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Ross Sea Connection*

The science of this project:

Summer blooms of phytoplankton are critical to the Ross Sea ecosystem in Antarctica. They're the base of the food web. But trace metals like iron restrict the growth of these blooms. We used our cruise to the Ross Sea to test whether the upwelling of warmer water from the mid-depths of the Southern Ocean delivers enough iron to fuel these phytoplankton blooms. I was in charge of the underwater robots – also known as gliders – that determined the location of this water before we even sent the research vessel out to collect our data.

The Broader Impacts component of this project:

We targeted grade 6 to 9 science teachers, and we used different tools to bring our science and our excitement for doing that science into their classrooms. During our time in the Ross Sea, we had a science writer and photographer onboard who documented the cruise in a daily blog on the COSEE NOW site. The blog became a forum for the students to interact with the scientists. We also set up 8 live calls between the scientists in Antarctica and the students in their classrooms. The students told us they were really impacted by what we were doing out there.

AUDIENCE:

Which audience have you targeted with the BI activities in this project?

Our target audience was 1000+ students in grades 6 to 9, and their 25 teachers. We thought these were the grade levels where we could have the biggest impact based on evaluation of prior BI activities focused on Antarctic ecosystems.

What are the benefits of working with this audience?

There was an already established earth science curriculum into which we could integrate easily. We worked very hard to make sure the teachers felt like they were part of the team, and it paid off. They were eager to participate because it gave them real-time content that they could use in their classrooms.

And the challenges?

Initially the big challenge was the technology. We were relying on webinars and live calls between the ship-based scientists and the classrooms. Some schools had technology that was readily available, and others did not. Some teachers were more familiar with those technologies, and others were not. So we spent a lot of time leading up to the cruise working with the teachers to make sure they were all comfortable with the technical aspects of our partnership.

And then another challenge – which, thankfully COSEE NOW helped us tackle – was determining how to get our science through the front door of classrooms that were limited by time and pre-set science standards.

How do you deconstruct your science to reach non-expert audiences?

I'm still learning how to do that. I try to talk about my science using analogies or something else that my audience is familiar with. And I'm lucky to work with technologies – like ocean robots – that naturally generate public interest. So I link the technologies back to my science and the big questions I'm trying to answer about the ocean.

What impressed you about your audience from doing your BI project?

The caliber and thoughtfulness of the questions submitted by the students impressed everyone onboard the ship. The scientists even said that some of the questions could be the start to a PhD thesis!

PARTNERSHIPS:

Who were the members of your support team?

The team was facilitated through partnerships established by COSEE NOW and Janice McDonnell at Rutgers University. She helped construct a team that included Chris Parsons as our evaluator and the Liberty Science Center to facilitate the teacher professional development and the live calls. We also had two live-aboard documentarians – science writer Hugh Powell and multimedia producer Chris Linder.

How did you go about designing this project and setting up your partnerships?

I benefited from COSEE NOW who facilitated the BI component of this project. Based on their previous experience, they helped design the approach and establish the partnerships needed for our proposal.

How do you balance your research with your BI activities?

BI activities are always a major part of my science. There are a variety of audiences that I can target depending on the science I'm trying to do. For each project, I incorporate a BI

component. Some projects are predominantly focused around the science with a small amount of BI. Others are almost entirely BI-based.

EVALUATION:

Can you describe the metrics and tools you used to evaluate the project and provide evidence that it was effective?

Chris Parsons did our evaluation. She has a lot of experience evaluating programs like ours. We predominantly used surveys before, during, and after each component of the BI project.

BUDGET:

In your budget planning process, how much did you allocate for your BI activities and why?

We all recognized that a program like this one wouldn't be free, but we were able to reduce the costs somewhat by leveraging the budget with COSEE NOW. The Ross Sea Connection cost about 10% of the total budget – so around \$200K. It would have been more had COSEE NOW not been there.

FINAL THOUGHTS:

Has participation in BI projects influenced your ability to more effectively communicate?

Yes, by far. It's given me a different lens to look through when I'm building my presentations. I'm aware now that my goal should be to get my message heard by my audience. It's helped me write better proposals. For instance, the reviewers of the Ross Sea Connection proposal recognized the strength of the BI piece, and I believe that had some influence on our proposal getting funded. I learn more each time I do a BI program.

What are some overall lessons that you've learned from your BI activities?

The first lesson I've learned is that because I don't know how to build a strong BI piece on my own, I have to rely on partnerships with people who do. It's the same with the science plan. I invite people with expertise other than my own to be a part of my team.

The second lesson is that these programs cost money. You have to make a budget that covers those costs fairly, just as you do with the science.

Do you have a story about your BI activities that really touched you or meant something to you?

There's many. During the cruise, many of the scientists wanted to get more and more involved in the BI piece. We even had some complaining that their families were tracking them on our boat and they didn't think they were onboard because there weren't any pictures or mention of them on the blog. We were out at sea for 4 or 5 weeks away from home, and the BI project became a way for us to share with our families what we were doing.

After the cruise, we had a follow-up workshop with the teachers at Liberty Science Center. One teacher brought in a 4-page narrative that this one student wrote about the impact our program had on her. She explained how disappointed she is that she won't get to do something like this next year. 4 pages. That was really something. We all had goose bumps as she was reading it to us. It's just one student but it's remarkable to hear firsthand what impact our program had on her.

I have one more story. Once the cruise finished, we stopped updating the blog. As we were flying from McMurdo Station on Antarctica through Christchurch in New Zealand, there was a major earthquake in Christchurch that made international news. Many of the students and teachers wrote emails to ask if "their scientists" were okay. So here's a group of 1000+ students and 25 teachers that were really concerned for us and whether we got home or not. It shows the connection that we made with our audience. They felt they were part of our team. And they were.

ABOUT ME:**What is your research interest?**

I'm a physical oceanographer, and I'm interested in how physical characteristics influence coastal environments and ecosystems.