



Date: 04/13/2026

Your Name: Kaleigh Martins

Your School: Pelham High School

Grade Level(s): 10-12

Course(s) Taught: General Biology, Forensic Science

Number of Students Involved (Total): 50

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):

Dr. Maria Florencia Fahnestock, Research Scientist III, 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 in Pelham for 9 years, where I have started my professional teaching career. Before becoming a teacher, I was a student at the University of New Haven, where I earned my Bachelors of Science in Forensic Science, Biology, and my Masters of Science in the Teaching of Secondary Science Education. I have had the pleasure of also earning my Master of Educational Leadership in Curriculum, Instruction and Design from Southern New Hampshire University. I have been able to put all of my degrees to work writing curriculum for the science department in Pelham reworking the Biology curriculum and writing a Forensic Science curriculum. I am currently in the process of writing an Environmental Science curriculum as well. I am passionate about curriculum writing and implementation. I am someone who enjoys diving into standards and working to translate them to classroom activities and lessons that students would enjoy.

Outside of school, I am a competitive baton twirling coach for a team out of Nashua, New Hampshire, where I have the opportunity to take my 17 years of National and International competitive baton twirling experience and pass it to the next generation of twirlers. I am a mom to an energetic 3.5 year old son, a black lab rescue boy from Puerto Rico, and a wife of 8 years. I love to spend time with my family and read, when my busy schedule allows it.

I became passionate about the All About Arsenic+ project Through my work with Dr. Janet Holden, the previous Pelham Teacher on the grant. I grew up with well water, and working in a town that has high levels of toxic metals wants me to continue to pursue this work to help students live healthier lifestyles, by learning the negative effects of the toxic metals on the body. This is my third full year participating in the grant, as Janet Holden has stepped down from her work on the grant in preparation for her retirement from the educational field.

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!

Pelham High Schools participating in the 2025-2026 SEPA grant allowed a new group of students to immerse themselves in the understanding of toxic metals in drinking water. Students in the General Biology classes were able to take the classroom curriculum and apply it to their lives. The historical well water data of the homeowners tested have shown elevated levels of toxic metals. Students had the opportunity to share meaningful dinner table conversations with their families about the impact of the water they use every day. While sharing with their families, students had the opportunity to discuss any previous water testing, ask valuable questions about interventions that were put into place, and discuss retesting with their families. Additionally, it provided students with the curiosity to test the student lab sinks used in laboratory activities in the school. We were able to collect 30 water samples for analysis. Students used the data analyzed by scientists to share their findings and explore new interventions with their families. Students also were given the opportunity to explore classroom study samples and pose new questions for the next group of students.

Students used the Science Communication Toolkit to learn how to best translate their findings into a language that the average person could understand. Students were able to analyse historic data through the use of the teacher laptop and TUVA, to explore pockets of town that have a more serious toxic metal problem than others. Additionally, they inquired about why the school, as part of the classroom study, had such varying data in regards to the levels of some of the toxic metals. They posed questions for the next class of students coming up to investigate. Students were able to use Google Sheets to explore the data from previous years and compare it to recent data to draw conclusions of “pockets” of elevated toxic metals around the town. Students were able to help their parents understand why testing their water was important, as well as maintaining any intervention systems they had put into place if water had been previously tested.

Although students were unable to access the TUVA software on their own devices, they were able to explore data through Google Sheets. Through use of the Science Communication Toolkit, students were able to learn the importance of communicating with others in a way that does not speak above the knowledge of the general public. By practicing with their peers, students were then able to work on their communication skills in the field of science in a way that drew the attention of the public. Students were able to have those open and valuable conversations with their parents and determine if testing, or retesting, was the best course of action for their family. This left students with a lot of knowledge about the hazards of toxic metals in water and the best ways to communicate those findings with the public in a way that is most appropriate to the audience in which they are trying to reach.

Details

Did you...

	No	Yes	Where appropriate, how many?
Collaborate with your Scientist Partner? - If so, how?	☐	☒	Mostly via email, approximately 5 times and in person at Dartmouth College as part of our training for SEPA 2025-2026
Use the Science Communication Toolkit? - If so, how?	☐	☒	I find this a great reference when communicating with students and parents about the importance of testing their water.
Use the Solutionaries Framework? - If so, how?	☒	☐	_____
Use any Intergenerational Activities? - If so, how?	☐	☒	The well water sample collection was paired with a homework assignment for students to understand the cycles of matter that impact ecosystems and how they interact and can cause settling of hazardous metals.
Collaborate with any other teachers in your school? - If so, who and what do they teach?	☐	☒	Worked in collaboration with Janet Holden, previous SEPA teacher, and Michelle Fox, Chemistry teacher on classroom studies.
Conduct any experiments? - If so, what kinds of questions did students ask?	☐	☒	The science department is preparing a series of experiments for the next school year based on the results of the classroom studies from this year. Students were curious about the impact of using classroom tap water in their bioassays, so the taps in the labs were tested. The results led to more questions regarding the safety of the water and inconsistency of the data from a public source.
Go on any field trips? - If so, where and why?	☒	☐	_____
Have any guests visit your classroom? How many? - 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 classroom award to purchase anything for your classroom? - If so, what, and how did you use it?	☐	☒	\$381.92 The creation of two demonstration tanks, one for bioassays to include brine shrimp and algae, and one for aquaponics. Both tanks tie directly into the curriculum of the Biology courses offered at PHS.

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.

The General Biology students were engaged in their learning around the All About Arsenic+ program through their participation in the creation of bioassay experiments. Students helped create, design and set up the two bioassay lab experiments that are running in the classroom. Students researched the environmental requirements for the tanks and ensured that the environments were suitable for their species. Students learned hard lessons about the importance of creating the proper environment, as the aquaponic experiment failed. Students returned to the drawing board to work through the issues that arose and are currently working on the second set up of the experiment.

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 in the General Biology classes tend to be least interested in the “science” and “data” of the class. They see the class as a graduation requirement, that they need to pass to move on. By introducing real, impactful data, students were able to gather and learn about the hazards of their drinking water. Some students, and parents, shared that they “won’t give their pet water from the sink”, but they are not afraid to use it themselves. Having the opportunity to provide students with real world data, and showing students the real world impact of that data, has helped the General Biology student care a bit more about what their water says. Although we had fewer students turn in water samples, this group of sophomore students have been tested before, during an outreach program at the elementary school, something the students believed would continue to have a stronger impact on the parents of the community. Students this semester are working on language to help elementary students and parents understand the importance of knowing what is in their water, having their water tested, and what mediations are available to help prevent long term effects of consuming water with toxic metals in it.

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?

Although my work in the past on this grant has been focused with students who are highly invested in science and often are pursuing a collegiate degree in a science field, I find that working with the General Biology student to understand the importance of understanding, interpreting and relating scientific data and findings is critical for the public. While it is beneficial for students who want to continue to study science, I have found it incredibly important for all students to understand the importance of data and communicating data with their families and peers. Helping students understand data and relate their findings to the appropriate party has been a goal I have continued to work towards and am constantly finding new ways to integrate this into my teaching.

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?

Students have had the opportunity to look at TUVA using the teacher laptop on the projector. We are starting to find more accessibility to TUVA through student chromebooks. This year was a slow introduction to the program that will continue to increase as the years progress.

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

Due to bandwidthing issues within our school, and the age of the student chromebooks, we were not able to have students work on TUVA on the website on their personal devices. We were able to work on the teacher laptop to manipulate data. We also had students look through the data collected from previous years to identify trends, patterns or anomalies they may have found.

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?

Students accessed the data using Google Sheets to identify trends, patterns or anomalies in the data. Students worked together to color code a copy of the data from previous years to help them identify the trends on their particular toxic metal they were studying for their communication to their peers. When we have several students, or more than one class trying to get into Tuva at the same time, we find that the system portrays as if it is overloaded and becomes slow, glitchy and nonfunctional.

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

Students accessed the data using Google Sheets to identify trends, patterns or anomalies in the data. Students worked together to color code a copy of the data from previous years to help them identify the trends on their particular toxic metal they were studying for their communication to their peers. Tuva has been proving difficult for our students over the last few years. We have gone through troubleshooting with Tuva and our school IT Department, but have not been able to come up with a solution to allow more than two (2) students in the classroom to log into the system at once. When we have several students, or more than one class trying to get into Tuva at the same time, we find that the system portrays as if it is overloaded and becomes slow, glitchy and nonfunctional.

Science Communication Outreach

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

Students created talking points for “dinner table” discussions with their parents about the importance of water testing and heavy metals in their drinking water. To start, we did not formalize any of their talking points, as I wanted these conversations to feel organic and natural. In the future, we will formalize the talking points for students and their parents to have open and honest dialogue about data, drinking water, and toxic metals.

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

Students were able to understand the importance of using language that the people of town would understand, as if they had minimal exposure to scientific readings. Some improvements students felt could be made were to make the science communication toolkit a bit more user friendly. Although, once they got familiar with working with the toolkit, they said it was fairly easy to use.

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?

Students at all levels benefited from understanding the importance of communicating scientific knowledge to others around them. While students are relatively good at communicating their findings to others, they tend to struggle with communicating to a non-science community. The Communication Toolkit helped students understand why communicating in a way that all can understand is important. Students shared the benefit of having real world, impactful conversations with their families and how they were able to decide, as a family unit, if testing was the best move forward. Additionally, students shared that, for those that had already placed interventions in place at their homes, they were able to work, as a family, to see if those interventions were working, needed updating, or if filters needed changing. This allowed students to feel as if they were contributing to the solution for their families.

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?

Students drafted and participated in a “dinner table discussion” with their families about the importance of understanding toxic metals in their drinking water. This opened the discussion for students to know if their water had been tested before, and if they wanted to retest. Additionally, it opened a classroom discussion about the water that is coming from the sinks in the classroom and whether or not it was safe to use in lab experiments. This allowed students the opportunity to work with the classroom studies to test the sinks in 3 of the science labs at the school. Students have just gotten their hands on the data from these classroom studies and are posing excellent questions about the inconsistencies of the results, even though all sinks are pulling from the same public water source.

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?

By having these open and honest conversations, students were able to connect with their parents on a matter of science that is directly impacting them. This has helped intergenerational learning by allowing students to have open conversations about what they are learning in school and how it will continue to impact their daily lives.

Did the intergenerational activity go home at the same time as the drinking water samples? Yes ☐

No ☒ **Please explain.**

Since a large number of students have had their water tested before, this intergenerational activity went home before water samples were collected. I wanted students to have the opportunity to have these conversations with parents before sending home sample kits. Students whose parents were still interested in having their water retested, either with or without intervention from previous results, were given the opportunity to based on the outcome of their conversations with their student.

What feedback did you hear about the activity?

Students were glad to have had the opportunity to converse with their parents about the importance of testing their water, and whether or not they have had their water tested before. While the majority of the students have had their water tested, several parents and families took interventions to help rid their water of the toxic metals. Few wanted the opportunity to retest and see if their interventions were helping, while others did independent research about the importance of changing filters to help continue to mitigate the issue.

Solutionaries Framework

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

If yes, please describe.

What worked best? What improvements could be made?

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

We have the opportunity in Pelham to study the environment by going outside onto an environmentally protected land. The work students do within this unit is very self guided, based on the interests of the class and the students. While we explored the Beaver Brook protected area, searching for evidence of beavers and discussing the importance of the cycles of matter, we did not focus this year on the Solutionaries Framework. For the most part, this portion of the course is exploratory, for students to learn about the natural world in which they live, and the human impact on it. We do not get the opportunity, due to time constraints, to get into how human interventions can be put into place to continue to protect the environment.

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 truly believe that all students have the ability to read, interpret and communicate their findings in relation to data collection. I have used the skills shared in the Communication Toolkit with all of my classes when we perform labs to help them best understand how they should be sharing their findings within their reports. Students, especially those in lower level classes, often assume that the person reading their work will always know what the data is trying to explain. By using some of the tools in the Toolkit, I have been able to help students see that they need to express themselves through a lens that the reader may not always have a baseline understanding of science. I will continue to help students with their science communication in a way that helps them best understand that they need to explain their findings in a way that a non-science reader can understand.

Which aspects of this project will you change next year?

With AP Environmental scheduled to run next year, which will lean more into this project. I will continue to develop the General Biology work with the All About Arsenic+ project to help more students feel involved with a project that has real world impacts on their daily lives.

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

Aquaponics Lab
Aquaponics Videos
Hydroponics Lab
Brine Shrimp Algae Lab (Algae research supply)

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

[Aquaponics Lab](#)

[Aquaponics Videos](#)

[Hydroponics Lab](#)

[Brine Shrimp Algae Lab](#)

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

What were the gaps or barriers you experienced this year?

Although getting better, TUVA proved to be our biggest difficulty/challenge this year. Our school Chromebooks do not like to run TUVA in the classroom when there are more than couple people trying to access the data set. We have worked with the TUVA representatives and have not been able to figure out a solution to the issues we are facing.

What are the anticipated needs for the 2026-2027 school year?

In preparation for 2026-2027, we will be working with the same supplies and resources that we have been for the last few years, while continuing to work on and troubleshoot the bioassays to set them up for long term success. We will also be working as a department to complete classroom case studies on the water data from each classroom to try to identify where the discrepancy is coming from in the levels of metals from the same public water drinking source.

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