



Date: 6/18/26

Your Name: Ragan Hedstrom

Your School: Westbrook High School

Grade Level(s): 12

Course(s) Taught: Environmental Science

Number of Students Involved (Total): 24

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):

Doug Currie-Scientist partner:USM

Karen Bieluch- Dartmouth College- In person message box, Zoom follow up

Kristie Munson- Cumberland County Soils and Water Conservation District- field trip, water quality testing

Lynn Leavitt- Westbrook Sustainability Coordinator- field trip, Earth Day Celebration, ideas of local connection

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 at Westbrook High School for 14 years and teaching in public schools since 2002. I have I taught a concurrent enrollment course called Fundamentals of Environmental Science that is only for seniors. I have taught at 3 different schools and started my career teaching in Baltimore, Maryland. I earned my BA and MA in Environmental Science and Policy at Clark University, and have been involved with environmental work in a variety of capacities ever since.

This year marks a big shift because I am retiring from teaching in the classroom. In 2022, I suffered a cerebellar stroke, and it impacted my speech, fine motor skills, and my stamina. For the last 3 years, I have taught part-time with the idea that I may return to full-time. Now I am shifting out of the classroom, but plan to pursue jobs that are based in my passion about the environment and getting community involved.

I have been part of the All About Arsenic program since 2020, when Doug Currie called my department chair, and I happened to be at her house. I love being part of the program because it helps bring real science to the classroom, and encourages students to think about how they can contribute to data, and use that same data compilation to inform and strengthen their community.

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!

The All About Arsenic project was woven throughout my Environmental Science curriculum rather than taught as a standalone unit. Students were first introduced to arsenic during our study of biogeochemical cycles and the inorganic components of ecosystems. After learning about carbon, nitrogen, and phosphorus, students explored other naturally occurring elements found in the environment and discussed how human activities can influence their movement through ecosystems. During our watershed ecology and water cycle unit, students examined how water acts as the universal solvent, transporting both natural and human-made substances through the environment. This provided a natural opportunity to discuss groundwater, arsenic contamination, and the impacts of drinking water quality on human health. The field trip to two parts of the same river helped solidify this idea.

Because Westbrook uses a public water supply, we focused primarily on lead rather than arsenic. Students learned that while water leaving the treatment plant meets safety standards, lead can enter drinking water through older pipes, fixtures, and plumbing. This helped them understand why lead levels can vary between buildings—and even between faucets in the same building. Using our sample results, we compared lead concentrations to Maine's action level of 15 ppb for public drinking water and the more protective 4 ppb standard used in Maine schools. These discussions highlighted the importance of lead service line replacement and maintaining infrastructure to ensure safe drinking water.

Data analysis was an important part of the project. Students used TUVA to visualize and interpret the water quality data, looking for trends and possible relationships between arsenic and other measured elements. Because TUVA was used throughout the semester for other investigations, students became increasingly comfortable working with data and creating graphs. One of the most valuable lessons was that different graphs can tell different stories using the same dataset. Students explored multiple ways to represent the data and discussed why it is important to choose a graph intentionally based on the message being communicated and the audience receiving it.

Students also participated in an intergenerational learning activity by working with a household member to identify and analyze the types of pipes in their homes. This activity extended learning beyond the classroom and encouraged conversations about drinking water infrastructure and water quality. Several students shared that family members became curious about their own water systems and wanted to learn more about potential sources of contamination. It was rewarding to see students bring scientific discussions into their homes and communities.

Science communication was integrated throughout the project and supported students' participation in classroom discussions and Solutionaries advocacy projects. Students used the Science Communication Toolkit, Solutionaries Framework, and Message Box to identify audiences and craft effective messages. They learned that successful advocacy requires more than presenting facts—it requires understanding the audience and communicating in a way that resonates with them. Throughout the project, students practiced discussing data, interpreting results, and supporting claims with evidence. Water quality was one of several topics students could choose for their advocacy work, allowing some to connect their drinking water investigations to broader community issues. By linking local water quality data, scientific investigation, family involvement, and communication, the All About Arsenic project helped students see environmental science as a meaningful and relevant part of their everyday lives.

Details

Did you...

	No	Yes	Where appropriate, how many?
Collaborate with your Scientist Partner? - If so, how?	☐	X	2-3 times. He provided planaria bioassay
Use the Science Communication Toolkit? - If so, how?	☐	X	Used, but not as much as solutionaries
Use the Solutionaries Framework? - If so, how?	☐	X	Use almost all parts
Use any Intergenerational Activities? - If so, how?	☐	X	Students worked with adults to ID pipes and test for lead
Collaborate with any other teachers in your school? - If so, who and what do they teach?	☐	X	Librarian, research website
Conduct any experiments? - If so, what kinds of questions did students ask?	☐	X	Planaria bioassay Lettuce seed bioassay
Go on any field trips? - If so, where and why?	☐	X	Presumpscot River in 2 parts of watershed Chemical water tests Macroinvertebrate
Have any guests visit your classroom? How many? - Who and why? What did the guest do?	☐	X	Karen Buelich-message box
Have a Community Meeting? - If so, where was it, what did the students do, how many people attended, etc...?	☐	X	Large presentation room at WHS
Have other Outreach Events? - If so, where were they, what did the students do, how many people attended, etc...?	☐	X	One group presented @ Earth Day Celebration

Use your classroom award to purchase anything for your classroom? - If so, what, and how did you use it?	☐	☒	\$300
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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.

Lydia and Tatyanna did their project about lead in drinking water- especially through pipes. After completing the iceberg model, completing the message box, they decided their audience was the citizens of Westbrook.

They interviewed 2 people:

1. Lynn Leavitt- the sustainability coordinator for the City of Westbrook
2. Jane Disney

[2026 Celebration of Learning](#) Their slides are 49-56
[Solutionaries Notes Template](#)

[Final product- Canva](#)

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.

Their notes show that they used TUVa to create a graph that was meaningful, and they also interpreted a variety of other graphs and data. They then were tasked with making the message fit the audience, and show them how to find more information if they desired. The final product that got distributed through the community news letter was created in a way that was easy to read, provided enough information to explain the problem, but did not get into the weeds as to avoid losing their viewers.

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?

Being part of this program has taught me about audience, and being intentional about the solution. I have become more and more focused on this. At the beginning, it was more about incorporating real science into the classroom. Now it's that PLUS sharing the information to empower them and educate the community.

How did you use our Tuva drinking water dataset? Did you use the Tuva 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?

I used TUVa to demonstrate that there is a strategy to selecting data
Because Westbrook is public water, there was not as much excitement around the water sample data
I used it for students to find data and construct a graph to support a claim [Using graphs to identify relationships](#)

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

The biggest issue was following the communication toolbox because we were so entrenched with the solutionaries project.

They liked the assignments in TUVa. They struggled to make their own graphs. Given more time and more proactive, they would improve.

I think there is a lot of good information on the site, it is just how to best use it in the time available.

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?

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

The entire process of selecting the audience, tailoring it to the audience, and being intentional about what solution would be the most impactful are all products of being part of this program. At first, I was more excited about bringing the data into the classroom, but this project helped me develop the communication piece which is equally as important.

Science Communication Outreach

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

Every group had to come up with their own way of reaching the community. See the options in the slideshow below.

[Solutionaries Project- master list 2026](#)

[2026 Celebration of Learning](#)

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?

There are a lot of good idea in here, I would just like to align it with the solutionaries project so the student don't have so many places to look.

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 of 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?

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 ☒ No ☐

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

[WHS Intergenerational Learning](#)

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

What worked best? What improvements could be made?

Maybe take a picture of the work

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

I sent it home the week before the water test. I thought this would help gain buy-in and provide perspective for the purpose of the testing.

What feedback did you hear about the activity?

Pros:

It was fun to work together

It made us think about water- something we use every day, but take for granted

Cons:

Sometimes it is difficult to get the parents to be available (give more than 1 day to complete)

Sometimes it's difficult to find the intake if its an apartment

Solutionaries Framework

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

If yes, please describe.

It was a big part the class- the final project

[Solutionaries overview](#)

What worked best? What improvements could be made?

Having students do a topic that they were passionate about
Having a rubric at the beginning.

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.

Did you attend the Institute for Humane Education series on the solutionaries framework in your class?
Yes ☒ No ☐

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

I hope to help teachers get SEPA and the Solutionaries framework incorporated into classes.

Which aspects of this project will you change next year?

I will not be teaching myself, but have a lot of experience to share.

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

TUVA

Message box

Bioassays- completing lab reports

Iceberg model

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

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



More pictures from the field trip in these 2 folders:

[Presumpscot River Westbrook 2025](#)

[Presumpscot River Windham 2025](#)

What were gaps or barriers you experienced this year?

Using the sountionaries framework and the communication toolkit. They overlap, but could be more streamlined.

Time - There is so much good information to use, but it takes time as the ducator to make it fit, and there is limited time in the classroom.

What are the anticipated needs for the 2027-2028 school year?

N/A

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Step 1: Big issue

Step 2: Research topic, and start the notes

Step 3: ID the local issue

Step 4: Message box

Karen was good at guiding students on getting more specific- can't address everything- (framing- the lens)
~There's not always one answer-

Example: Water in watershed is polluted

Ways it is polluted

Sources of pollution

- Thinking about audience might not have been thought about before
- Students use data to become experts, but they can't share everything
- Students are used to doing what the teacher tells them to address. This is a step that they are not used to
- Examples of audience
 - Community of Westbrook- hazardous waste
 - Educated on climate change but not taking action]
 - Elementary students/

It empowers the students to be the "experts" to communicate the issue.

Zooming in gave them a chance to revisit and refine. Continue to think about how to think it through
[Solutionaries Project- master list 2026](#)

Dave Thomas- Brunswick High School PFAS
He's already doing PFAS w/ ski wax