2024-2025 SEPA Case Study

Date: 03/25/2025

Your Name: Hogan Marquis

Your School: Easton Junior Senior High School

Grade Level(s): 7 - 10

Course(s) Taught:
7th Grade Science - 12 students.
8th Grade Science - 16 students.
Technical Preparatory (Tech Prep) Biology - 6 students.
College Preparatory Biology - 16 students.
Seasonal Outdoor Science / Envirothon - 6 students (all enrolled in biology).
Video Production - All 7th and 8th grade students.

Number of Students Involved (Total): 50 students

Name of your scientist partner and their institution, and any other partners:
Dr. Judith Roe, University of Maine Presque Isle (UMPI)

Teacher Profile:
I'm a teacher working in Aroostook County Maine. I like to get outside, work on real projects with students, and connect what we're learning to the real world. I was trained to teach science, but I've taught a variety of different subjects in my career. I've taught STEM and computer science to elementary schoolers, ancient civilizations to middle schoolers, general science 7-12.

I got involved with MDIBL and SEPA from a connection with a colleague at my school. The art teacher suggested I message Judy (Dr. Judith Roe) about a project. That connection led me to attending DataCom 2024 at MDIBL, and incorporating SEPA, scientific communication, and the All About Arsenic program into my courses at Easton Junior Senior High School.

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…).

I teach general science to 7th and 8th graders. The 7th grade curriculum mirrors the curriculum of the 10th grade biology students I teach. The 8th graders had minimal involvement in SEPA other than sampling water at their homes, communicating the project to their parents, and returning their samples.

Our scientist partner has been part of the arc of the year for my students. She visited in the Fall and taught alongside me for a full day. She gave presentations about drinking water, DNA and environmental DNA, and the All About Arsenic/ SEPA project.

Later in the Fall, partners from the University of Maine helped my students sample stream water from the Prestile Stream. The sample was collected and filtered by students, sent to UMaine for PCR, shipped to the University of Rhode Island for sequencing, and sent back to UMaine to find matches. We were presented with a list of species present in the 500mL sample (12 species identified) in March.

In March, Dr. Roe welcomed my biology students to visit UMPI to do a bioassay with annelid worms. The students spent a couple of hours in the lab examining blackworms (*Lumbriculus variegatus*). Specifically, Dr. Roe had the students learn about the worms' escape behaviors in response to a stimulus. The students compared the strength of responses from control worms (spring water) and experimental worms (copper sulfide solution). She gave a presentation of the work she has done with PFAS/PFOS sampling, mapping, and tracking in some Aroostook County communities.

Three students sampled water from a local restaurant to investigate the water and ice from the soda fountain. Dr. Roe proposed the idea with the students during our visit to UMPI. The samples were analyzed to determine that there were no exceedances.

The results of our water tests were quite good. 44 samples were analyzed, and only two exceedances were present in the water samples. Amy Steckel related this news to us by saying "...of the 44 samples, only two had exceedances - in Manganese."

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? I wouldn't say we collaborated, but we tested samples for several teachers. Students communicated the project to these teachers and brought them on board.	√	○	_____
Conduct any experiments? - If so, what kinds of questions did students ask? We did a bioassay with Dr. Judy Rue.	○	√	_____
Go on any field trips? - If so, where and why? Lots of field trips. Not all are related to SEPA. -UMPI / SEPA worm bioassay (Biology) -Aroostook State Park → hiking and ecology (Biology) -Prestile Stream → eDNA with UMaine researchers (Biology) -WAGM (local news station) → Learning about video production skills (7th and 8th grade Video Production) -Mi'kmaq Farms & Fish Hatchery → (7th and 8th grade) -UMPI Envirothon Training → Soils, forestry, aquatics, and wildlife (Outdoor Science/Envirothon) -Visiting a JD Irving Woodlot → Forestry (Outdoor Science/Envirothon and 8th Grade and 9th Grade) -Lots of nature walks and work outside (all classes)	○	√	_____
Have any guests visit your classroom? - If so, who and why? What did the guest do? Dr. Judy Roe → Taught about SEPA, water, and eDNA.	○	√	_____
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? We purchased videography equipment.	○	√	$400

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?

The group that most exemplified the All About Arsenic+ project were my biology students. I've thoroughly enjoyed teaching my 10th graders. I believe that our work with SEPA has opened us up to a few different opportunities. The students enjoyed the science toolkit activities about scientific communication. I believe that they enjoyed Dr. Roe's visit to our school, and then bringing the experience full circle by visiting Dr. Roe's lab at UMPI.

Several students designed an intergenerational activity, which was essentially a set of interview questions to ask families. The students were proud to design something that was sent home with every test kit, and I think they felt empowered.

From the beginning of the year I incorporated videography in all of my classes. Students enjoyed filming footage of class activities, experiments, and field trips. For example, when visiting UMPI, I asked my students to document our trip. Students collected footage of the lab, Dr. Roe's presentation, their lab work with worms and microscopes, and more.

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?

I think the biggest things students gained were:

- Experience communicating scientific ideas
- Experience working in a university lab
- Experience collaborating with our scientific partner
- Confidence in communicating with a variety of audiences
- Opportunity to do something real/relevant

Opportunities for growth:

- Working more with TUVA
- Making the data make sense, and communicating the results better to participants

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?

I didn't use Tuva, and have felt a bit of guilt for not spending enough time. We've used Google Sheets to collect data, graph, and visualize data from experiments throughout the year.

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

Anecdata was simple enough to use. A batch import-style feature could save a great deal of time during data entry, especially when many of the fields are the same data. That being said, data entry is a good experience for students to have. If everything was totally optimized and automated it might take away from students' understanding of the management of data.

If you did not use Tuva this year, how did you analyze drinking water data?

We looked at the raw data in spreadsheet form. There were no “exceedances”, so folks didn’t have the best frame of reference when looking at their data. It would be nice to have resources to show a story of a person that had high numbers in a given category. Come to think of it, I think that would make for a good lesson. Students could role play and act out a person receiving a high result, and trace their path to fix their problem.

How did you enhance *your own* Data Visualization and Science Communication skills?

I’ll start with a story. This project has opened my eyes to more than just drinking water. It has led to a great deal of conversations with staff, students, and families in Easton.

In one interaction with a colleague, they told me about an experience mitigating radon in their home. “Radon?” I thought to myself. This wasn’t even on my radar. I went home, picked up a test kit at Lowes, and tested my home. In a few weeks I got the result. It wasn’t awful, but it rocked my world. The way the results were communicated was scary. The exposure related in terms of equivalents to “number of cigarettes” was terrifying.

I called Maine’s radon hotline and talked to someone about my test results. They could tell I was spiraling, and tried to put things into perspective.

Looking back, I think this was a good experience to have. When you have the knowledge and experience, and you’re trying to communicate something sensitive, you have the obligation to communicate in a manner that is accessible and empathetic.

Science Communication Outreach

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

We didn't make outreach products (yet). We aspire to build a set of videos that show students sampling water, and what to do when you find out your results. These are a work in progress.

Did your students work with the Science Communication Workbook this year? Yes √ No ☐

If yes, please describe how it went. What worked best? What improvements could be made?

We watched the videos on "levels of communication".
We completed some role playing activities where students communicated ideas they were learning about in biology class to their classmates. The students took turns being the communicators and the receivers.
I think that this prepared several of my students to teach young children later in the year.
One of my classes, Seasonal Outdoor Science and Envirothon, has taken communication to the next level. We've called a few experts a week for the whole school year. We're constantly cold-calling people to help us with our projects.

For example, we've contacted Maine's Department of Inland Fisheries and Wildlife several times this school year. We're talked to game wardens about visiting our class, we've talked to bear biologists, fish biologists, and many patient receptionists/operators. We practice our calls each time before we call. We talk about our goals, the message we want to convey, we talk about strategy ("How much do they need to know in order to forward our call to the right person?"), and we practice often. I think that this frequent practice has helped my students become spokespeople for our class, our projects, and our school in general.

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.

It was a simple set of questions to ask families. The questions were designed to be a structure for a discussion/interview with families. Each student was assigned this task, even the ones that opted out of sampling.

What worked best? What improvements could be made?

I think that each set of students should tailor the questions to their own families. This will help the project feel authentic to our audience.

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

What feedback did you hear about the activity?
We didn't get much feedback on the activity.

Solutionaries Framework

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

If yes, please describe.

What worked best? What improvements could be made?

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 will:

- Collaborate with my scientific partner, and try to do it even more.
- use the communication tool kit and lessons.
- continue to work on videography and digital storytelling with my students.

Which aspects of this project will you change next year?

In hindsight, I believe that a few changes could have been made to make the project more impactful. **Sampling earlier could have made a difference.** Our school starts earlier than others because we have a harvest break in the Fall. We didn't sample until after harvest, and that was a mistake. By that point, it felt like we lost the enthusiasm of when we first talked about the project. On my list for the future: less talking about the project and more doing the work.

Roleplaying how to respond when results come back, and planning what to do and say could have helped. Our results were so good, that we could have lacked urgency to act. Had there been more concerning results in our samples, I believe that we would have been forced to spring into action and advocacy. The response to a problem could have been a cause to rally behind.

More outreach could have given the students a better experience. The students never got to wrap the project up and bring it full circle. There is still an opportunity to do this in the Spring, and I hope to give my students the opportunity to communicate our results, and share our recommendations.

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

Dewey Raposo suggested a series of videos that helped my students learn the basics of video production.
Level Up: An SRL Tutorial Series - YouTube

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

SEPA Videos

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

What are the anticipated needs for the 2025-2026 school year?
I'll have more students that need something meaningful to do. I'd love to give it another try, with all of the lessons learned. I'll have a couple new classes of students that we can start fresh with, and some returners that we can go deeper with as well.

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