

Title or Description of Your Project: 2019 Data to Action –Well, well, what’s in your well?

School: Pinkerton Academy, Derry, NH

Grade Level: 11-12

Teacher: Michelle Mize

Project Partners: EPA, SEPA, Dartmouth College, MDI Biological Laboratory, Anecdota, Tuva, Derry and Manchester Municipalities.

Teacher Profile Michelle Mize, a NH native is a Career and Technical Education teacher for the past 19 years and has taught plant science, natural resources, environmental studies, forestry and previously worked in the green industry.

She has a M.A.L.S. degree from UNH with a focus in Environmental Education and Natural Resource Inventory (N.R.I.) applications and case studies. In addition she has a great interest in water quality and is excited about her students being involved in an EPA study about arsenic in drinking water. She is also involved in lake water quality monitoring in Southern NH and has long volunteered to serve the NH Dept. of Environmental Services "Weed Watch Program". Michelle has also been a longtime volunteer the Sunset Lake Association and Advisor for FFA and SEA at Pinkerton Academy.

As a product of CTE herself (KHS- '85) she realizes the value of hands on application to real life scenarios which interests and motivates high school students to develop cross-curricular critical thinking skills.

Summary (short paragraph):

- 2018-19 school year students planned the execution, budget and ordering of supplies to take 30 set samples of class students well water and a set of CTE faculty samples as well as pH and Nitrites test strips and 10-1 test strips.
- Students had identified areas in need for testing and realized that Pinkerton students and staff cover a variety of town’s that are in need of education. We toured Derry and Manchester municipal water and waste water plants and learned where much of our Town water in Derry comes from and where it goes as well as ways of water quality remediation as well as quality of aquifers and potable water sources.

Introduction:

The students are from many towns in the surrounding area; Derry, Hampstead, Chester, Auburn, Hooksett and sending students from Windham and Plaistow for CTE courses. We focused on the issues of our soils types having high occurrence of potential arsenic, high past/present farm/apple orchards/pesticide and subsequent potential health issues. We broke town parts of a water test, EPA parameters and aesthetic issues with drinking water. We looked at previous tests and students brought in tests outcomes from home. Students were surprised that a few of them already had filters and many types of remediation even arsenic and uranium. Some of our faculty members and students were excited for test results and others had a “don’t know don’t care” attitude which we found odd and wove into our next round of tests and education. Through the field trips we learned

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about the Massabesic watershed and its early conservation that has helped municipalities for decades. We also talked about who owns water and worldwide clean water availability and water privatization.

The focus of our project was to understand arsenic, how it appears, and what arsenic has been used for in the past and educating our community about the potential health problems it can cause.

Project Details:

Similar to past year's participation in scope and sequence.

- 2018-19 Students developed a “commercial” to show how to take a sample and tested pH and Nitrites with Science week students as well as present this to the Upper Room in Derry to young adults in a variety of programs as well as adults. Our focus was how different elements in drinking water can affect ones health especially children. Chronic and acute toxicity, Blue Baby Syndrome were the focus for the audience. Water test kits were given out to those interested. We had Allied Clearwater of Kingston, NH come in and speak with us about our results and what types of remediation is available. We visited a municipal water supply of Derry that had arsenic/remediation for a subdivision, Derry water Treatment Plant, Manchester Water Treatment Plant and Wastewater Division.
- Students distributed 100 flyers at the Londonderry Hazardous Waste Day to encourage people to think about their drinking water and potential contaminants and offered “best management practices” for homeowners for well water protection. Students became more aware of their impact on community related environmental issues and had a great deal of ownership and excitement as did I.
- Science week presentations were prepared for peer to peer teaching.
- Reflections were collected throughout the project as well as feedback from our audiences.

Discussion:

Students learned that it was important to be aware of one's own well and that municipalities have a responsibility under EPA requirements to provide clean drinking water. This happens to coincide with the former Pease Airforce base contamination in Newington and Portsmouth, NH, and it was relevant timing.

The project was exciting in that the students could see real life results and of samples, mapping and their community. The addition of Anecdota and Tuva made the statistical analysis fairly easy and the interfaces were able to be used on Chromebooks in class. This provided great opportunities for students to manipulate data to create and present their own projects. As an educator this is probably the best situation I have found using software in a group that includes so many features such as GIS and graphic displays. For many students this was the first real application in statistics and data analysis they had done ever as well as using a data set that they created along with other NH and Maine students. As in the past years of testing water through the grant projects I continue to be thrilled with student involvement because they can relate to it and take ownership as it applies to them personally.

I think students are more apt to see other environmental issues in their communities and the world because of this experience and I found them much more willing as learners and presenters than normal due to a close reality connection. They also had discussions with their parents and taught them what they had learned about their water in class and were able to share both Anecdota and TUVa information with them.

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What do you think that students learned?

In addition to the objectives, it was interesting to see the initial sense of understanding, ownership and pride from sharing the learning process with family members. I think students shared and had family members participate in all aspects of the project more than I expected because of the way the portal was set up and the responsibility was on the students and parents to initiate the process..

We had some difficulty organizing time and posting with community partners and mentors with the many aspects and units taught in this yearlong two period course.

Student input on what they learned:

Which elements are common in water, Types of water sources, processing and pH levels. What arsenic is. Arsenic is a carcinogen. Arsenic is very common in certain soils. How Arsenic affects the body. E.P.A. standards for levels acceptable in drinking water and how they have changed over time. That arsenic is a health problem that can be remediated if one is aware of the presence of the contaminant. Other parameters can also cause health problems where others are aesthetic. People often shy away from getting their drinking water tested for whatever reason.

NH is in the process of possibly adopting stricter standards for public drinking water and students understanding state and national standards may differ.

A few student responses to learning, using and demonstrating gained knowledge with Anecdata and Tuva:

“I am glad to have had the opportunity to contribute to the arsenic awareness project by means of Anecdata and Tuva. I especially enjoyed using Tuva as a data interpretation platform and found that it was very user friendly and informative. I am taking away from this project an increased knowledge of environmental problems that pose a threat to my community, and hope to spread this awareness to others with the intent to create a safe, informed, and involved community. The skills I have learned in this project, specifically data literacy, will be instrumental in advancing my knowledge and education as a whole, and I am grateful for the opportunity to learn in such an important project.” C.L.“

“Using Anecdata and Tuva was a great way to study our water qualities and it was very interesting to see the results. ” N.L.

“I liked using Tuva and I liked how you can see everyone’s data even from other schools so that you can compare many different areas.” M.M.

Thank you for supplying us with these water tests and for helping us learn more about arsenic, now we can be even safer. G.M.

“The tools used are very effective in establishing clear and understandable data sets. The expansive nature of the project and how we could manipulate the data with Tuva and Anecdata enabled us to examine what we wanted to know. I could see myself using this in future research just for this malleability.” J.L.

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References:

USGS ARSENIC CONCENTRATIONS IN PRIVATE BEDROCK WELLS IN SOUTHEASTERN NEW HAMPSHIRE
U.S. Geological Survey Fact Sheet 051-03
2003
How to Interpret a Water Analysis Report — Water Quality — Penn State
NH DES Interactive Lake Ecology Student Workbook-NH DES Water Division Services-2003
"Flow- For The Love of Water" film and supplemental student materials
"A Civil Action" film and discussion questions
National and Local links from "All About Arsenic" website

Guest Speakers: Chris Borst, Allied Clearwater, Kingston, NH, Charles Myette, Brown and Coldwell, Andover, MA

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Appendix: