

Engaged Learning Project Final

Title of Project: Footprints

Subject(s): Science, Math, and Language Arts

Grade Level(s): 6th Grade

Abstract:

What are carbon footprints? It is not the same footprints left behind on a wet floor or along a beach. Your carbon footprint is the amount of all the greenhouse gases like carbon dioxide, which were produced by your actions in a given time frame. These greenhouse gases can have a negative impact on our planet. With this project, students will learn how we can reduce our carbon footprint by using alternate energy sources.

“My Footprint” science project incorporates math, language arts, and technology. Sixth grade students’ will be an explorer of their surroundings and produce more ideas to share with the community around them beyond our middle school. This project will take place in 6th grade Earth Science to allow students to understand what they do now will leave a “footprint” for future generations. Students will learn about Human Impact in relation to climate change, global warming, and pollution (water, air, and ground). Students will collect real data about their personal use of everyday natural resources as well as the schools use and post to class website. Students will research and report solutions for reducing our school’s footprint. More collaborative opportunities, activities, and extensions could spin off from this original lesson and be implemented into an ongoing school year project that the students produce. This project is a partner strand to the “Down the Drain” or water conservation project by Lorraine Edwards. After an introduction, students will have the option of choosing the water strand “Down the Drain” or the carbon strand “Footprints.”

Learner Description/Context:

Students will understand human behaviors change our planet’s ecological balance, sometimes damaging the environment in dangerous, hard to fix ways. For the sustainability of the planet, people must learn to live in ways that do not compromise the ability of future generations to meet their needs. People face choices about how much space and resources are required for humans to live the way they choose to live. There are crucial decisions about how much space and resources other species on earth require if they are to survive. This project will allow students to see that natural resources that are plentiful can not be replaced in the future and that we are use to living comfortably without thinking about impacts. Cultural differences and views of Earth may be discussed. Students will understand and participate in conservation.

Time Frame: This project will take 4 weeks with the majority of core work completed in Science classes. Some activities will be completed outside of classroom time.

Standards Assessed:

National Science and Technology: Scientific inquiry and understandings about science and technology (including identifying a problem, proposing alternative solutions, evaluating the solution and its consequences, and communicating the problem, process, and solution).

NETS-S:

1. Creativity and Innovation: Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.
 - b. Students create original works as a means of personal or group expression.
2. Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.
 - a. Students interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media.
3. Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information.
 - c. Students evaluate and select information sources and digital tools based on the appropriateness to specific tasks.
4. Critical Thinking, Problem Solving and Decision Making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.
 - b. Students plan and manage activities to develop a solution or complete a project.
5. Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
 - a. advocate and practice safe, legal, and responsible use of information and technology
 - b. exhibit a positive attitude toward using technology that supports collaboration, learning, and productivity
6. Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems, and operations. Students:

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- a. understand and use technology systems
- b. select and use applications effectively and productively

Earth Science:

SES5. Students will investigate the interaction of insolation and Earth systems to produce weather and climate. e. Describe the hazards associated with extreme weather events and climate change (e.g., hurricanes, tornadoes, El Niño/La Niña, global warming). f. Relate changes in global climate to variation in Earth/Sun relationships and to natural and anthropogenic modification of atmospheric composition.

SES6. Students will explain how life on Earth responds to and shapes Earth systems. c. Explain how geological and ecological processes interact through time to cycle matter and energy, and how human activity alters the rates of these processes (e.g., fossil fuel formation and combustion).

English Language Arts:

ELACC6W7: Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.

ELACC6SL5: Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.

ELACC6W6: Use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others.

Learner Objectives:

At the end of this project

- Students will research and create a plan to help reduce their carbon footprint.
- Students will effectively collaborate with peers and experts.
- Students will successfully use technology to create products that demonstrate their learning.
- Students will know how to calculate their carbon contribution in their home or school.
- Students will analyze human impact in our community and on Earth.

Essential Questions:

How do organisms that lived millions of years ago become the fossil fuels of today?

What is the greenhouse effect?

What is global warming?

How does the carbon cycle play a role in these processes?

What are carbon footprints?

How do the greenhouse effect and global warming differ from one another?

What are some alternate energy sources instead of fossil fuels?

Why do we need to recycle and how does recycling impact our environment locally and globally??

Enduring Understandings:

Students will understand and develop ecological awareness.

Students will develop their abilities and capacities to solve problems by working together and utilizing all the tools available.

This project will engage students by presenting them with a real-life authentic problem from which solutions will benefit not only their school environment but reduce their “Footprints” on Earth. Thus, the students will understand that they are connected with a larger community and the entire planet.

The Introduction/“Hook”:

Students will watch the [Eco-Bunnies](#) video and then go to <http://www.coolcalifornia.org/calculator> in order to see what resources they use before starting the project. Students will have a chance to permanently leave their mark on their school and community by designing solutions for the Global Warming/energy crisis. They can also connect with a wider world community through GlobalSchoolsNet.org and participate in this global effort for sustainable growth and a greener future.

Process:

Instructor Preparation and Materials:

- Review the *Down The Drain Project* lesson plans and resources contained on the website to offer as an alternate choice and complement this project.
- Review *The “Green” Dream Project* which is a older age group focused lesson on global warming/recycling.

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- Create a Project Rubric with columns for all areas assessed
- Prepare worksheets for data collection
- Research district and school permissions for all online participation and publication
- Review and edit criteria for acceptable products (may need specifics on size, length, numbers of pages, etc.)
- Prepare project on Blackboard LMS for collaboration and display of products
- Review sources for outside collaboration and make initial contacts if needed

Week 1: (*Footprints*) This is the introduction and discovery section of the project. Students will work through the activities to calculate carbon use for both home and school, which culminates in students uploading their resource usage data to the project's website.

Teacher:

1. Review the timeline and project choices with the class
2. Create small groups based on student preferences.
3. Individual projects will also be allowed
4. Advise students on quality of projects to ensure balanced efforts from all students

Students:

1. Participate in introductory activities of the "*Footprints*" Project
2. Compare school data with other data on the project website and ask questions about the differences
3. Communicate project choice preferences with teacher
4. Assessment: *Footprints* Participation column on rubric

Week 2

Global Warming Research

1. Explore natural resources conservation
2. Communicate with experts (meteorologists/climatologists/environmentalists)
3. Work on the Project Draft with peer groups (project draft due at the end of the week)
4. Meet with science teacher daily for guidance
5. Assessment: Draft Project column on rubric

Weeks 3-4

1. Students will work on projects during class
2. Students continue to research and communicate with experts if needed
3. Teachers will guide as needed, continue to provide tools and technical support

Week 4-5

1. Share projects with class, school, and beyond; based on type of project chosen
2. Students will secure permission for publishing products
3. Assessment: Group Participation column on rubric
4. Assessment: Final Project Rubric column on rubric
5. Self-Assessment rubric: Group Participation and Final Project

Product:

Students will create a proposal for change using footprint data analysis using a technology- based format for communicating this information to other people. As a way to present findings on ecological topics, students will have a choice to use PowerPoint, social media, post to a website, or blog as a way to get more people/students involved in sustainability issues. I will allow student-directed ideas as well. Students have access to MacBook's that have iMovie, Garageband, and other productivity/hypermedia software. Rubrics will be included for the overall project expectations.

Students will complete these assignments along the way:

- Greenhouse Effect Assignment
- Energy Demands Discussion
- Solar Oven Lab
- Human Impact Test

Product Expectations

- Product will demonstrate a compelling case for global warming and the "Footprints" we leave.
- Product gives worthy, authentic reasons for conserving natural resources and not burning fossil fuels.
- Product gives the audience clear examples that can be used to reduce their "Footprint".
- Product includes examples of what can happen if the carbon cycle increases or decreases drastically.
- Finished product looks professional and aesthetically pleasing. (Captivating)

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Higher-Order Thinking Skills:

Evaluate: Students will evaluate information from a variety of sources (interviews, technical literature, internet articles) to formulate an informed position on Global Warming. They will create a product, which displays many perspectives on the same issue.

Understand: Students will understand concepts of green technology to design viable solutions for the school building.

Apply: Students will apply their understanding of concepts about Global Warming to be instruments of change for the future.

Analysis, Synthesis, and Creation – Students will assimilate information, synthesize and apply it to create the required products. This knowledge will

Technology Resources/Management:

Students will use their school assigned MacBook to research and develop their projects. Teacher assistance may be needed as students are learning how to use different programs and applications.

Internet Video (such as YouTube): Engaging students in the project, research & exploration of the topic.

Computers/Internet: Communication with peers, mentors, experts; drafting and completing products.

Adaptations for Special Needs:

English Language Learners can implement the use of the ESOL teacher where appropriate. Students will have research materials that are written at an appropriate level for English Language Learners. Additional lessons on carbon cycle, global warming, and climate change will be added to support their background knowledge for developing the project. Allow students to use their native language in a section of the website so they can see that their native languages are valued as a resource. They can also use the MacBook Reader for documents, articles, and any research found online websites. Created podcasts or recorded instructions/tutorials will help students who have trouble reading English. Students with disabilities will be provided text-to-speech products and simplified word processing programs. Also, students can use the highlight feature to hear what they have written. Gifted students will collaborate globally with students on the topic of global warming. Gifted students who have previous experience using technology programs can become the “experts” and provide tutorials in place of the teacher. Gifted students can research other programs (besides the ones we are using) to determine what we would be the best choice for word processing and publishing.

Assessment:

Students will be assessed throughout the unit. Students will be assessed on their narrative writing piece, their website, and their overall discussion post/presentation. Students will be assessed using rubrics that will be provided at the beginning of the unit. Students will not be assessed separately through content, as students will show their understanding of the content through the published pieces.

Summary of Collaboration:

My collaborating teachers gave me some feedback on the design. We discussed the importance of flexibility and ability to change when things happen unexpectedly. The project could take longer and lead to other experiences for the students. I learned a lot of facilitating technology use through the creation of this project. It is really important that the teachers are as supported as the students. If a teacher doesn't feel prepared or supported, then they are probably not going to jump on board with their students. I really like how engaged learning projects allow for the seamless integration of technology use. The focus remains on the content, but the students are learning very valuable, real world technology skills.

This project supports the following Engaged Learning Indicators

- Standards-based, Challenging, Collaborative, Multidisciplinary
- Authentic/Meaningful tasks and products
- Student-directed, students are teachers, explorers, producers
- Teachers as facilitators, guides
- Performance-based Assessments

Supporting Material:

The “Green” Dream School <https://softchalkcloud.com/lesson/files/rou21jid473Ncp/GreenDreamSchool.pdf>

Resource Links

Introduction Videos

Eco-Bunnies https://www.youtube.com/watch?v=e158_QppCtY

Suggestions for Outside Collaboration:

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- Local television and radio meteorologists/climatologists
- Interview environmentalists

Optional Web 2.0 and Software Links:

- Publisher, Powerpoint: Microsoft Office Suite
- Gimp: <http://www.gimp.org/>
- Audacity: <http://audacity.sourceforge.net/>
- Windows Live Moviemaker: <http://windows.microsoft.com/en-us/windows-live/movie-maker>
- Weebly: <http://www.weebly.com/>
- Wikispaces: <http://www.wikispaces.com/>
- Glogster: <http://edu.glogster.com/>

Research and collaboration links:

- http://www.epa.gov/climatechange/Downloads/ghgemissions/wheel_GuideforTeachers.pdf
- <http://www.epa.gov/climatechange/ghgemissions/ind-calculator.html>
- http://www.pearsonhighered.com/assets/hip/us/hip_us_pearsonhighered/samplechapter/0136101259.pdf
- http://www.nrdc.org/greensquad/intro/intro_4.asp
- <http://www.projectgreenschools.org/become-a-member/>
- <http://www.coolcalifornia.org/calculator>

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Criteria	Drifting 5 points	Moving in the Right Direction 10 points	Valuable Performance 15 points	Our Goal 20 points
Contribution to the Learning Community	Demonstrates little effort and appears indifferent	Occasionally makes relevant contributions but shows minimal effort	Often makes relevant contributions and interacts freely while encouraging others	Consistently presents creative ideas demonstrating an awareness of the learning community and fosters further discussion
Relevance of Post	Posts irregular topics or remarks	Occasionally posts relevant comments while many posts show no insight	Posts are related to the topic with some connection to the content	Posts are consistently related to the topic with comments specific to content and include supplemental information
Expression Within the Post	Opinions or ideas are not expressed clearly and have no connection to the topic	Minimal expression of opinions or ideas with an unclear connection to the topic	Opinions and ideas are expressed clearly with occasional lack of connection to the topic	Opinions or ideas are expressed clearly with obvious connection to the topic
Delivery of Post	Posts appear "hasty" and poor grammar and/or spelling errors are contained in most posts	Poor grammar and/or spelling errors are contained in several posts	Few grammatical or spelling errors are noted in posts	Consistently uses grammatically correct posts with rare misspellings
Promptness and Initiative	Rarely participates freely or responds to other students' posts	Participates with limited initiative and responds to others' posts several days after initial discussion	Participates with initiative but requires occasional prompting and responds promptly to most posts	Demonstrates good self-initiative and responds promptly to others' postings
Overall Score	Drifting 0 or more	Moving in the Right Direction 55 or more	Valuable Performance 70 or more	Our Goal 85 or more