Unit 3: Science Research-Independent Project Development

Content Area: **Science**
Course(s):
Time Period: **Full Year**
Length: **Yearlong**
Status: **Published**

General Overview, Course Description or Course Philosophy

Science Research 8 provides students with the IQWST science program and an embedded science research experience in which students will learn how to research and develop an investigation for a regional Science Fair. Students will be expected to complete all laboratory work and additional research for the scientific research project outside of school hours. In both the IQWST and science research program, student engagement comes from actively *doing* and *making sense of* science and mathematics.
Students investigate and explain phenomena, gather and analyze data, develop and use visual models, and solve multi-step problems. They develop important life skills as they work collaboratively in groups and explore individually with technology supports. Our program helps students to articulate their thinking, critique the reasoning of others, and persevere in completing rich tasks and tackling complex problems.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Communication of scientific ideas must be conducted through written text, open discussion, and formal presentations. The collaborative nature of scientific investigations requires scientists to work with people within their area of study and outside of their area of study. Scientist must be able to convey their message in an accurate and concise manner. Scientists present their ideas in a variety of forums (group collaborative meeting, conferences, etc).

CONTENT AREA STANDARDS

SCI.MS-ETS1-3	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
SCI.MS-ETS1-2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
SCI.MS-ETS1-4	Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
SCI.MS-ETS1-1	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion

Standards are Required)

LA.RH.6-8.7	Integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts.
LA.RH.6-8.9	Analyze the relationship between a primary and secondary source on the same topic.
LA.RST.6-8.3	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
LA.WHST.6-8.1.A	Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.
LA.WHST.6-8.1.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.
LA.WHST.6-8.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
LA.WHST.6-8.2.A	Introduce a topic and organize ideas, concepts, and information using text structures (e.g., definition, classification, comparison/contrast, cause/effect, etc.) and text features (e.g., headings, graphics, and multimedia) when useful to aiding comprehension.
LA.WHST.6-8.2.B	Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.
LA.WHST.6-8.2.F	Provide a concluding statement or section that follows from and supports the information or explanation presented.
LA.WHST.6-8.8	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

STUDENT LEARNING TARGETS

Declarative Knowledge

Students will understand that:

1. Scientist engage in compelling arguments based on evidence.
2. Scientific communication of ideas must be conducted in a clear and concise manner using written text and verbal presentation methods.
3. Scholarly work benefits from the collaboration with others and the scholarly critique by others.

Procedural Knowledge

Students will be able to:

1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
5. Integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts.
6. Analyze the relationship between a primary and secondary source on the same topic.
7. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
8. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.
9. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.
10. Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
11. Introduce a topic and organize ideas, concepts, and information using text structures (e.g., definition, classification, comparison/contrast, cause/effect, etc.) and text features (e.g., headings, graphics, and multimedia) when useful to aiding comprehension.
12. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.
13. Provide a concluding statement or section that follows from and supports the information or explanation presented.
14. Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation

EVIDENCE OF LEARNING

Formative Assessments

Science Fair project-Revised proposal

Abstract

Project description and summary

Article and research journal

Student self assessment

Summative Assessments

Research paper

Research poster

RESOURCES (Instructional, Supplemental, Intervention Materials)

1. www.Sciencebuddies.com
2. https://www.sciencenews.org/
3. https://www.discovery.com/
4. https://www.sciencejournalforkids.org/
5. https://www.usnews.com/science/news
6. https://time.com/section/health/
7. https://student.societyforscience.org/2019-broadcom-masters-project-showcase
8. https://student.societyforscience.org/broadcom-masters
9. https://sspcdn.blob.core.windows.net/files/Documents/SEP/ISEF/2020/Rules/Book.pdf

INTERDISCIPLINARY CONNECTIONS

Students will work with the media specialist to learn about proper research methods and the proper ways to cite sources used in the scientific research project. Students in this course will be picking topics from a wide range of categories and may be making interdiciplinary connections within thier own research projects. https://student.societyforscience.org/isef-categories-and-subcategories

Researching based writing

Media Literacy

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.