Science 8 Unit 10: Human Impact on the Environment and Design Solutions 2022

Content Area: **Science**
Course(s): **Life Science 8**
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Enduring Understandings:

- Green energy can help slow down Global Climate Change.
- Human Activity is directly linked to Global Climate Change.
- Humans have the power to change the environment more than any other living thing.
- Materials are constantly cycling through ecosystems and get re-used in the environment.

Essential Questions:

- How can humans help stop climate change?
- How do the movements of water affect the Earth and its systems?
- How iis human activity related to Global Climate Change
- What does the future hold in terms of global climate change?
- What evidence have scientists found about the impact of climate change?

Lesson Titles:

- Biodiversity Notes
- Carbon footprint calculation and reflection activity,
- Compare and Contrast Renewable and Non Renewable Resources
- Design a Plan to help fix a problem (STEM)
- Exploring NASA satellite images and maps
- Global Warming / Green house Effect lab
- Global Warming notes with video clips
- Greenhouse Demonstration
- Invasive Species Research
- Wind Turbine Lab (STEM)

21st Century Skills and Career Ready Practices:

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.

CRP.K-12.CRP3	Attend to personal health and financial well-being.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP9	Model integrity, ethical leadership and effective management.
CRP.K-12.CRP10	Plan education and career paths aligned to personal goals.

Inter-Disciplinary Connections:

LA.RST.6-8	Reading Science and Technical Subjects
LA.RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts.
LA.RST.6-8.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
LA.RST.6-8.3	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
LA.RST.6-8.4	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 6-8 texts and topics.
LA.RST.6-8.5	Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.
LA.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).
LA.RST.6-8.8	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
LA.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.
LA.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.
LA.WHST.6-8	Writing History, Science and Technical Subjects
LA.WHST.6-8.1	Write arguments focused on discipline-specific content.
LA.WHST.6-8.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

Instructional Strategies, Learning Activities, and Levels of Blooms/DOK:

- It is important that students handle mathematical data appropriately. They should use variables to represent quantities and construct simple equations and inequalities to solve problems. While analyzing numerical data, students will need to solve mathematical problems that show both positive and negative values and apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computations and estimation strategies. Support from mathematics teachers will help students with the mathematics required for this type of analysis.

- Once students have evaluated competing solutions and analyzed and interpreted data showing the similarities and differences of these solutions, they may then begin designing their own solutions. It is important that students consider the benefits and risks of each existing design solution. The impact on the environment and human society must be considered in the design. The final goal for students is to identify the parts of each design solution that best fit their criteria and constraints and combine these parts into a design solution that is better than any of its predecessors.
- Students can be provided with data from tests performed on these existing design solutions. They will analyze and interpret these data to determine similarities and differences in findings. This is where they are deciding where different parts of the pre-existing solutions can be combined. For example, the building materials of a particular dam may be superior while the shape of another design may be more suitable. Students should consider the ratio relationship between the impacts that humans have on the environment and the impact that the design solution has on minimizing these impacts. Students will need to consider both qualitative and quantitative data when drawing conclusions about the various design solutions.
- Students will need to jointly develop and agree upon the design criteria that will be used to evaluate competing existing design solutions (i.e., varying dam designs, irrigation systems, varying methods of reducing pollution, varying methods of urban development). Students can use a rubric, checklist, or decision tree to assist them in evaluating the design solution selected.
- Throughout this unit of study, students will be engaged in the engineering design process. Students can start by identifying a human impact on the environment that has resulted from human consumption of natural resources. Using what they have identified, students will begin to define the criteria and constraints of the design problem whose solution will help to monitor and minimize the human impact on the environment. Using informational texts to support this process is important. Students will draw evidence from these texts in order to support their analysis, reflection, and research.
- Tutoring during Academic Enrichment
- When students consider criteria, they should conduct short research projects to examine factors such as societal and individual needs, cost effectiveness, available materials and natural resources, current scientific knowledge, and current advancements in science and technology. They should also consider limitations due to natural factors such as regional climate and geology. While conducting their research, students will need to gather their information from multiple print and digital sources and assess the credibility of each source.
- When students quote or paraphrase the data and conclusions found in these resources, they will need to avoid plagiarism and provide basic bibliographic information for each source. After comparing the information gained from their research, experiments, simulations, video, or other multimedia sources, they will be able to determine precise design criteria and constraints that lead to a successful solution.

Modifications

Formative Assessment:

- 3-2-1 Review
- Kahoot (online game)
- Pass-out of Class
- Review Ball
- Anticipatory Set
- Closure

- Pair / Share
- Survey Students using Technology (Edmodo, Google Classroom, ect.
- Thumps up/down
- Type 1 Writing Prompt (Brainstorm)
- Warm-Up

Summative Assessment:

- Alternate Assessment
- Benchmark
- Global Warming Lab
- Invasive Species Project
- Marking Period Assessment

Resources & Materials:

- Plant Growth and Gas Exchange Unit: This model unit from Michigan State University includes 11 lessons that guide students through the process of collecting evidence and developing explanations of where the dry matter of plants comes from and of the roles of photosynthesis and respiration in the carbon cycle. Along with the focus on building explanations of these core ideas, the unit explicitly integrates the crosscutting concepts of matter and energy and scale, proportion, and quantity. This unit is built around the question of how small seeds grow into large plants, and the core activities of the unit guide students in tracing the mass changes that occur as seeds germinate and grow. These core activities are supported through a carefully planned sequence of learning and assessment activities that follow a research-based learning progression to support the development of student understanding.
- http://ngss.nsta.org/Resource.aspx?ResourceID=247