

Engaging teens in STEM: A journey through the Nationwide Eclipse Science Ballooning Project

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Introduction

This poster showcases the enriching experience of Native American teens who participated in the Nationwide Eclipse Science Ballooning Project. High school students collaborated with scientists, engineers, and peers to delve into authentic STEM inquiry. The students and their teachers created a device for sampling microbes in the atmosphere, culminating in a journey to Texas to launch their payload. The project unfolded within an introductory computer science class.



Figure 1. Eclipse Team logo for shirts and stickers. Designed by Savannah Smith.

The poster illustrates the iterative engineering process undertaken by students as they designed and refined the sampling device. Through various investigations, they developed protocols for assembling, running, and retrieving their payload. Reflections from participating students offer insights into their learning journey, highlighting the acquisition of valuable skills and knowledge in STEM fields.



Figure 2. Eclipse Team watching the solar eclipse in Texas. Photo by Bree Oatman.

Milestones and Events



Figure 3: Photo collage of images taken during the development of the students' payload as well as a photo of bacteria samples cultured after the launch. Photos by Bree Oatman.

- October 2023-launched first payload on a balloon.
- January 2024-began researching how to sample for bacteria in the air.
- February 2024-investigated different materials to attract bacteria (latex, teflon)
- March 2024-tested the feasibility of sampling in the air with a Aerokat Kite assembly from NASA.
- March 2024-developed portable glove box.
- March 2024-tested feasibility of using UV wands to create a sterile field for payload assembly.
- March-April 2024-built samplers and figured out coding for motors.
- April 2024-assembled "Kevin" and launched during the eclipse.
- April 2024-processed samples and sent them for genetic analysis.

Balloon Payload

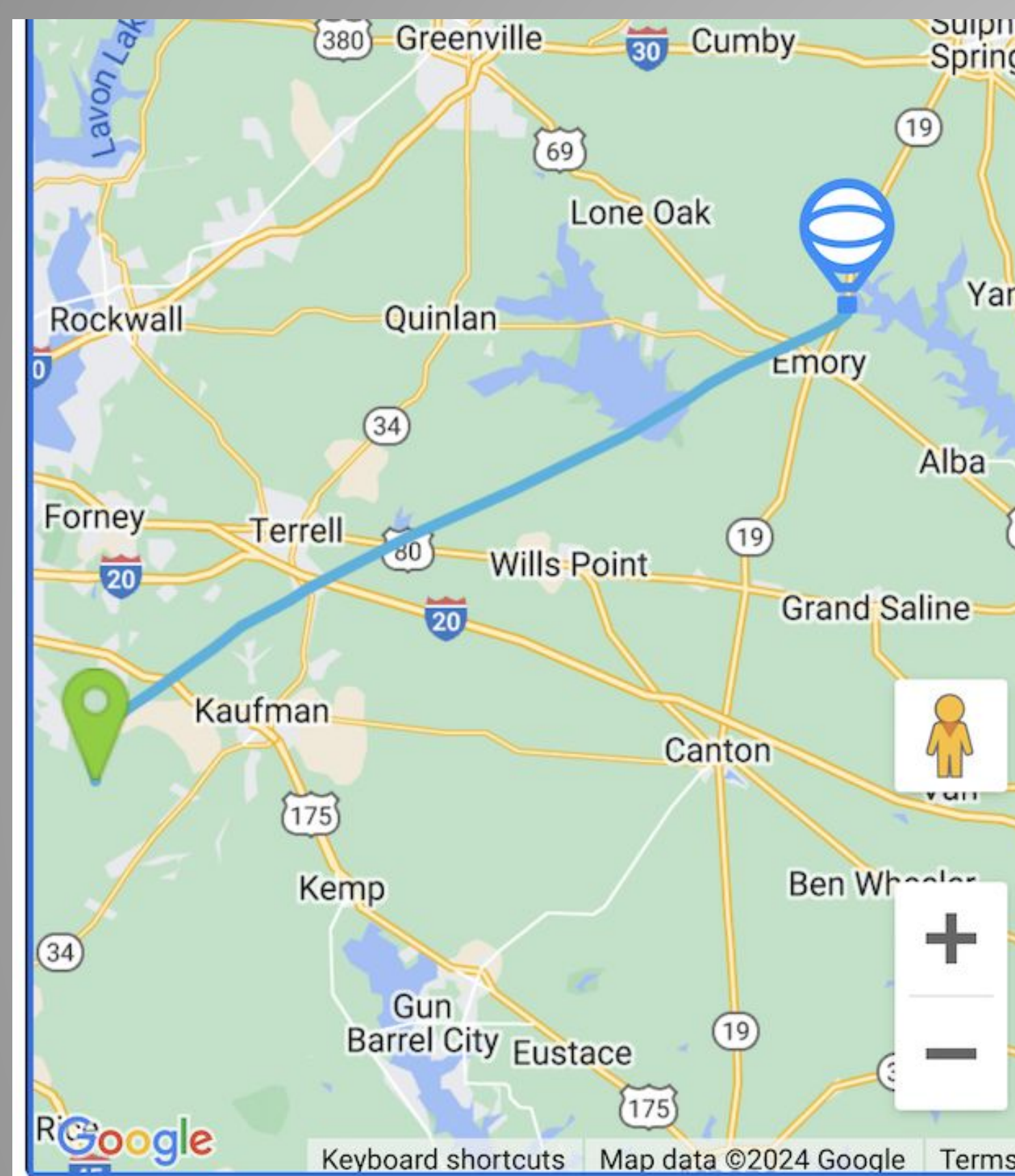


Figure 4. From left to right: map of balloon flight path, Tanice assembles the sampling payload box, Vincent helps with launching the balloon. Photos by Bree Oatman.

Student Feedback

The eclipse ballooning project helped students gain confidence in doing STEM and inspired them to pursue future STEM endeavors.

Student attitudes about STEM positively changed.

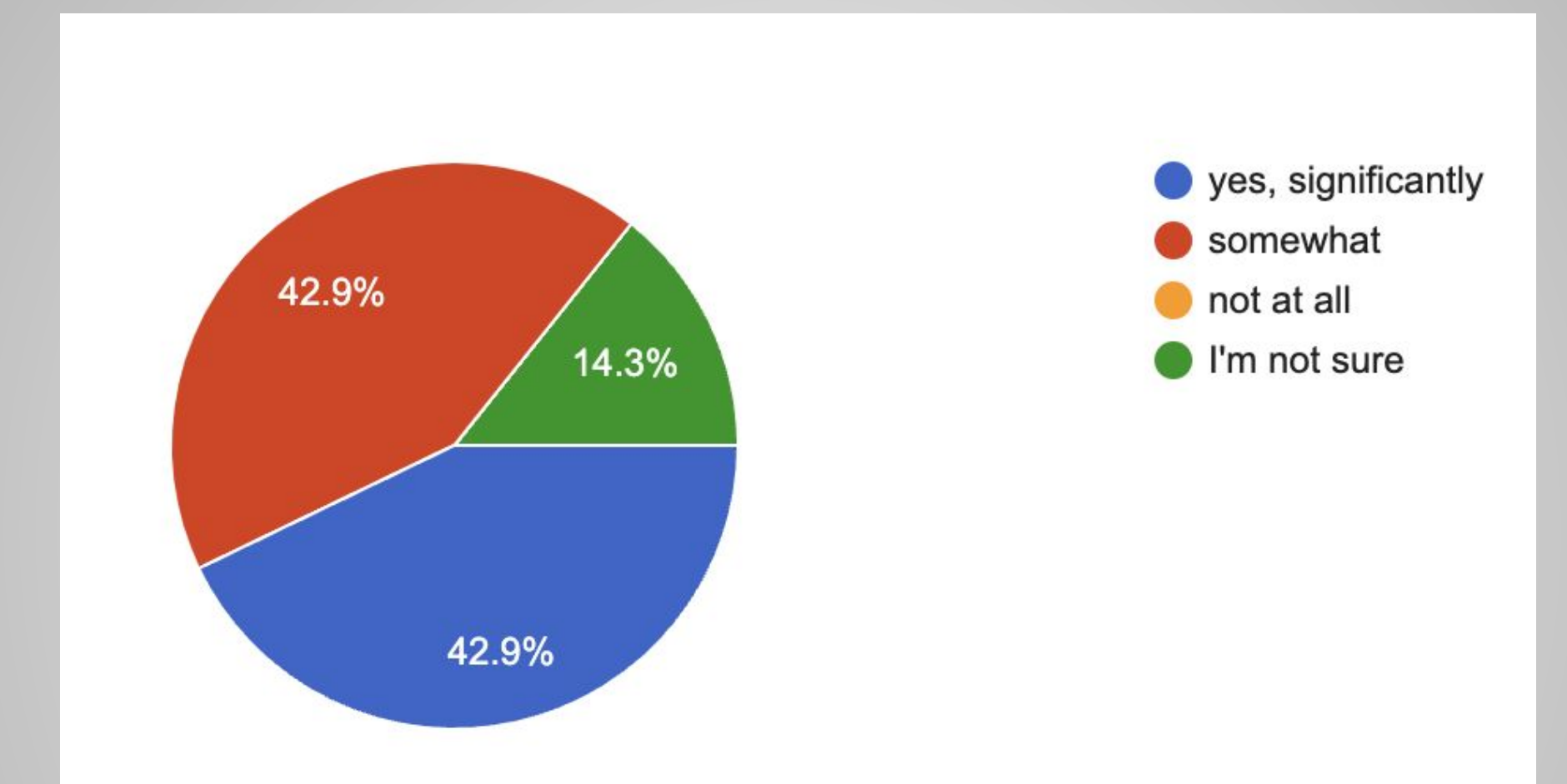


Figure 5. Pie chart showing student responses to a question asking if their attitudes about STEM had changed.

Students also identified specific topics they want to learn more about including computer science, coding and microbiology. One student stated they now want to minor in computer science in college.

Conclusions

The solar eclipse provided a once in a lifetime opportunity to engage students in interdisciplinary, authentic STEM inquiry. The nature of the project required long term engagement, problem solving, overcoming challenges and perseverance. Our sampling device can be used to study microbes in other environments and contexts. The team plans on participating in a balloon launch during Neutrino Day in Lead, SD on July 13, 2024. The team is still waiting for the genetic results from their samples which were sent to South Dakota State University for processing.

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