

Title of Project: Backyard Conservation

Subject(s): Biology

Grade Level(s): 9th (could also be high school-level environmental science)

Abstract:

Students at Lassiter High School are surrounded by an ever-growing community and constant development of vacant land. Lately, more and more wildlife have been sighted in and around homes and some students have even witnessed a black bear in their backyards! Biology students are going to research the impact of human development on already established ecological communities and the resulting impact on the environment. Students will start by looking around their neighborhoods and brainstorming ways in which humans have negatively impacted the environment. Then, using these observations, students will go online to research what these actions and impacts actually *do* to the environment. Students will also calculate their personal ecological footprints and those of their families. Local DNR and Division of Wildlife officials will talk with students and help them develop methods to coexist with backyard wildlife and how to reduce their ecological footprints. Students will write a reflective essay regarding what they have learned from their ecological footprint research and identify action items for how to reduce this footprint. As a final culminating activity, students will create and produce public service announcement (PSA) videos to be presented to elementary students and members of the local community via the Cobb County streaming video channel, CobbedTV. Videos will also be produced to iTunes to reach an even broader audience.

Learner Description/Context:

Students at Lassiter High School range from 14-19 years of age and come from mostly affluent families. Recently, many students have enrolled at the school from other areas of Marietta, GA bringing broader socio-economic ranges and varying perspectives to the school. The high school is one of 16 high schools in Cobb County located primarily in Marietta, GA. The school's mission statement is "Reaching excellence and climbing higher" and many students are expected to achieve above and beyond what is considered excellence at other schools. In addition, most classes are taught as college-preparatory classes. Biology is a course every ninth grader must take and offers an opportunity to connect the outside world of students to the classroom. Many students live in large homes and drive large SUV's the short distance between school and home. Students tend to live in ways of excess without much knowledge of pollution, habitat destruction, or the impact their own family is making on the environment. This project will serve not only as a knowledge-building opportunity, but also to enlighten students and their families as to what impact they actually have on the environment.

School Demographics:

	Students
Caucasian	75%
African American	10%
Hispanic	7%
Other	3%

Time Frame:

The project will span three weeks with students given 2-3 hours of work time each week. Some aspects of the project will be expected to be completed outside of class time (i.e. the filming of the PSA and calculating family ecological footprints).

Standards Assessed:

Biology Standards

SB4. Students will assess the dependence of all organisms on one another and the flow of energy and matter within their ecosystems.

1. a. Investigate the relationships among organisms, populations, communities, ecosystems, and biomes.
- b. Explain the flow of matter and energy through ecosystems by...
- c. Arranging components of a food chain according to energy flow.
 1. b. Comparing the quantity of energy in the steps of an energy pyramid.
 2. c. Explaining the need for cycling of major nutrients (C, O, H, N, P).
- d. Relate environmental conditions to successional changes in ecosystems.
- e. Assess and explain human activities that influence and modify the environment such as global warming, population growth, pesticide use, and water and power consumption.
- f. Relate plant adaptations, including tropisms, to the ability to survive stressful environmental conditions.
- g. Relate animal adaptations, including behaviors, to the ability to survive stressful environmental conditions.

ISTE Student Standards

1. Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.
 - 1.1 Apply existing knowledge to generate new ideas, products, or processes
 - 1.2 Create original works as a means of personal or group expression
2. 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.
 - 2.1 Interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media
 - 2.2 Communicate information and ideas effectively to multiple audiences using a variety of media and formats
3. Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.
 - 3.1 Identify and define authentic problems and significant questions for investigation
 - 3.2 Plan and manage activities to develop a solution or complete a project
5. Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
 - 5.1 Exhibit a positive attitude toward using technology that supports collaboration, learning, and productivity
 - 5.2 Select and use applications effectively and productively
6. Students demonstrate a sound understanding of technology concepts, systems, and operations.

Learner Objectives:

As a result of this learning experience, students will understand the effects of pollution on the environment, be able to calculate their ecological footprints, identify solutions for reducing their carbon footprints, and create and produce PSA videos. The final product will be evaluated using a rubric for both the response essay and the video.

The "hook" or Introduction:

Prior to starting this project, students will be shown the National Geographic video "Six Degrees Could Change the World." After viewing this video, we will have a class dialogue to discuss student emotions in regards to the major themes of the video. Then, students will brainstorm a list of the things they do in their daily lives that contributes to harming the environment. Before beginning this project, I would like to survey students in the building and ask two major questions: (1) What kind of car do they drive? And (2) How many miles do they drive round trip to school? I will use this data to help present the impact students at just this school have on the environment. After presenting this data, I will read a story about a displaced family of coyotes due to a subdivision being built next to the school. This will appeal to the students in that they see the direct impact of human development on the environment.

Process:

1. Students will view the video "Six Degrees Could Change the World"
2. The teacher will facilitate discussion with the class based on their opinions after viewing the video
3. Students will make a list of everything they do in their daily lives that they think contributes to global warming, habitat destruction, pollution, etc.
4. The teacher will facilitate discussion with students regarding the teacher's data collection of cars driven and miles driven by other students in the building
5. The teacher will introduce a fictional story regarding coyote displacement from the habitat destruction of a new development by the school
6. Students will calculate their ecological footprint using an ecological footprint calculator.
7. Students should calculate their footprints using the detailed information part of the calculator.
8. After doing the ecological footprint activity, students will enter four pieces of data into Google Forms:
 - a. Number of planet Earths to sustain use
 - b. Number of global acres used
 - c. Number of tons of CO₂ used
 - d. What part(s) represent the largest piece of the pie chart?
9. Then, students should use the explore option to help brainstorm ways to reduce their ecological footprint. Then, students should facilitate discussions with their parents about taking steps to reduce their ecological footprint as a family.
10. Once all data points have been collected, the teacher will facilitate a class discussion regarding the overall results of the graphs
11. Students will begin working on their reflective essay regarding their ecological footprints after the class discussion.
12. Students will create their own groups for the PSA project and share their reflective essays with their group members. Then, students will begin to create an idea and a script for their PSA video.
13. Then students will brainstorm a list of questions they would like to ask the local DNR official when they come visit the class. Each group will be responsible for submitting two questions to the teacher via Google Forms.

14. Students will brainstorm and begin working on their scripts during the second week of the project and will also be visited by the DNR official. Scripts will need to be submitted to the teacher by the end of the second week for approval.
15. During the third week students will begin working on filming their videos and using Camtasia to edit the video for final production. The video will be due at the end of the third week of the project.
16. The teacher will use a rubric to grade the video for the final assessment.
17. Student videos will then be submitted to the Cobb livestreaming channel for view in local elementary schools and other members of the school district.
18. As a final step, the videos will be uploaded to iTunes so the videos can reach a broader audience.

Product:

The end product is a student-produced PSA video to be shown to elementary students and members of the local community. The product will be the culmination of local research by students on their personal home environments and will help to educate younger students on the impacts their choices have on the environment. Students will use technology in the following ways to complete this project:

- Internet to research human impacts on the environment
- Ecological footprint website to calculate each student's personal footprint
- Google Forms to submit data points to the teacher for a class graph to evaluate
- Google Drive to submit reflective essay
- Google Drive to collaborate on script for the PSA with group members
- Google Drive submission of script for teacher approval
- Skype, email, and other chat methods to communicate with local DNR and Division of Wildlife experts
- Video recorder to record PSA video
- Camtasia software to edit and publish final PSA video
- Videos will be submitted to Cobb Streaming and be published on CobbedTV
- iTunes to publish the videos

Technology Use:

- Google Forms → to submit data to the teacher, produce graphs for class analysis
- Google Drive → to communicate with peers, to submit the reflective essay, to submit script for teacher approval and collaboration with peers
- Ecological Footprint Calculator Website → calculate ecological footprint, gather specific data points, explore options for reducing student footprints
- Skype & email → communication with local DNR and wildlife specialists to aid in background information of the topics
- Video camera → to record the PSA video
- Camtasia → to edit and produce the final PSA video
- CobbedTV → to publish videos to a local audience
- iTunes → to publish videos to a worldwide audience

The proposed technology above will support the indicators of engaged learning by creating an authentic learning experience for the students through the ecological footprint calculator and the production of a personal PSA video. Google Drive, Skype, and email will allow students to collaborate with their peers and local community professionals that work with the environment. The video camera and Camtasia will support the indicators of student-direction, explorers, and producers. The entire project as a whole supports the culturally

responsive indicator because the project is personal to the students. In addition, the math and statistical analysis of the data points and the reflective essay help build this project to support the multi-disciplinary indicator.

References and Supporting Material:

Supporting materials needed by the teacher:

- Rubric for the reflective essay
- Rubric for the PSA video

Web Resources needed for this project:

- Camtasia software to edit and produce PSA video (*free trial can be found at <https://www.techsmith.com/camtasia.html>*)
- Cobb County School District. <http://www.cobbk12.org/cobbedtv/>
- Footprint Calculator. <http://footprintnetwork.org/en/index.php/GFN/page/calculators>
- Google Drive. <http://drive.google.com>
- Last time carbon dioxide levels were this high: 15 million years ago, scientists report. (2009, November 1). *Science Daily*. Retrieved July 9, 2015, from <http://www.sciencedaily.com/releases/2009/10/091008152242.htm>
- *Six degrees could change the world* [Motion picture]. (2008). National Geographic. https://youtu.be/R_pb1G2wIoA
- Skype software to communicate with local DNR and wildlife experts

What modifications have you made since you submitted your "idea" for feedback?

Since I submitted my idea for feedback I have made several changes. First I changed the abstract to reflect the additional changes I made including students writing a reflective essay and submitting videos to the Cobb livestreaming channel and all videos will now be put on iTunes. I also changed the product section of the idea to reflect the submission of ecological footprint data points via Google Forms, the submission of the reflective essay on Google Drive, and the use of CobbedTV to broadcast videos, and iTunes to also broadcast all videos. I also used the ideas from peer review to aid in creating the "hook" for my project and further supplementing the multi-disciplinary component by including a reflective essay and gathering and analyzing data points from students to give a graphical representation to the class of all impacts to the environment.

Which indicators of Engaged Learning will be high in this lesson and Why?

This project has a high *authenticity* indicator in that students are looking at their local environments and creating PSA videos to educate other local community members. The videos will be *student-directed* from the script to the creation of the video in the Camtasia software and then students will be the *producers* once they create the videos. Students will also be *explorers* as they observe their local environments and research the impacts they and their families are causing. This project will also be *performance-based* as students will be creating a final product to be assessed and presented to others via the Cobb County streaming video and iTunes.

Which indicators would you like to strengthen?

At this point, I am comfortable with the indicators I have incorporated in this project and feel like they are very well-supported by all aspects of this project.

What LoTI level do you think this lesson would be and Why?

I think this lesson would be a LoTi level 5 because although technology will be expanded beyond the classroom, I would like to incorporate more outside technology and maybe better methods to collect information when the students make observations in their neighborhoods. I would also like to implement a few more technology tools and apps.

What help would you like to receive from us?

I would like help to make sure the new additions I made still compliment the rest of the project and mesh well with the other components. Otherwise, just any general feedback regarding the overall project would be much-appreciated.