



Date: May 2026

Your Name: Daniel King

Your School: Bedford High School

Grade Level(s): 10 and 12th

Course(s) Taught: PSP Biology and IB Environmental Systems and Societies

Number of Students Involved (Total): 120

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):

Priyanka Roy Chowdhury Keene State College.
IB Diploma Candidates.
School Newspaper.

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've been teaching for over 15 years. My passion in the classroom is helping students enjoy the ordinary. Outside of the classroom I have a legacy farm that I am the current caretaker of. In my town I am a member of our Conservation commission. The AAA+ project overlaps with many of my interests. I continuously look for opportunities to have authentic place based science connections and the citizen science component of this SEPA project fits perfectly. This is my first year with the SEPA project and I was recruited via Amy Hudnor.

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!

At Bedford High School we have a project day called "Group 4" which includes nearly every upperclassman in a science class. On this day the students are tasked with designing a "breakout room" themed around a real world problem that helps facilitate a solution to the identified problem. The students were given a range of options largely based on the data in TUVA. Some groups worked with the Arsenic data to present it as a clue (the student group determined what this looked like) that other students would have to "solve" to get their next clue.

Unfortunately, this year's data wasn't used due to the timing of the "Group 4" event but I was able to use the available data from TUVA.

Students engaged in another project that was complete after their data was available. The assignment was called "All about Arsenic+ - Data to action" and they were prompted to make an infographic utilizing the historical data from TUVA. 2 examples of student work are uploaded in the google drive folder.

The work in the science class spilled into the Environmental Club at the high school as well. From their the science writer for the school newspaper got involved and wrote an article about the project. This attention to water and water quality also prompted several students to let me know that they also listened to the NHPR show "Safe to Drink" and talk at home with their parents about water quality.

Another story from the work was about one student who had unusually high levels of copper in his water. He was able to let his family know and they sought out additional testing to determine if further action was required.

The Science Communication Toolkit resources were used with the Arsenic project but only got to step 5 with a touch of 6 and 7. Going through all steps is the goal for next year but may take longer due to some scheduling changes that are coming.

As for intergenerational learning there was quite a bit of excitement from parents that I got to speak to about the project. Many are interested in water quality and there were several inquires about how we could get more information about PFAS and PFAS remediation.

Details

Did you...

	No	Yes	Where appropriate, how many?
Collaborate with your Scientist Partner? - If so, how? Priya and I made contact via email but were not able to connect in person. We both have a better idea of what each others schedules are and hope to connect in the future!	☐	yes	_____
Use the Science Communication Toolkit? - If so, how?	no	☐	_____
Use the Solutionaries Framework? - If so, how?	☐	yes	_____
Use any Intergenerational Activities? - If so, how?	no	☐	_____
Collaborate with any other teachers in your school? - If so, who and what do they teach?	☐	yes	_____
Conduct any experiments? - If so, what kinds of questions did students ask?	no	☐	_____
Go on any field trips? - If so, where and why?	no	☐	_____
Have any guests visit your classroom? How many? - Who and why? What did the guest do?	no	☐	_____
Have a Community Meeting? - If so, where was it, what did the students do, how many people attended, etc...?	no	☐	_____
Have other Outreach Events? - If so, where were they, what did the students do, how many people attended, etc...?	no	☐	_____

Use your classroom award to purchase anything for your classroom? - If so, what, and how did you use it? Packing materials for water sampling and waders to expand some field work that meet other water unit objectives (ie biotic index).	○	yes	\$_____
---	---	-----	---------

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 is feedback from one of our students in reflecting on the “Group 4 day”

An absolute blast, one of the most informative experiences I truly have ever had the joy of having. I learned so many amazing facts from so many amazing minds, it was truly a joy to work with young scholars in a variety of the scientific fields- I really stretched my brain! Not only did our minds come together to make an excellent scientific product but our minds came together in feelings of joy and pure bliss. Truly a transcendent experience that I will recommend to all of the future young scholars.

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 learned a lot about the significance of the size of a data set. They are still confused about when there is “too little data” and can sometimes be disillusioned that we can’t know anything. In terms of science communication they want to over share and can sometimes muddy the message with too much data or irrelevant data. A common mistake would be to include every trial of a particular experiment instead of just an average.

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?

na

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?

The assignment “All about Arsenic+ - Data to action” students were prompted to make an infographic utilizing the historical data from TUVA.

Students also explored the other data sets during the group 4 day. Example: Group A was assigned a certain environmental topic (ex Recycling in the 50 states) and had to explore the data in a way to tell a story about what’s going on.

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

This process was difficult for students and will require more scaffolding in the future. For example, students sometimes would manipulate the graph until they had a perfect linear relationship between two variables. Unfortunately, for the student it turned out that the relationship was between the same thing (ex As recycling rates go up, recycling rates go up).

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?

-n/a

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

I was able to use more examples from unique data sets to quickly illustrate points. For example, connecting two variables that may not make sense to connect. I would have students explain why it doesn't work as a visualization and what they would need to do (or what data they'd need) to make it better.

Science Communication Outreach

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

"All about Arsenic+ - Data to action" project. Artifacts in google drive.

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?

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?

My use of the toolkit this year was limited as I was more focused on executing the logistics of permission slips and water samples and understanding the different platforms/websites. This is likely the area I could develop the most and could extend into other work that we do at our school. Incidentally I used some of the Science Communication Toolkit but I didn't set out to incorporate it along the way. Ways I see using it in the future could be with our sophomore biology students. Every year they do a biotic index for a local stream. They could extend this work with adding suggestions to local landowners about ways in which they could help maintain and improve the quality of the stream. Recently the town passed a wetland setback ordinance on new lawns. Students could make an outreach campaign to encourage landowners who have "grandfathered lawns" to convert back to a natural buffer.

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?

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

We were able to use the winter conference time with parents to discuss the program. There were many parents that were excited about the prospect of having a free water test as well as learning about easy ways to remediate water issues.

What worked best? What improvements could be made?

Easy access to the website for their results was a positive thing. No improvements come to mind.

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?

Parents loved to have something to talk to their kids about. I have a lot of seniors and they rarely share with their parents what they're doing in school. This was the one time (some of them said) that they got to talk to their students about what was going on in school.

Solutionaries Framework

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

If yes, please describe.

I used the framework with my Biology students but not in the Arsenic context. Students were introduced to the HIPPO factors in which they learn the different categories of human impact (Habitat Loss, Invasive species, Pollution, Population growth, Overpopulation) on species. We use the Hawaiian Monk Seal as a case study and students use a version of the Solutionary Framework to help address the issues.

What worked best? What improvements could be made?

Ofentimes students leave feeling hopeless about environmental issues. This gave them a perspective that change is possible.

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.

The work with the Hawaiian Monk Seals is connected with a project from PBS called Wild Hope. The site curates a lot of case studies that allow for the exploration of problems AND solutions. The work helps guide them through the details of addressing issues including things like key partners to help implement the solutions.

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 like the infographic work and would like to repeat that. I would like to practice the creation of infographics and perhaps add in a presentation of the infographic to increase accountability.

Which aspects of this project will you change next year?

There may be more things I need to change since my teaching schedule will change. I will be on a team of 3 teachers and will be in touch with them about things we can incorporate into the existing IB Biology curriculum.

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

TUVA. This was used a few times but one not listed yet was during the students "Internal Assessment". This project requires the student to research a focused environmental issue, design and conduct an experiment or fieldwork. They can either utilize existing data to answer their question or conduct their own experiment, generating their own data. I was able to get students to use TUVA datasets as an option to both explore environmental issues and ultimately decide where to focus. This opened up opportunities to have conversations about the data sets themselves, ex; How were they created?, Do we trust the numbers?, What different stories do the numbers tell?

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

Attached in shared google folders

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

What were gaps or barriers you experienced this year?

The gap between getting arsenic data and being ready to discuss the data in the curriculum. Now that I've done it once I have a better idea of how to manage this!

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

I have two additional teachers ready to participate in the program. I will be adding this material into a new curriculum so there will be some compromises as to how much of the SEPA program I can get them to do!

Acknowledgments: The work reported in this publication was supported by the National Institute of Nursing Research of the National Institutes of Health under Award Number **1R25NR021077**. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. [Acknowledge any other sources of support/funding/people or organizations involved and explain their role]