



Date: 03/23/26

Your Name: Tiffany Thompson

Your School: Coe-Brown Northwood Academy

Grade Level(s): 9, 11, 12

Course(s) Taught: CP Chemistry, CP Intro to Science, General Intro to Science

Number of Students Involved (Total): 23, and 17 adults (faculty, staff and community members)

Name of your scientist partner and their institution, and any other partners (other partners can include, but are not limited to, collaborations within the school, community groups, non-profit organizations such as the YMCA, or stand out family or friend mentors that helped your project succeed):

Name: Maria Florencia Fahnestock, University of New Hampshire

Teacher Profile: A brief biography of yourself. How long have you been teaching? What did you study in school? What are you passionate about inside and outside the classroom? Why are you interested in the All About Arsenic+ project? How long have you been participating in SEPA and how were you recruited to participate?

I have been teaching high school science for 10 years at Coe-Brown Northwood Academy. During my time in college, I pursued a Bachelor's of Science degree in Chemistry with a concentration in environmental and green chemistry and pursued a Master's of Science degree in Chemistry. My focus of Chemistry in school was analytical chemistry which turned more to incorporating analytical chemistry into a high school classroom through projects. I became interested in the All About Arsenic Project because of my prior experience with environmental chemistry and interest in safe drinking water. In my undergraduate degree program, I examined soil samples from a riverbed next to an EPA superfund site for toxic metals and I wanted to be able to bring some real-world science into my classroom. I also had the opportunity to take a drinking water class in my undergraduate career. This is my first year with the SEPA project and I hope to join again next year. I was recruited through an email that mentioned a presentation that was covering the project.

Abstract: Provide a 500-word summary of your project. Describe the **curriculum**. How was drinking water sampling, **data analysis**, and **science communication** integrated into that curriculum? Provide specifics (number of samples collected, what the samples were analyzed for, how Tuva was used, what opportunities students had to talk about their data through some public outreach, etc...). Did students use the **Science Communication Toolkit** and/or Solutionaries Framework to prepare for this outreach event or guide their participation in SEPA this school year? Did students participate in an **Intergenerational Learning** activity (pH exercise etc.)? Please include anecdotes or stories in this section!

For the SEPA Communicating Data project, my school submitted a total of 42 water samples from a combination of students, faculty, staff and community members. The water samples were analyzed for 30 different metals and sent to UMass Dartmouth for analysis. Students and their families participated in the pH intergenerational activity that was sent home in their sample kit that included the datasheet, permission slip, sample collection tube, pH strips, parafilm, and instructions on how to obtain their water sample. To prepare students for the analysis of their water samples, two Edpuzzle video assignments were created using water quality videos found on YouTube with associated questions and one TUVA assignment "Well, should you question your water?" to familiarize students with the graphing program. Students also completed two lab activities; The Effects of Personal Water Filtration Systems on Water Quality and the Toxicity of Metals in Water and the Effects on Lettuce Seed Germination. These two lab assignments were able to provide students real-world context of the impacts of poor water quality on human health and the ecosystem.

Once student water sample data arrived, I exported our school's data into a dataset into TUVA for students to use as well as introduced students to the 2025-2026 Drinking Water Dataset and the All- Drinking Water Dataset. Students began to notice that not all of the water contaminants were present in the large TUVA datasets and wanted to be able to compare their data to other schools. After our data analysis, students chose a contaminant from our class list to develop their scientific communication tool. Students were required to create a presentation that provided the class with background information about their contaminant (i.e. sources of contamination/found), impacts on human health and the community, how to remove/neutralize the contaminant and the allowable limits in drinking water. Students were required to include at least 2 graphs accompanied with discussion using the class data and at least the 2025-2026 data or the all years drinking water data. Students also created a brochure with similar requirements except they needed to include 1 data table and 1 graph. Since our adult samples (batch 2) results would not be available in time for the ending of our Quarter, the brochures also serve as a communication tool to share with our community members if they have a contaminant that is out of range. Once the second batch of samples come in, we will discuss those results as well.

Details

Did you...

	No	Yes	If yes, how many?
Collaborate with your Scientist Partner? - If so, how? - Via email and zoom meetings	☐	☒	__1__
Use the Science Communication Toolkit? - If so, how?	☒	☐	_____
Use the Solutionaries Framework? - If so, how?	☒	☐	_____
Use any Intergenerational Activities? - If so, how? - I used the pH activity for my students so they could test the pH of the water.	☐	☒	__1__
Collaborate with any other teachers in your school? - If so, who and what do they teach?	☒	☐	_____
Conduct any experiments? - If so, what kinds of questions did students ask? - I redeveloped and expanded upon the lettuce seed bioassay and created a lab looking at different water parameters after water had been filtered through 3 brands of water filter pitchers. - One of my students asked why their water stained their tub blue.	☐	☒	__2__
Go on any field trips? - If so, where and why?	☒	☐	_____
Have any guests visit your classroom? - If so, who and why? What did the guest do?	☒	☐	_____
Have a Community Meeting? - If so, where was it, what did the students do, how many people attended, etc...?	☒	☐	_____
Have other Outreach Events? - If so, where were they, what did the students do, how many people attended, etc...?	☒	☐	_____

Use your stipend to purchase anything for your classroom? - If so, what, and how did you use it? Kit Materials - 50 pack Plastic Centrifuge Tubes - Parafilm 4 in x 125 ft - Self-Adhesive Envelopes 100 pack - Re-sealable zipper bags 2 pack of 100 Laboratory Experiment Materials - Lettuce Seed Variety Pack - 2 30 pack Plastic Petri Dishes with Lids - pH strips Shipping - Cost of Shipping Materials	○	X	\$_156.18_____

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

This year I had one student who best exemplified the project. One student reported that her bathtub and shower curtain would stain blue after running the water. She was curious about what was causing this especially after we tested the pH of her water coming back in the acidic range. We suspected elevated levels of copper which led her to an investigation of the pipes in her house. Once her water results came back from UMass Dartmouth, she was able to see that the combination of pH, the identification of her pipes as copper and the elevated copper levels at her house contribute to the blue tinge there.

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? Please include anecdotes and stories here.

Students involved in this project were able to engage in the authentic research experiment that was connected to water quality in their daily life. Students were able to manage large data sets by investigating their own school's data (approx. 25 data points), the 2025-2026 data series (approx. 220 data points) and all years of drinking water data (approx. 4927 data points) for a variety of trends. Once students were able to talk about their data, and create graphs in TUVA, they then chose a contaminant to develop as an informational brochure and presentation. These brochures will be available for school community members to look at to learn about a specific contaminant in their water. Students discussed background information of sources, used data to support this, ways to remediate or prevent that contaminant from getting in the water.

If you are a teacher who has participated in both SEPA grants, how have you shifted your teaching to include the additional goals of science communication and intergenerational learning?

I have not participated in a SEPA grant project before, but it has shifted my focus on bringing more authentic research experiences into the classroom.

How did you use our Tuva drinking water dataset? 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? Please include stories that illustrate students understanding the link between data visualization and literacy and science communication. If you are a teacher who has participated in both SEPA grants, how have you shifted your data literacy focus to include this grant's science communication goal?

First, I used the TUVA assignment "Well, should you question your water?" to familiarize students with using the TUVA software to look at different trends, filter data and create graphs. I uploaded all of my classes data set including contaminants that were not in the main TUVA data sets for students to work with. They were able to create graph looking at trends in a variety of contaminants and some students were able to connect that to the 2025-2026 Drinking Water data set and the All-Drinking Water data set. I also had some students who preferred to pull the data out of the TUVA table and graph using Microsoft Excel. Students were able to make cleaner bar graphs of their data this way. During the presentation portion of the project where students presented on their contaminant using at least 2 graphs created in TUVA or Microsoft Excel, they were able to make connections between variables including filter types, contaminant concentration and well location. For example, one of my students looked to see if there were any trends between calcium, magnesium and barium concentrations in water by town. It was interesting to see that it appeared to have some similarities.

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

TUVA

For some of my students, it was difficult to navigate the graphing software, but this could be due to my first year using it. I have been primarily trained on Microsoft Excel. Another challenge that I ran into was the size of the data points and the scaling of the graph. It can create a misconception on what the range of the data point is. Also, sometimes the text can overlap or is too long to be seen on the axis's labels. It would also be interesting to include other contaminants in the data set such as magnesium and calcium as it was very easy to tell which homes did not use a water softening system.

Website

The website has come a long way in regards to being able to find information to support SEPA teachers and the improvement of the water testing sheet to non-color was a positive as well. Earlier in the year, the sample number box was not working even though results had been returned, but that seems to have resolved itself.

DataSheet/AnecData

One suggestion that I would have on the data sheet would be to have the questions about arsenic testing come before the research questions about using the data at the state level and for research. This would be in more alignment with how the AnecData form is set up. I also would hope that the map feature was more accurate in terms of locations. For example, some data points say they are from Epping, NH, but are placed closer to Rochester. I understand the need for privacy of location, but there is significant variation here. Also, for the datasheet, if there as a way to rework the question of is the sample filtered to provide more clarity that if you have a whole-household filter then it is most likely filtered would be helpful.

Project Process

One suggestion that I would have for the project program would be to have the 2-day workshop earlier in the school year. For new SEPA teachers, it is very difficult to meet the November sample deadline with a training date at the end of October as teachers are still trying to get their bearings. Also, it would allow teachers to use it as a quarter project and have access to outside taps before they freeze in the winter.

If you did not use Tuva this year, how did you analyze drinking water data? Please explain why you did not use Tuva. What challenges and successes did students experience with your chosen data analysis/visualization tool?

We used a combination of TUVA and Microsoft Excel. Some students found TUVA difficult fine tune their data. Some of my students found that TUVA was very helpful and easy to compare different variables quickly.

How did you enhance *your own* Data Visualization and Science Communication skills As an educator or scientist partner?

From this project, I was able to visualize larger data sets and easily look at trends between different categories. It also helped investigate different ways to portray science data to the community and my students.

Science Communication Outreach

What kinds of science communication outreach products did your students produce?

My students produced a variety of outreach products including google slide presentations (for class), brochures and posters for their school community.

Did your students work with the Science Communication Toolkit this year? Yes ☐ No ☒
If yes, please describe how it went. What worked best? What improvements could be made?

N/A

Please include anecdotes or stories here. If you did not use the Science Communication Toolkit, why not? What other resources and activities did you use to teach or facilitate science communication? Did the science communication skill building inspire outreach or build capacity in your students in ways not directly associated with the SEPA project?

I chose not to use the communication tool kit as I wanted to provide my students with a set of products, they could choose from rather than being overwhelmed by learning a new style of communication. I think next year I would explore the scientific toolkit more, but it was overwhelming trying to get my bearings on all the requirements.

Don't forget to add all final student products to your teacher folder on the shared google folder! (Feel free to add additional products that led to the final products. Simply create a separate folder under your teacher folder.)

Intergenerational Learning

Did you send an intergenerational activity home to parents? Yes **X** No ☐

If yes, please describe the activity. What are stories and anecdotes you can include about student participation in intergenerational learning activities?

I used the pH activity sheet and pH strips with my students. Some students noted that their water was slightly acidic and it also helped one of my students understand why her bathtub was blue.

If no, please describe why. What other resources or activities did you use to teach about or facilitate intergenerational learning?

N/A

What worked best? What improvements could be made?

I think the pH activity was helpful. I understand that the pH activity is a part of another project, but the data set in there is not updated and I had a few students whose families were not comfortable with sharing that information outside of the classroom setting.

Did the intergenerational activity go home at the same time as the drinking water samples? Yes **X** No ☐
Please explain.

For my students, they received an orange envelope with the following items inside: permission slip, datasheet, water sample collection instructions, Ziplock bag with parafilm, sample collection tube with sample information, pH strips, and the intergenerational activity. I also highlighted the required areas on the datasheet and permission slip to make it more accessible for families to complete and to limit the number of follow ups for missing information. I also prefilled in student information and sample numbers to limit the overwhelming feeling for families.

What feedback did you hear about the activity?

Some feedback that I received from the students/ families/ faculty were the following:

- One of my students stated that the pH activity helped them understand later on why there were blue colors in their bathtub.

Solutionaries Framework

Did you use the Solutionaries Framework in your class? Yes ☐ No **X**

If yes, please describe.

N/A

What worked best? What improvements could be made?

N/A

If no, why not? Please include other activities or resources you used to teach about or facilitate systems thinking, place-based discovery, or project-based learning.

I did not use the solutionaries framework as it was a lot of additional material to learn on top of the initial project. This would be beneficial for possibly returning SEPA teachers. In place of this, I developed and revamped two labs, and created multiple Edpuzzle activities for students to use. The first lab that I developed was to investigate the effects on different water quality parameters with the use of three different water filter pitchers. The other lab that was revamped included investigating the effects of copper (II) chloride and iron (III) chloride solutions on the germination and root length of 4 different varieties of lettuce seeds.

Did you attend the Institute for Humane Education series on the solutionaries framework in your class?

Yes ☐ No **X**

Which aspects of this Communicating Data project will you repeat next year?

I plan to repeat the following activities: pH intergenerational activity, TUVa prelab activity, water filter pitcher lab, newly designed lettuce seed bioassay, having students pick one contaminant to present on, and present/create a brochure on.

Which aspects of this project will you change next year?

I am planning on changing the requirements that I had students do in their brochure as well as limit the number of contaminants they could explore. I also plan on trying to incorporate this earlier in the year so students could have more flexibility on their water sources. I am also planning on trying to communicate more with my scientist partner. I feel that I could utilize the collaboration better next year. This year, I felt independent to be able to tackle the project myself, but it was nice to know I had someone I could ask questions of.

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

TUVa database- Having access to the 2025-2026 Drinking Water data set and all years drinking water

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

<https://www.youtube.com/watch?v=yLoxfTELf4> – Video used for edpuzzle

<https://www.youtube.com/watch?v=6HVNpoFvRdk&t=368s-> Video use for edpuzzle

[Sources and exposure of the New Hampshire population to arsenic in public and private drinking water supplies Research Article](#)

[Arsenic in Southeast NH Bedrock Article](#)

Add addendums such as stories and anecdotes, photos, student assessments, testimonials from parents/students, etc.

N/A

What were gaps or barriers you experienced this year?

I don't believe I ran into any barriers that could necessarily be controlled. For example, water sources are limited to gain samples from (i.e. outside sources) due to the winter. I also ran into address issues with the post office for the mailing addresses provided on the lab central. According to two different post office locations, the zip code for Salisbury Cove is for Bar Harbor, Maine and they also struggled finding the address for the location for the samples to be sent. Both post offices sent the datasheets with a zip code for Bar Harbor and to the generic UMass Dartmouth address with the hope it would get to its location.

What are the anticipated needs for the 2025-2026 school year?

If this is requesting needs for the 2026-2027 school year, I would recommend the following:

- 1) Moving the 2 -day workshop in person to earlier in the fall to allow for more time to prepare for the November sample deadline.

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