2023-2024 SEPA Case Study Template

Your Name: Well, well, what's in your well?

School: Pinkerton Academy, Derry, NH

Grade Level: 11-12 Teacher: Michelle Mize

Project Partners: SEPA Team, Anecdata, Tuva, PIDL, MDI Biological Laboratory, Dartmouth College Geisel School of Medicine, Derry and Manchester, NH Municipalities.

Teacher Profile: Michelle Mize, a NH native is a Career and Technical Education teacher for the past 24 years in plant science, natural resources, and forestry and previously worked in the field. 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 SEPA study about arsenic in drinking water. She is also involved in lake monitoring in Southern NH and has long volunteered to serve the NH Dept. of Environmental Services "Weed Watch Program" as well as the Sunset Lake Association. As a product of CTE herself (KHS- '85) she realizes the value of hands-on application in real life scenarios to interest and motivate high school students to develop cross-curricular critical thinking skills.

Summary: ● The 2023-24 school year students planned the execution, budget and ordering of supplies to take 30 samples of class students well water and a set of CTE faculty and Pinkerton Academy faculty and staff samples as well as pH and Nitrites strips.
● Students had identified areas in need for testing and realized that Pinkerton students and staff cover a variety of towns that are in need of education. In the past we have limited the number of samples to just CTE and my courses and decided to try a larger data set witch brought us a variety of NH towns in the set. We planned to tour Derry and Manchester municipal water and wastewater plants and learned where much of our Town water in Derry comes from and where it goes as well as ways of remediation. The students are from many NH towns in the surrounding area; Derry, Hampstead, Chester, Auburn, Hooksett and sending students from Timberlane and Pelham 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 test outcomes from home. We planned our outreach to Science Week and Derry Municipal Waste Day and also reached out to the Upper Room and provided educational display and materials for their TIPs program for new parents. The CTE depattment has been working with the Math department for higher student achievement and myself and Crista developed assessments relative to the types of data analysis necessary for TUVA and to also understand students current knowledge base. Student were also provided lessons in municipal water at Derry Municipal Water and Wastewater Manchester Waste Water Treatment Plants also arsenic remediation.
Details: Several lectures and student research were completed as well as writing our proposal and obtaining materials.
● 2023 Oct.-Dec. Students developed an outline for the project with guidance and the questions were posed "what do you know, don't you know and curious to know " about drinking water quality regarding arsenic and other factors and parameters. Students created test kits and deliverd and cataloged all information.
● 2024-May.- Results were obtained and while waiting student had lessons on TUVA and and also did manipulation with last year's results. We discuss parameters and recent EPA standards as well as New Hampshire drinking water standards and changes. We went over types of remediation for arsenic, uranium and aesthetics and how pH and correlative parameters such as soil and ionic exchange. Students became familiar with using Anecdata, TUVA and began using the tools. Students developed independent research projects

comparing 3 schools and arsenic and other chosen parameters to start their investigations based on last year's results as we were behind in getting samples to the lab.
● Once our sample data was available students compared data to prior tests and developed a comprehensive project with community PSA and outreach material which was shared. We participated in science week this year and students did presentations to peers and educators as well as flyers for Derry Hazardous Waste Day.
● Upper Room and Library display posters and handouts
● Discussion: 2023/2024I think students did a great job and the outcomes of their individual projects and we worked very hard at data literacy. It is clear that as I am teaching AP at the same time a Environmental Science II that lessons need a lot of differentiation between level and also the different math level the individual student is coming from to, this, to me, is the hardest part of teaching these types of competencies

Students 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.PA. 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(s) and well water testing is important. • They learned that several of the areas surrounding Derry were in apple production for many years and several of those property wells have an abundance of arsenic in soil and well water. Also that allowable amounts in drinking water are a relative thing and can change with legislation and vary throughout the USA.

TUVA practice assessments: https://tuvalabs.com/search/?q=fire&type=datastory,activities

Pictures of AAA project

Details

Did you…

	No	Yes	If yes, how many?
Collaborate with any other teachers in your school? - If so, who and what do they teach?	○	X	Science Dept. 2
Conduct any experiments? - If so, what kinds of questions did students ask?	○	X	Causation/corelation types of questions.
Go on any field trips? - If so, where and why?	○	X	Water and Wastewater plants to see how municipal water works as Derry has both wells and municipal water.
Have any guests visit your classroom? - If so, who and why? What did the guest do?	X	○	_____
Have a Community Meeting? - If so, where was it, what did the students do, how many people attended, etc…?	X	○	Science Week-40 Upper Room-15
Have other Outreach Events? - If so, where were they, what did the students do, how many people attended, etc…?	○	X	2-Library and Hazardous waste Day
Use your stipend to purchase anything for your classroom? - If so, what, and how did you use it?	○	X	Test kit supplies and transportation.

Describe the student, or group of students, whose work most exemplified the All Abut Arsenic+ project this school year. What were they excited about? How did that facilitate their learning?

The group that did The Upper Room and PA Library were excited to share their knowledge and help others. Through teaching others they had to become good experts and be able to convey what they learned to others that have little experience with the subject mater.

Reflect on your students' primary learning outcomes/gains with reference to data literacy, science communication, and using data visualizations in communication. What are they getting out of their involvement in this project?

Practice knowing how to observe data, correlations and also which types of TUVA tools for which application. We spoke a lot about correlation and causation along with sample size.

They state that they feel a great sense of pride helping inform their community as well as the citizen science/real life and data and that they are learning something they can apply and understand.

How did you use Tuva, for the arsenic data?? Did you use the software for teaching, was it a tool students used to create data visualizations? What about other Tuva data activities? Did you use them in your teaching? Did students build skills using those activities?

I used, in addition to the tools on AAA, the TUVA library including fire, population, ecosystem related pre-made lessons. These were very helpful and students like the variety.

What challenges your students had with Tuva, the website, the datasheet, Anecdata, anything related to the project process.

TUVA access is hard to find on the AAA website. There used to be an access button right at the top.
We are a Google school and it would be helpful to submit items in that platform, use imbedded links, photos, etc. as opposed to Word and Xcel.

How did you enhance *your own* Data Visualization and Science Communication skills?
Each year I learn something new because the students have such varied backgrounds and science and math levels. The workbook was super helpful for me to go to on many occasions for myself to organize and refresh areas that I haven't used in a while.

Which aspects of this project will you repeat next year? The same as this year and continue to collaborate with the Math department.

Which aspects of this project will you change next year? I think I will start with the generic TUVA lessons before jumping into arsenic for the reason the students can more easily find a common ground topic for natural resources that we have for units in class that they have been exposed to before. IE fire, algae blooms, invasive etc.

List and describe the resources that helped your students the most this year.

The tutorials and also the TUVA lessons.

Provide a list, and links, if applicable, to specific curricular items such as online worksheets, articles, books, YouTube videos, and labs.

https://tuvalabs.com/search/?q=fire&type=datastory,activities

Add addendums such as curriculum, photos, student assessments, testimonials from parents/students, etc.

***See attached:

Upper Room
PA Library
Making test kits

What are anticipated needs for the 2024-2025 school year?

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