explanations (for science) and designing solutions (for engineering) | An explanation includes a claim that relates how a variable or variables relate to another. A claim is made in response to a question. Scientists often design investigations to generate data. Designing solutions to problems is a systematic process that involves defining the problem, then generating, testing, and improving solutions. |  |  |  |  |  |
| 7. Engaging in argument from evidence | Argumentation is a process for reaching agreements about explanations and design solutions. In science, reasoning and argument based on evidence are essential in identifying the best explanation for a natural phenomenon. In engineering, reasoning and argument are needed to identify the best solution to a design problem. |  |  |  |  |  |
| 8. Obtaining, evaluating, and communicating information | Scientists and engineers employ multiple sources to obtain information used to evaluate the merit and validity of claims, methods, and designs. Communicating information, evidence, and ideas can be done via: using tables, diagrams, graphs, models, interactive displays, and equations as well as orally, in writing, and through extended discussions. |  |  |  |  |  |

Priority *Common Core State Standards* in English Language Arts Standards: Science & Technical Subjects, Grade 9-10

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| Skill | Evidence | Non | Strcted | Guided | Open |
| READING | | | | | |
| CCSS.ELA-LITERACY.RST.9-10.1  Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. |  |  |  |  |  |
| CCSS.ELA-LITERACY.RST.9-10.3  Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. |  |  |  |  |  |
| CCSS.ELA-LITERACY.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. |  |  |  |  |  |
| CCSS.ELA-LITERACY.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. |  |  |  |  |  |
| WRITING | | | | | |
| CCSS.ELA-LITERACY.WHST.9-10.1  Write arguments focused on discipline-specific content. |  |  |  |  |  |
| CCSS.ELA-LITERACY.WHST.9-10.2  Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. |  |  |  |  |  |
| CCSS.ELA-LITERACY.WHST.9-10.7  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. |  |  |  |  |  |
| CCSS.ELA-LITERACY.WHST.9-10.8  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. |  |  |  |  |  |

Additional *Common Core State Standards* in English Language Arts Standards: Science & Technical Subjects, Grade 9-10

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| Skill | Evidence | Non | Strcted | Guided | Open |
| READING | | | | | |
| CCSS.ELA-LITERACY.RST.9-10.2  Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. |  |  |  |  |  |
| CCSS.ELA-LITERACY.RST.9-10.4  Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics. |  |  |  |  |  |
| CCSS.ELA-LITERACY.RST.9-10.5  Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). |  |  |  |  |  |
| CCSS.ELA-LITERACY.RST.9-10.6  Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. |  |  |  |  |  |
| CCSS.ELA-LITERACY.RST.9-10.8  Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. |  |  |  |  |  |
| WRITING | | | | | |
| CCSS.ELA-LITERACY.WHST.9-10.4  Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. |  |  |  |  |  |
| CCSS.ELA-LITERACY.WHST.9-10.5  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. |  |  |  |  |  |
| CCSS.ELA-LITERACY.WHST.9-10.6  Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. |  |  |  |  |  |
| CCSS.ELA-LITERACY.WHST.9-10.9  Draw evidence from informational texts to support analysis, reflection, and research. |  |  |  |  |  |