Board 128: Work in Progress: Toward a Common Sci Comm Strategy

Mr. Mark Blaine, University of Oregon

Mark Blaine is a professor of practice who works at the intersection of storytelling and science, producing stories, developing experiential courses, and training scientists with audience analysis, strategic communication, and storytelling tools. He also works with media researchers to translate their work to best practices in science communication for journalists and strategic communications teams. At the Knight Campus, he has designed a novel, holistic approach to training scientists that seeks to strengthen the connection between scientific collaborators, innovators and entrepreneurs, and the public they serve.

Dr. Nathan Jacobs, University of Oregon

Nathan is the Director of Research Training and Career Acceleration for the Knight Campus for Accelerating Scientific Impact at the University of Oregon, where he helped launch UO's first ever engineering program. Nathan received his PhD in Mechanical Engineering and Applied Mechanics from the University of Pennsylvania and a BS in Biomedical Engineering at the University of Utah.

WIP Toward a Common Science Communication Strategy

The success of scientists and engineers, and their societal impact, hinges on their ability to communicate the value of their work, and this **Work in Progress paper** seeks to address that challenge. Much valuable literature in science communication has described ways of helping scientists expand their thinking about how and why to communicate, including setting goals and understanding audiences[1]. However, practical approaches needed to accomplish these aims have been limited. Therefore, we have explored a ground-up approach that not only motivates but gives a framework for scientists and engineers to share the impact of their science and engage with society.

A common approach to communication training for scientists has been lacking, leading to inconsistency across the field and a gap in knowledge around research-based best practices [2]. Although some science organizations have defined learning objectives for communication aimed at expanding beyond just delivering knowledge into more engaged approaches, they remain high level and challenging to apply broadly within traditional paths of delivering training[3]. In addition, science and engineering departments often lack expertise in best practices in science communication [4]. Therefore, any science communication training provided is often informal guidance from individual PIs offered in response to specific needs of their trainees, e.g., publishing, conference talks, and posters. Unfortunately, many PIs themselves have no formal training in evidence-based best practices and must rely solely on personal experience that may or may not be informed by effective strategies. And in this ad-hoc model, when scientists-in-training seek help to be better communicators, in our experience it's often too late in the development of their communication task to integrate best practices into the novel design of the specific piece of communication. At best, specific flaws may be triaged. Rarely is science communication integrated into a curriculum that addresses specific needs of science trainees in real time. And, to our knowledge, science communication training has not been delivered universally through all levels of an institution – faculty to postdocs to graduate and undergraduate students – therefore, there is no common approach within an organization. As a result, systemic and strategic problems in the implementation of science communication remain unaddressed in this model.

To address these traditional, systemic issues, our program started with workshops and coaching for faculty in science communication. This groundwork – early coaching and training a common set of practices for the whole research community with the PI as hub – allows us to explore more advanced communication objectives, particularly in goal setting and navigating career milestones through the lens of communication objectives [5]. Using this approach, we address a variety of systemic problems in science communication training and work to build intrinsic motivation within faculty and students to be better communicators. This paper will articulate those high-level approaches with one of the rhetorical tools that we use and describe an activity to bring these skills together in real time.

Approach

The Phil and Penny Knight Campus for Accelerating Scientific Impact at the University of Oregon was established to drive impact of science and engineering [6]. In support of this mission, a strong emphasis on innovation and communication complements technical training in

science and engineering. This emphasis is based on a simple premise: It's hard to have impact without people knowing about it. Therefore, one of our goals is to help our research community communicate meaningfully within the research field while also connecting with our stakeholders and broader audiences. We operate on three principles:

1. An ***impact cycle*** that motivates the work: Science and engineering discovery leads to translation and innovation, which then feeds back to new discoveries – this must be communicated well through all phases to ensure impact.
2. Everyone is a communicator. This includes students, PIs, and staff.
3. Evidence-based information and cultivated feedback fuel valuable iteration.

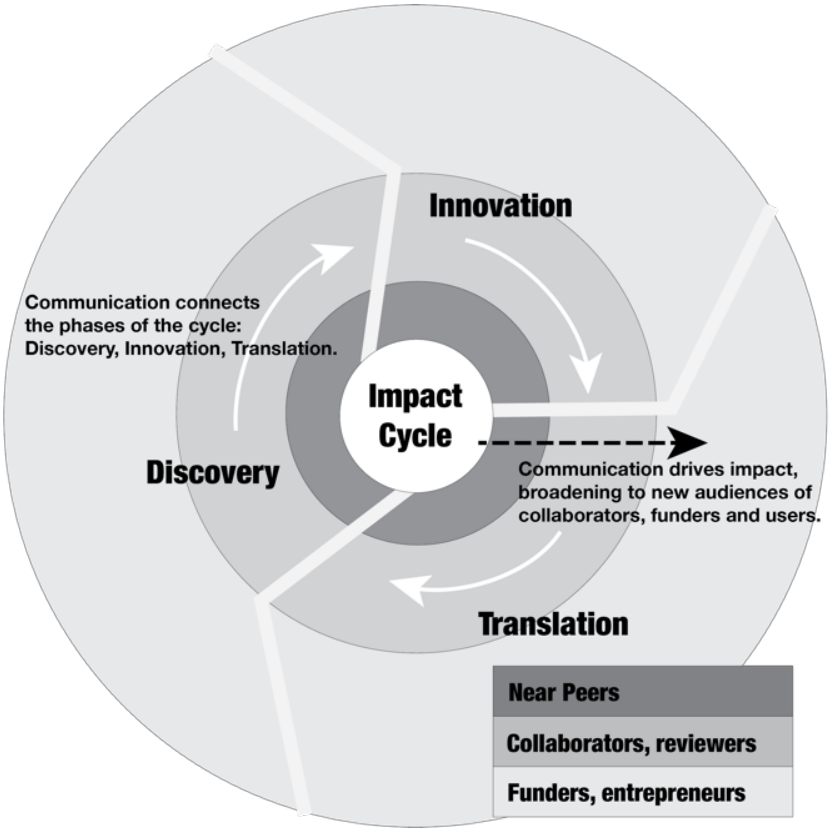

Figure 1: We use a model called the impact cycle to describe how discovery, innovation, and translation feed each other. Communication is essential to each stage of the impact cycle and effective communication needs to perfuse all levels - near peers, collaborators, reviewers, and funders.

To train this impact cycle-driven approach, we work to understand the needs of audiences that our community engages with and help them clarify communication goals for those audiences. We build on that with messaging training that sharpens scientific assertions and the evidence to support them. Using these assertions as a foundation, we apply story-telling frames – our Elements of Impact – as rapid prototyping tools for helping the audience to focus. That focus happens by identifying tension, motivation, scale, and timing in research topics, and applying simple Elements tools to them. With the Elements language, our community shares a common framework that fosters clear and more detailed feedback, which leads to more effective iteration and flexibility across platforms and to a variety of audiences.

The Elements are simple story rubrics that are easy to apply, both in composing a message and in giving feedback to a colleague. The rubrics address three fundamental story questions – what's the central complication, who is motivated to act on it, and what is the essential evidence that tells the story? For example, we use a rubric to help select evidence that sets up movement between context and detail. It's modified from a common filmmaking concept of wide-medium-close shots that establishes a storytelling rhythm. It's also paralleled in the common journal

article structure that's often described as a "wine glass" shape, but in a story, the detail-to-context rhythm is repeated many times. It offers a map to sequence a story and a tool to challenge information used to move it forward. We deliver these storytelling and strategic lessons in a variety of ways, depending on the internal audience who we're working with. We began with faculty workshops, intensive four-part three-hour sessions that we run once each year for incoming faculty and affiliates. That formal workshop leads to consulting and coaching on a more flexible basis as faculty find themselves engaging with new audiences. Those foundations also help the faculty have a common science communication language with the graduate cohorts. Those graduate students become versed in our approach through a weeklong bootcamp and at least three courses with significant communication components in them. We also help with an institutional seminar series, which creates opportunities for the whole community to present their work. Each quarter, we run training and coaching for all comers in the Knight Campus community.

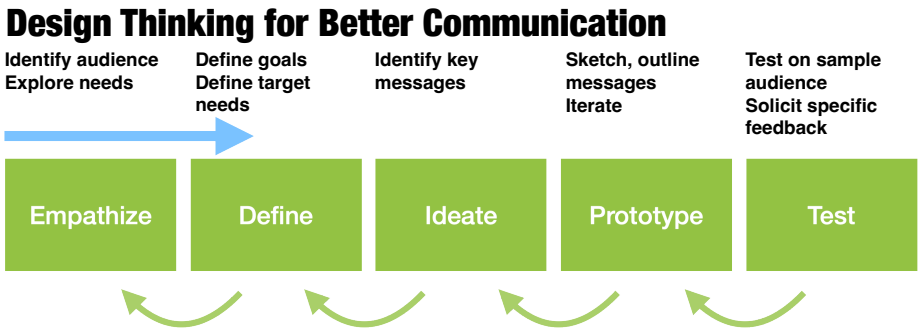

Figure 2: The design thinking process drives our communication instruction and practice.

Design thinking is central to how we've built this communication training and how we ask faculty and students to use it. We hope to create a culture of iteration by asking students to build communication prototypes using the design thinking process [7]. Participants begin by focusing on empathy and listening, exploring audience needs in a way that leads to sharply defined problem statements. Through a process of divergent and convergent thinking, participants are asked to first generate lots of ideas and reflect on them with a group of peers, then narrow what they will write, say, or show, using quick sharing tools like storyboards or flow outlines and testing both their messages and strategy. Then they give and receive critical feedback in real time, allowing them to refine their approach and iterate through the process again until ready. We focus on practice for our trainees, emphasizing simple, memorable tools – the Elements – that can be applied at a variety of scales. A great illustration of this is a culminating activity that we do with our workshops that's a modification of speed networking. The purpose is for trainees to implement the Elements tools and connect their small group practice in a real-time exercise with people from outside the workshop who have a stake in the trainee's science. In an academic setting, these stakeholders may be other scientists, fundraisers, communication staff, or administrators, but we choose people who know about what we are trying to accomplish and who are friendly to the mission. We ask for bios for each of the stakeholders, and they also brief the

group a few minutes before the session about what they're listening for when they talk to researchers and engineers.

Each trainee works alone or in pairs to tell their science story in a few minutes to these stakeholders. They then take a minute or two to discuss with the stakeholder their messaging. We rotate after each round, and finish when each trainee has had a chance to talk to each stakeholder. The pace is fast and asks trainees to think on their feet. The reflection helps them amplify messages and self-correct as the session progresses. At the end, we gather everyone again and the stakeholders talk about a few key points that they heard – with a particular focus on the way the scientific content was delivered. As an added benefit, the stakeholders get to hear about a range of the work that's done at the institution in a short, focused time that provides a good summary of the activities of a dozen or so researchers and engineers. It's a win for the practice of science communication and a win for networking within the institution.

Programmatically we use that Impact Cycle – with communication built in – as a framework to expand to new audiences, rather like ripples in a communication pond. Near peers are likely to be the first and most frequent points of communication contact, but in those exchanges, much can be modeled for stakeholders and audiences who may be less familiar with the work, particularly out-of-discipline collaborators, funders, hiring committees, and communities they connect with around broader impacts initiatives [8]. Communication isn't just for results and discovery. We urge students and faculty not to wait to communicate their work, but to build it into the daily practice of doing – and thinking about – science.

Discussion

Everything we build has clear learning objectives matched with our core guiding principles that include:

1. Building community around communication.
2. Starting early and being available.
3. Making the training relevant by being available when needed.
4. Creating shared milestones and opportunities for community communication.

We also model mentoring and expectations of good writing and other communication opportunities (e.g. posters, talks, "informal" comm), so that students can take this approach and use it in the next phase of their careers, paying the training forward. Given what we know about science communication training in the sciences, it's likely to not be as institutionally grounded in their next position. Ultimately this is about building trust so conversations can start earlier (at all audience levels), making feedback appropriate and useful, and getting the stories of Knight Campus science out to the right audiences when they matter most. Using exercises like the speed networking activity described previously, we can broaden the community of people within the institution who are familiar with our content and the ethos of regular practice. This helps to create a culture of better communication and productive feedback, and it raises expectations around engagement for all participants.

Conclusions

The keys to success and potential models for dissemination can be simplified as a list that we use to check our work in all that we develop.

1. Develop motivation to practice better communication by connecting this science communication work to student, faculty, and institutional success.
2. Have a simple set of tools that everyone has training in and is committed to use both in their communication and in their feedback to others about how that communication has worked.
3. Plan for continuous engagement with repeated touch points that start with a mix of mandatory sessions and opt-in opportunities and build toward a common acceptance of the value of this work.
4. Reinforce a culture of usable feedback from multiple levels.
5. Apply design thinking as a powerful framework to enhance the quality of all communication, starting with familiar presentations and topics and challenging assumptions about what works and what doesn't.

We acknowledge a unique opportunity with the Knight Campus as a generously funded startup research institution. As we've built programming, we've done so with the support and commitment of our leadership and kept the programs lean and low cost. Our hope is to use this opportunity to pioneer approaches that would scale in all institutions and bring the best practices of science communication more to the center of scientific training in general. We would like to share this approach in a **Lightning Talk**.

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