Student Leadership and Climate Literacy

Jessica Lura
Bullis Charter School, California

Abstract

In order to be an active citizen of today's world, children and adults need to be climate-literate. This article describes a NOAA Climate Stewards year-long project that provided opportunities for student leadership, student choice, and learning how to be a climate-literate person. The schoolwide stewardship program in California involved students at all grade levels. Sixth, seventh, and eighth graders established overall goals for students to reduce energy usage and waste consumption. Fourth and fifth grade students created an *Eco Super Hero* program for grades K-5 and a *Turtle Camp* specifically for kindergarten and 1st grade students. Grade 4 through grade 8 students in the program were able to explain climate science, understood its connections to human activity, and felt like they had the tools to continue to make a difference in mitigating future impact.

In late 2017 the NOAA Climate Stewards Education Project changed its title to the NOAA Planet Stewards Education Project.

Introduction

Research shows a significant increase in the concentration of heat-trapping gases (so-called greenhouse gases), especially carbon dioxide (CO2), in the Earth's atmosphere. In addition, a rise in global temperatures relates to the rise in carbon dioxide. A large percentage of the rise in carbon dioxide can be traced to human activity including the use of electricity.

For this reason, in order to be an active citizen of today's world, children and adults need to be climate-literate. According to *Climate Literacy: The Essential Principles of Climate Science*, a climate-literate person "is able to make informed and responsible decisions with regards to actions that may affect climate" (USGCRP, 2009). Climate change has been identified by many scientists to be one of the 'grand challenges' facing society with implications for many facets of life. Therefore, it is imperative that citizens gain an understanding of the climate system and the impacts that changes to the system will have in their daily lives.

As an educator, I have the responsibility to teach students to be climate literate and to provide opportunities for stewardship. Luckily, an understanding of the interconnectedness of communities and their environments and the responsibility to be agents of change is part of the mission statement of Bullis Charter School, the K-8 school I work at. In addition, I was fortunate to have been accepted into the NOAA Climate Steward Education Project —a program that focuses on

supporting formal and informal educators in teaching about climate science as well as assisting in developing and implementing stewardship projects.

After 16 years in the classroom, it was going to be my first year as a teacher on special assignment, and so I decided that for my stewardship project I wanted to focus on providing meaningful opportunities for students—opportunities that allowed for student leadership, choice, and learning. I decided to test the hypothesis: *If students analyze energy consumption at school and devise and implement a plan to reduce it, then energy consumption will decrease, and student habits and understanding will change.*

Eco-Workshop for Middle School Students

I kicked the project off with an optional two-day Eco-Workshop for middle school students (sixth, seventh, and eighth graders) where the students were tasked with analyzing the school and its impact on the greater environment and then using that information to create a yearlong action plan to implement solutions to the issues identified.

Twenty-seven students answered the call and gave up two days of their summer vacation to attend the workshop. To get baseline data of how our school is functioning, the students completed the National Wildlife Federation's Environmental Audit (nwf.org/~/media/PDFs/Eco-schools/Eco-SchoolsUSA%20EnviroReview12-7-15EditsUPDATED.pdf). The Environmental Review Checklist asks students to collect data on energy usage, water usage, climate change, global dimensions, transportation, school grounds, consumption and waste, healthy living, sustainable food, biodiversity, and healthy school. Students worked in small groups to survey classrooms, observing energy use and using tools such as Kill O Watt Monitors to collect data on energy consumption. They interviewed students and teachers about different habits with questions such as, "At what temperature do you keep your thermostat?" and "Do you use a reusable water bottle?" In addition, students learned about energy and saving energy from the National Energy Education Development Project (NEED) resources (need.org/content.asp?contentid=197). I used pre and post surveys to determine growth in climate literacy, student agency, and collaboration and communication skills.

Based on issues identified through their research, students created problem statements, brainstormed solutions, quickly prototyped solutions, and received feedback on the solutions from their peers. Examples of solutions included paper towel dispenser reminder stickers and videos to remind students to not waste paper towels. Reminders (such as door magnets to draw attention to turning lights off when leaving the room and closing the door when the heat or AC was on) were popular solutions. Check out the Eco Workshop slide deck (bit.ly/eco_slide) for the process used.

Students Identified the Challenges

After discussing the problem statements and solutions, students at the Eco Workshop picked three main areas the school should focus on for the school year—energy, waste reduction, and ocean literacy—creating two design challenges: *1) How might we reduce energy consumption at BCS so that BCS lessens its carbon footprint?* and *2) How might we reduce waste production so that BCS lessens its impact on the local natural environment and the ocean (and its animals)?* They created an action plan that included educating other students about the importance of energy reduction and its tie to climate change. Since Bullis is a K-8 school, students focused on activities that would be appropriate for all ages, adhering to the idea of "no gloom and doom before 4th grade." With this in mind, they decided that the school should create an *Eco Super Hero* program celebrating energy and waste reduction habits and a *Turtle Camp* to teach K-1 students about recycling, waste, and the ocean.

Student-created action plan in hand, I offered an elective class for 4th and 5th graders focused on creating solutions to the two questions from the Eco Workshop. To measure the effectiveness of

my stewardship project, students in the elective class, called Blue Crew, participated in pre and post surveys about their knowledge of climate change and marine debris and changes in behavior.

Because of the interconnectedness of the environment, many of the topics tackled by students in this class included activities that were also part of other grant initiatives such as National Marine Sanctuaries Ocean Guardians program and a Monterey Bay Aquarium Ocean Plastic Pollution Action Plan Proposal (marine debris and single-use plastic reduction) and Green Up Our Schools (recycling efforts).

Table 1. Performance Expectations addressed by the Stewardship Project

Connections to the Next Generation Science Standards (NGSS Lead States, 2013):
Grade K-2: K-ESS3-3 Earth and Human Activity Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.
Grade 4: 4-ESS3-1 Earth and Human Activity Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.
Grade 5: 5-ESS3-1 Earth and Human Activity Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Before designing and implementing ideas from the Eco summit, Blue Crew students learned about energy, marine debris, and human impact through activities from *Talking Trash and Taking Action* (Ocean Conservancy & NOAA Marine Debris) and NEED's (National Energy Education Development Project) *All about Trash*, *Using and Saving Energy*, and *Primary Energy Info Book* (resources shared as part of the NOAA Climate Steward Education Project). Once students had a basic understanding of climate science and ocean literacy, they selected topics to work on including recycling, reduction of energy use, no waste lunches, elimination of single-use plastic (especially single-use water bottles), reduction of marine debris, and creating *Eco Super Hero* cards. Each group created an action plan to implement their topic, taking notes on shared Google docs. Check out the Eco Super Hero doc for an example of the student action plans and directions.

The *Eco Super Hero* group created three K-2 super heroes and three super heroes for students in grades 3-5. Each super hero had specific "green" traits (such as focusing on recycling) and students who could verbally identify behaviors they shared were given the trading card of that super hero. See Figure 1 for a poster with all the *Eco Super Heroes*. To encourage students to exhibit these behaviors, the group created competitions between the classes to see which class received the most trading cards (and thus had the most eco-friendly students). I was lucky enough to receive funds for the trading cards and prizes the NOAA Climate Stewards Education Project.

Figure 1. Poster showing the six Eco Super Heros that students created to encourage the reduction of waste, the reduction of energy usage, and saving of water.

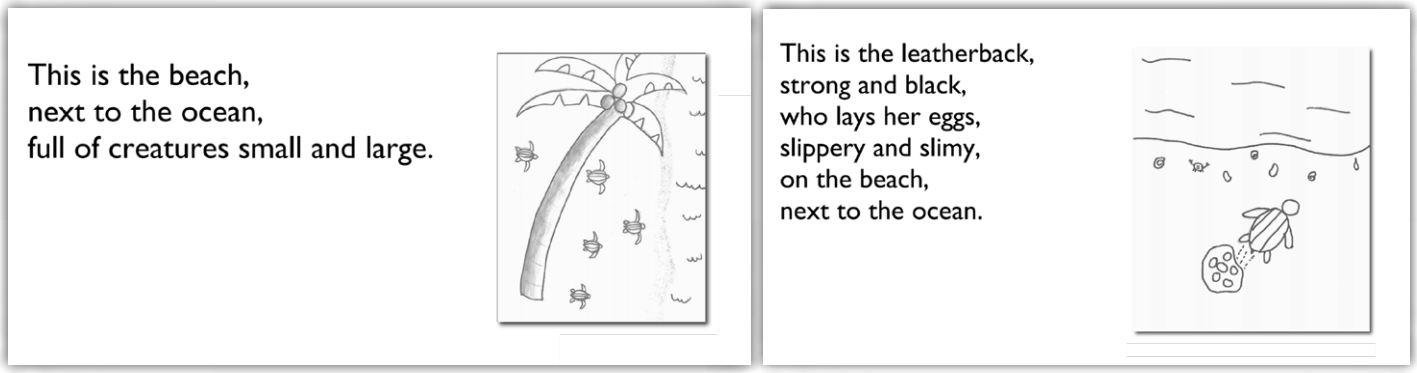

Figure 2a/b. The first two pages of "A Leatherback Turtle Story" written by first graders.

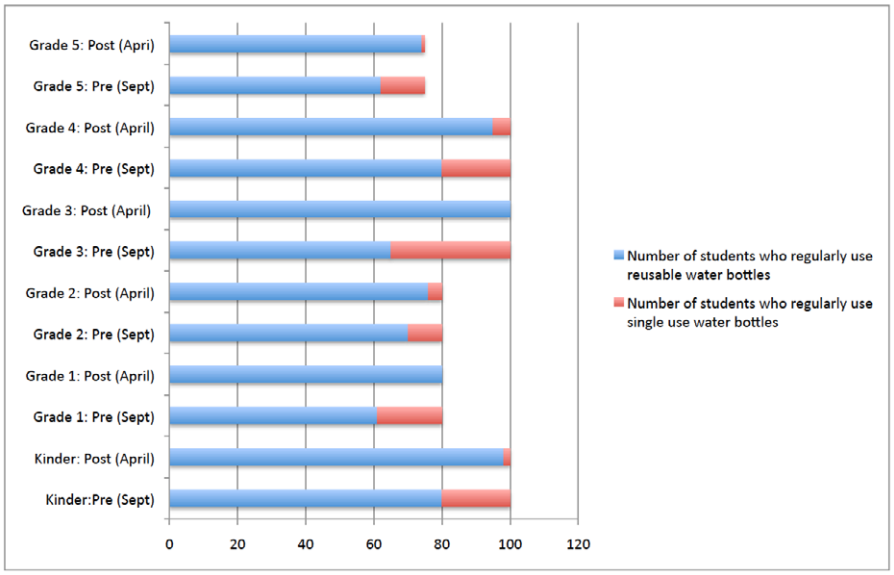

Figure 3. The number of students using water bottles in September compared to April across grades kindergarten through five.

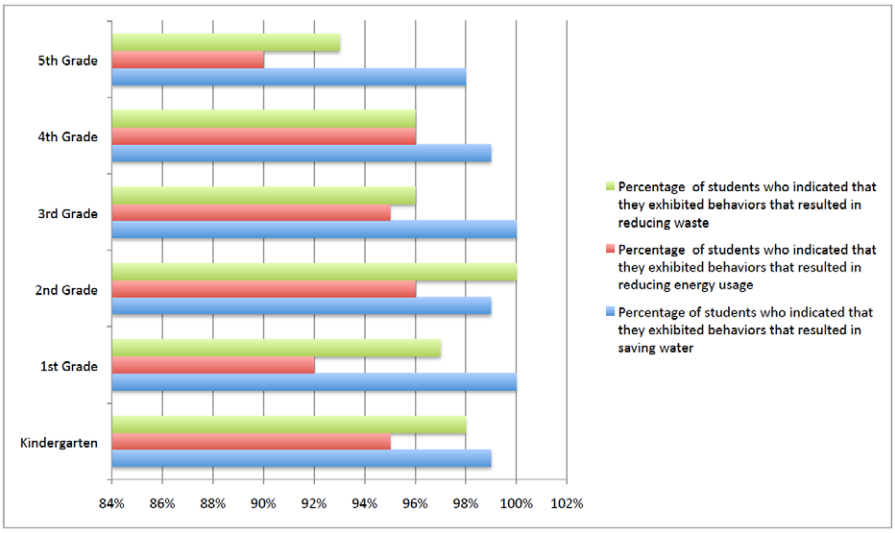

Figure 4. Percentage of students by grade level who indicated they reduced waste, reduced energy usage, and saved water.

To check out some of the items created by the *Eco Super Hero* group, click on the following: Eco Super Hero Kinder Presentation (intended to be shown by a kindergarten teacher who would record the number of students who raised their hands), Eco Super Hero iBook link, and Eco Super Hero Ads.

In addition, the Blue Crew students designed a turtle camp for all kindergarten and 1st grade students focusing on teaching the younger students about marine debris, reducing plastic usage, and leatherback sea turtles through a Turtle Camp Coloring Book (A Turtle Story) and Turtle Camp Rotations.

Evaluation

All of the activities implemented showed positive impact on student behavior and choice. For example, the usage of single-use water bottles declined in all grade levels between September, when the pre-project data was collected, and April, after the project was completed (Figure 3).

The biggest impact of implementation was on students saving water (Figure 4). The next greatest impact was on reducing waste and the least impact was on reducing energy use.

Conclusion

My goal of creating a stewardship project that provided opportunities for student leadership, student choice, and learning how to be a climate literate person was realized during this NOAA Climate Stewards year-long project. Students who attended the Eco Workshop or who part of the Blue Crew class were able to articulate what climate science was as well as the connections between human activity and the climate and felt like they had the tools to continue to make a difference in mitigating future impact.

References

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(2009). *Climate literacy: the essential principles of climate sciences: a guide for individuals and communities*. Washington, DC: U.S. Global Change Research Program/Climate Change Science Program.

About the Author

Jessica Lura works at Bullis Charter School, a K-8 public charter school in California. A National Board Teacher and Google Certified Innovator, she has taught both elementary and middle school including first, second, third, and eighth grade. She can be reached at msjlura@gmail.com.