

**Project Title:** All About Arsenic

**Your Name:** Lynn Hanna

**Your School:** Conners Emerson School

**Grade Level(s):** 7/8

**Course(s) Taught:** Science

**Number of Students Involved (Total):** 42

**Project Partners:** This year I worked with Dr. Jane Disney, and her two stewards with this project.

**Teacher/Scientist Partner Profile:** I am a 7th and 8th grade science teacher who teaches in Bar Harbor. I have been teaching here for 19 years, ed tech for 7 and teacher for 12. I started teaching in 1993 in a private school in Washington D.C. where I taught 1-5th grade science. I have been teaching a total of around 31 years, taking a couple years off to raise my children. I have recently found a passion with fly fishing, backcountry hiking, and winter camping. I teach both life and physical science and am interested in the Communicating Data Project because I enjoy making what I'm teaching real. Learning how to read data and then share that information with others is a good skill to have and I feel students should understand how what they are learning in the classroom has an impact in the world around them.

**Summary:** All About Arsenic is used in my chemistry unit for the 8th graders. While we waited for the samples to be analyzed students studied the elements that Dartmouth is analyzing for: arsenic, antimony, barium, beryllium, cadmium, chromium, copper, iron, lead, manganese, nickel, selenium, thallium, and uranium. Students chose an element and researched that element. Students then put together an element baby book which they share with the rest of their class. The research included the atomic symbol, mass, and number. Students also researched who discovered the element, the type of element, and state of matter. They also research what health impacts the element has. This year I also included a computer science piece. Students created a Scratch scenario where they choose a "super element" or a "villain element". Students then programmed their element and again, had to use the background knowledge of a Bohr and Lewis Dot structure, what the element is used for (or why it is dangerous), along with the researched involved with the Element Baby Book. Jane Disney and her associates also came to school and showed the students how to do a lettuce seed bioassay with different contaminants. After conducting the experiment students needed to write up a claim, evidence, reasoning as to why students got the results they did. Students collected 42 samples. I still struggle with being able to look at the data being collected. By the time the data comes back students have moved on to social studies. Next year I'm looking at starting early in the year with 7th graders to see if this makes a difference.

**Project Details:**

- 42 Students and teachers were involved with this project.
- Element Baby Book Form for students: [https://docs.google.com/document/d/1ZwYqp5nqdA8TIGNP4QVx2CDxfoiZRpqTklH66DKQ\\_tM/copy](https://docs.google.com/document/d/1ZwYqp5nqdA8TIGNP4QVx2CDxfoiZRpqTklH66DKQ_tM/copy)
- SUPERHERO/SUPERVILLAIN Scratch Project: <https://docs.google.com/document/d/18PHBzuKYgIOQsoJlaMLjGxXNyCwPFPRyAK0fjrd9io4/edit?usp=sharing>

- Students met with Jane Disney to do a bioassay on lettuce seeds and contaminants.
  - [Lab Write Up for BioAssay](#)
  - In these bioassays students tested lettuce seeds and copper sulfate, iron sulfate, 25 ppb arsenic and 50 ppb arsenic, filter and non filtered water. Some questions students asked were: How will lettuce seed grow in a copper sulfate solution? How will the lettuce seed grow in copper vs. arsenic? How will copper, iron, and arsenic affect the growth of lettuce seeds? And Does a level of 50ppb arsenic negatively affect the germination of lettuce seeds when compared to arsenic-free water?
  - Here is an example of a [student's work](#).
  - The people I had enter my room this year were Jane Disney to share and set up their bioassays along with Morgan Karns and Zya Sosa.
  - This year we did not get to a communicate piece due to timing in the classroom. Students completed their lettuce seed bioassay and shared the results with their peers.
  - One struggle I had this year was that students did not realize they needed to measure every lettuce seed growth, they only measured the longest one in their sample. This lead to some incomplete data and difficulty writing a claim, evidence, reasoning. Another struggle was that students didn't know how to measure. Even though they were shown specifically how to measure, the comments where "I didn't do this right." Or "I forgot to write the numbers down." This is something I will pay closer attention to next year in hopes of this not happening again.
- This year I used my money to purchase more test tubes, some wax, and folders to send the samples home in.
- Students were introduced to Tuva by using an intro lesson to get them more familiar with using this tool. Then we analyzed data from the years past about arsenic and the other elements that were being tested. And finally, students used Tuva to create graphs and gather information. I used TUVA outside of this project. Students gather data and they create their own graphs with the data collected. Students gather water quality information, temperature and dissolved oxygen, and students create a graph to see fall turnover and learn a little bit about lake ecology.
  - [Messing Around with TUVA Data](#)
- We did not use the Science Communication Toolkit this year and we did not do any outreach. Timing was off this year for this unit.
- I did have parent feedback that they really were grateful to be able to test their water. I had teachers questioning me at the beginning of the year when I was going to send out water samples again because they wanted to get their water sampled. The word is spreading about this project.
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**Discussion:**

- This year was a tough year. Students were tougher discipline wise which made it very difficult to do activities with them. I learned I needed to shorting the assignments, give more direction, and help

organize their thinking more. I enjoy this project because it is directly related to real life and it's good for students to think about water.

**Conclusion:** In conclusion this year was tougher in some ways. I was really excited to do the bioassays with the students, that was an eye opener in the students got to see the impact of these contaminants that they have been studying. This class I had struggled with measuring the lettuce seed length which was not discovered until they went to do their claim, evidence, reasoning write up. So the impact was not as great as I had hoped this year. I still was not able to get the data back before the students moved on to social studies so I need to think about the timing again. I love teaching about arsenic, but it's hard when you feel the pressures of having to teach other things that you can't spend time and dive deeper into one area, but I am happy that I am adding something new each year to this unit and that students talk about it to this day.

#### **References:**

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