

The Research Communication Continuum ...spreading the word



C. L. Alpert, Museum of Science, Boston



Center for High-rate
Nanomanufacturing

Good afternoon.

I'm going to begin at the beginning.

Genesis



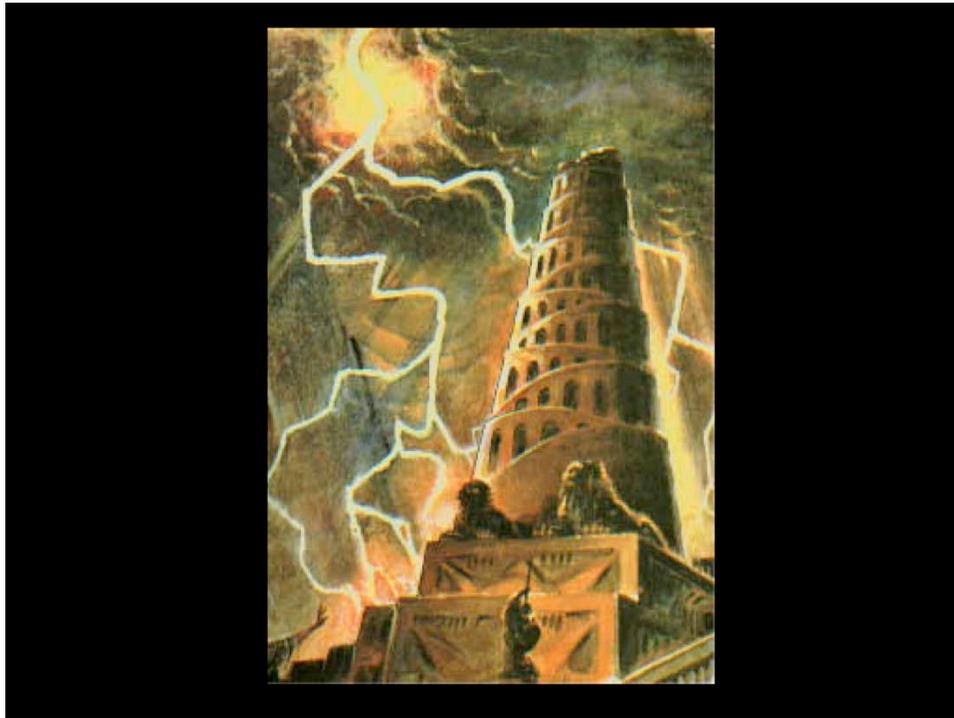
As the Old Testament has it, all human beings once spoke one single language.

This helped them collaborate so successfully with the technology of the day – bricks and mortar - that eventually they were able to construct a tower- or some say a stairway - reaching almost into Heaven

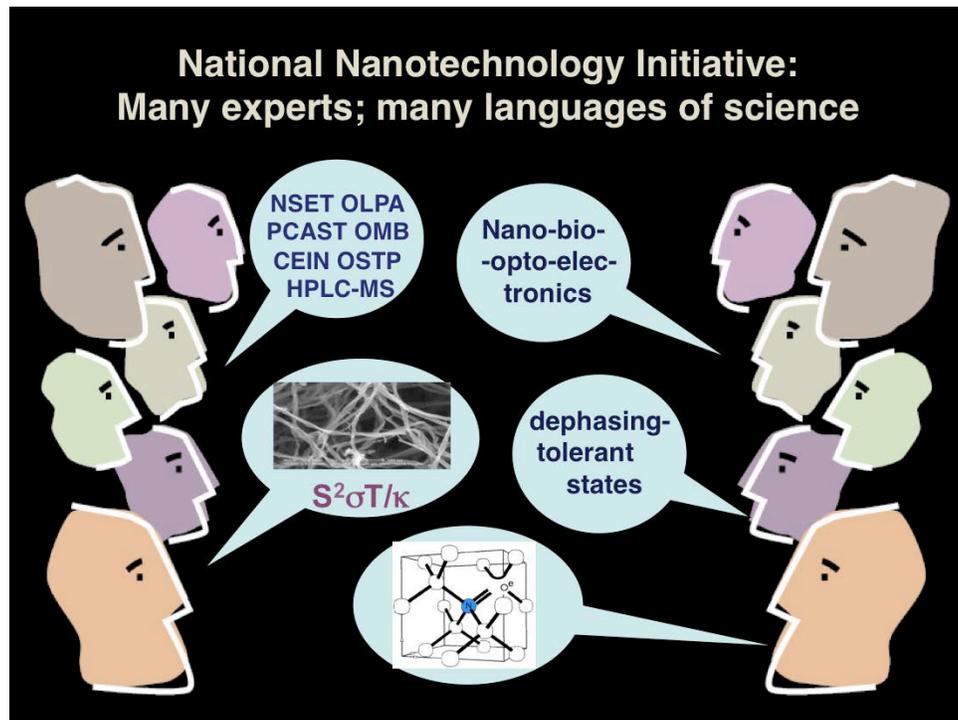
Genesis 11.6 reports that God saw this and got worried, saying...

*"If, as
one people
speaking
the same
language
they have begun
to do this
then nothing
they plan to do
will be impossible for them."*

Genesis 11:6 - "Tower of Babel" story

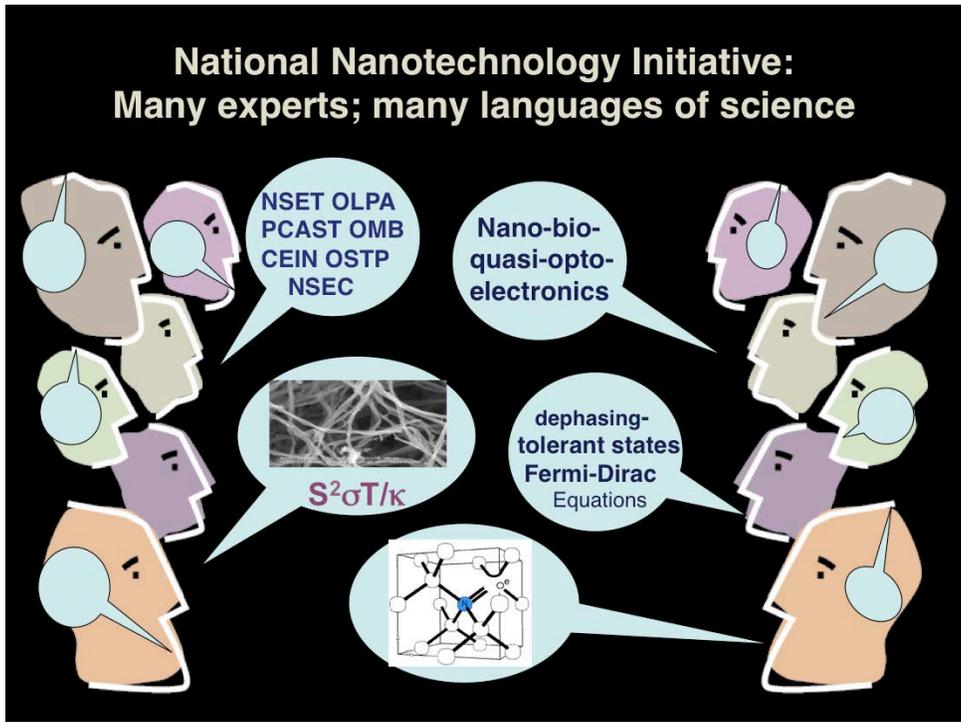


God struck down that tower and -
To make it harder for humankind to achieve such heights again -
took away that common language...
Thereby – as some have said - giving us the National Nanotechnology
Initiative...



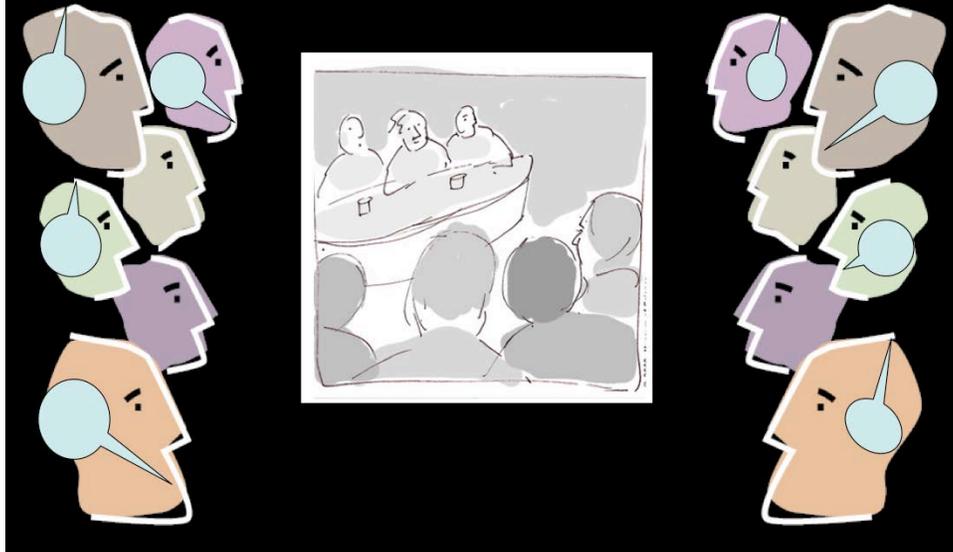
Where scientists and engineers gather together in rooms like this one speaking the many different tongues of physics, chemical engineering, materials science, medicine, and so forth using their own symbols, equations, acronyms, and syntax,.

While this frothy collision of diverse experience and expertise is one of the characteristics that makes the nanotechnology initiative and its programs so vibrant and successful and innovative...



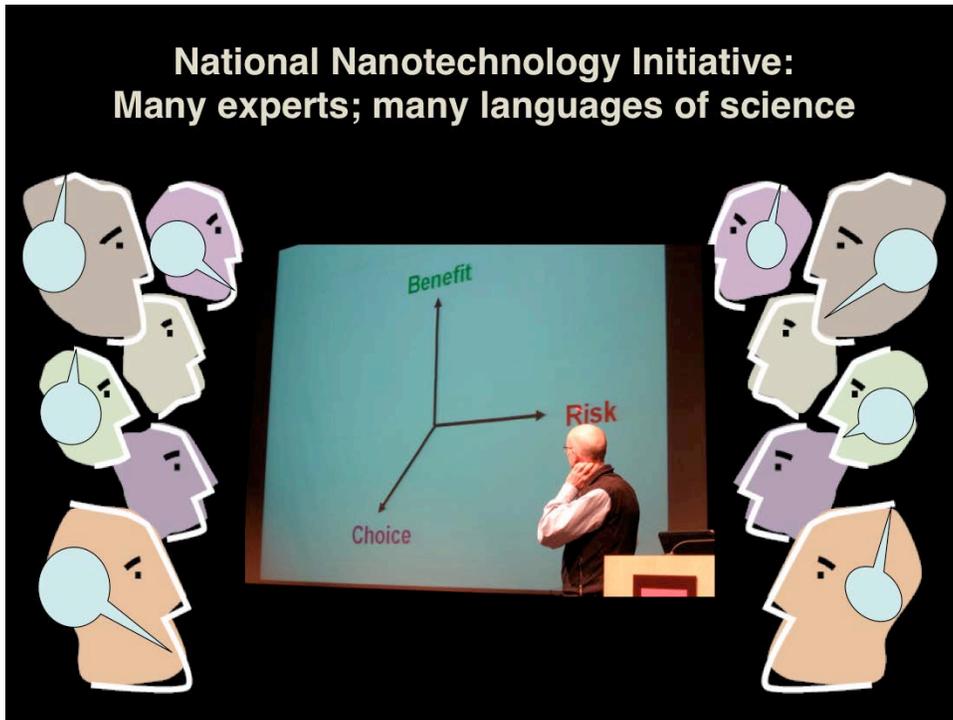
The necessity to continually translate the different flavors of nano jargon, does add impedance to learning and collaboration

National Nanotechnology Initiative: Many experts; many languages of science



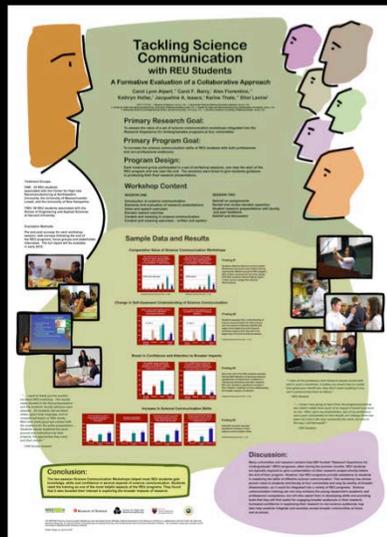
– particularly for students who may have less experience in these interdisciplinary discussions, especially for journalists, and perhaps most importantly for those members of the public

National Nanotechnology Initiative: Many experts; many languages of science



with whom we seek to deliberate over ideals and realities of technology and environmental stewardship.

Tackling Science Communication with Early-Career Researchers



C. L. Alpert, E. Levine, C. Barry, J. Isaacs, A. Fiorentino, K. Hollar, K. Thate, "Tackling Science Communication with REU Students: A Formative Evaluation of a Collaborative Approach," *Materials Education*, ed. M. Marinho Patterson, D. Dunham, E. Marshall, J. Nucci (Mater. Res. Soc. Symp. Proc. Vol. 1234, 2009), pp. 04-12.

Last time I was here, I reported to you about a number of science communication training initiatives that we had been developing at the Museum of Science in Boston, with support from the two Boston NSECs and the NISE Network. With the help of the Center for High-rate Nanomanufacturing, we had been able to quantify substantial gains in skills, understanding, and confidence produced by one our workshop structures, the REU Science Communication Workshop, for undergraduates engaged in research programs...

Science Communication Continuum

“Significant improvement in confidence and communication skills”

- UMass Donahue Institute for Research and Evaluation



“I wish all the professors and research people would take part in such a workshop. It makes you aware that no matter how great your results are, they don't mean anything if you can't communicate them to others.” - REU SCW student participant

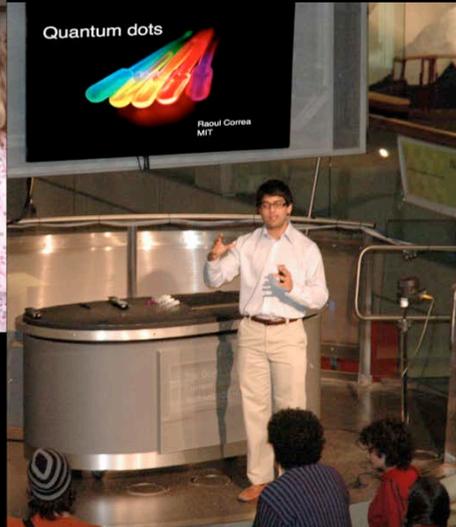
and we were noticing that

there existed a kind of science communication continuum, where the kinds of science communication skills that enable specialists from different fields to collaborate effectively with one another.

Science Communication Continuum

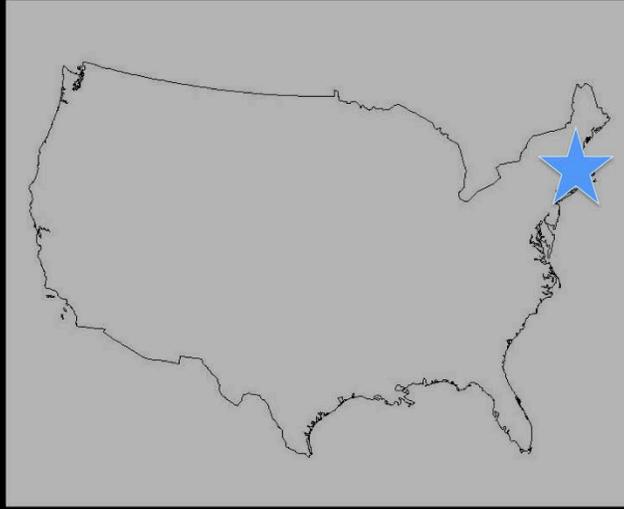


“I had to go for an interview in the evening, and the workshop experience helped me communicate my work better.” - Workshop participant



– also helped them communicate more effectively - as well as deliberate- with public audiences. And vice versa- Working with researchers to increase their public science communication skills also helps them communicate better with each other, and enhances their own work and their career prospects.

Scalability of successful science communication professional development models



So once you know you have a successful validated science communication workshop model, what do you do with it? We were conducting workshops with students at five universities in the Boston area – with our colleagues here at the Center for High-rate Nanomanufacturing and the Harvard – MIT NSEC. How could we leverage the federal investment in our work and build capacity at other institutions?



Andrew Greenberg
REU Program Director
for NSEC and MRSEC



WISCONSIN
UNIVERSITY OF WISCONSIN-MADISON

2010-2011 REU SCW Dissemination Experiment

We turned to our friend Andrew Greenberg, at the Madison campus of the University of Wisconsin, and we enrolled him in the idea of doing a dissemination experiment with us. And, with support from NSF through the NISE Network, we worked with Andrew to adapt the REU Science Communication Workshop model to his site. My colleague Karine Thate and I travelled to Madison twice to give the two workshop sessions, with help from Andrew and a few faculty mentors, adapting the workshops to local program needs.



And then in 2011, Andrew gave the workshop sessions on his own, and this year he expanded them to other groups, like graduate students.

Success



WISCONSIN
UNIVERSITY OF WISCONSIN-MADISON

2010 – 27

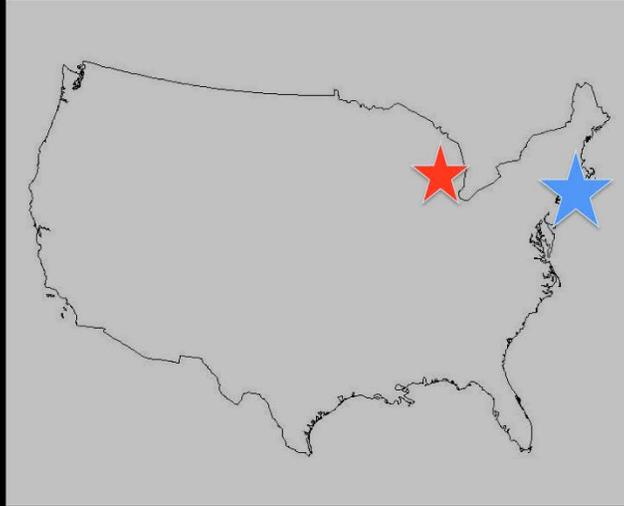
2011 – 32

2012 – 42

Donahue Institute Evaluation

The Donahue Institute confirmed that we were getting the same positive results in Madison that we were getting in Boston. So we knew dissemination was possible.

Scalability?



but at the rate of one new campus per year, the dissemination was going to be going pretty slowly... So, again with NISE Net backing, we tried something else...

Catalog of Exhibits, Programs, Tools & Resources

The screenshot shows the NISE Network website's catalog page. At the top, the NISE network logo is displayed with the tagline "NANOSCALE INFORMAL SCIENCE EDUCATION". A search bar is located in the top right corner, with radio buttons for "Site", "People", and "Catalog". The navigation menu includes "HOME", "COMMUNITY", "CATALOG", "ABOUT", and "WHAT IS NANO". A "Support | Log in | Sign up" link is also present.

The main content area features a header for the "Nanoscale Informal Science Education Network" with a sub-header: "The NISE Net is a national community of researchers and informal science educators dedicated to fostering public awareness, engagement, and understanding of nanoscale science, engineering, and technology." To the right, a call to action reads: "Become a partner of the NISE Network. Learn how to **get involved** or **sign up now**."

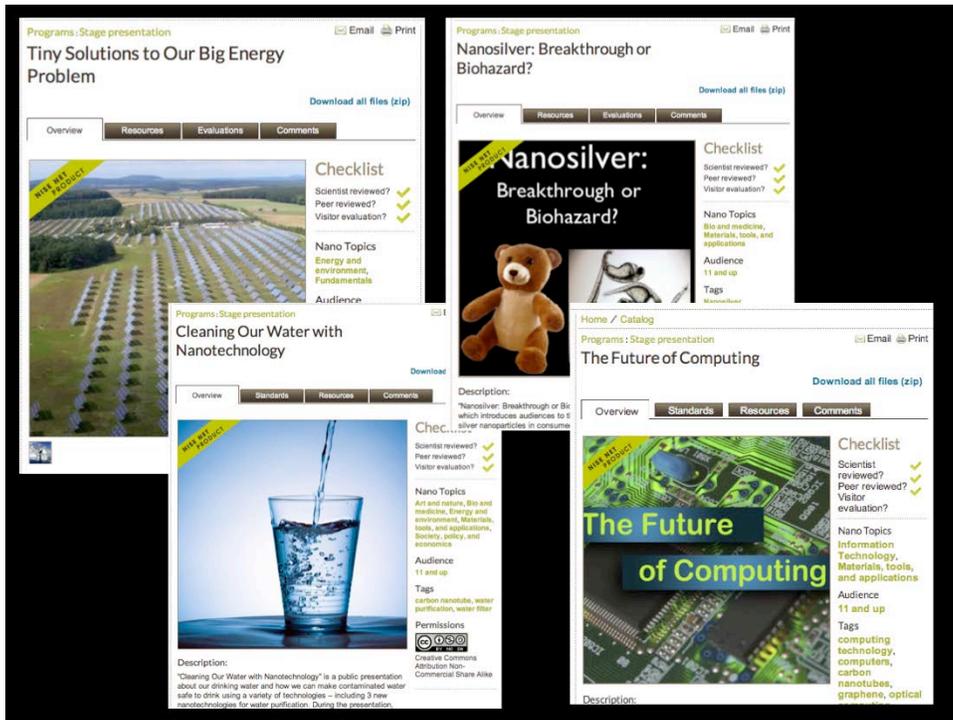
A prominent banner for "NanoDays" is featured, dated "MARCH 24 - APRIL 1, 2012", with the tagline "The Biggest Event for the Smallest Science!". Below this, it states "The NanoDays 2012 Digital Kit is now available for download!". To the right of the banner is a photo of three people in a lab setting.

Below the banner, there are three main sections: "Image Collection" with a microscopic image, a map of the United States divided into regions (West, Midwest, Northeast, Southwest, South, Mid-Atlantic, D.C., Southeast), and "New in the Catalog" with a photo of a woman in a red lab coat presenting.

The philosophy of the NISE Network is that you try to help build local capacity at other institutions, and you provide useful resources, and so it has an online catalog of resources...

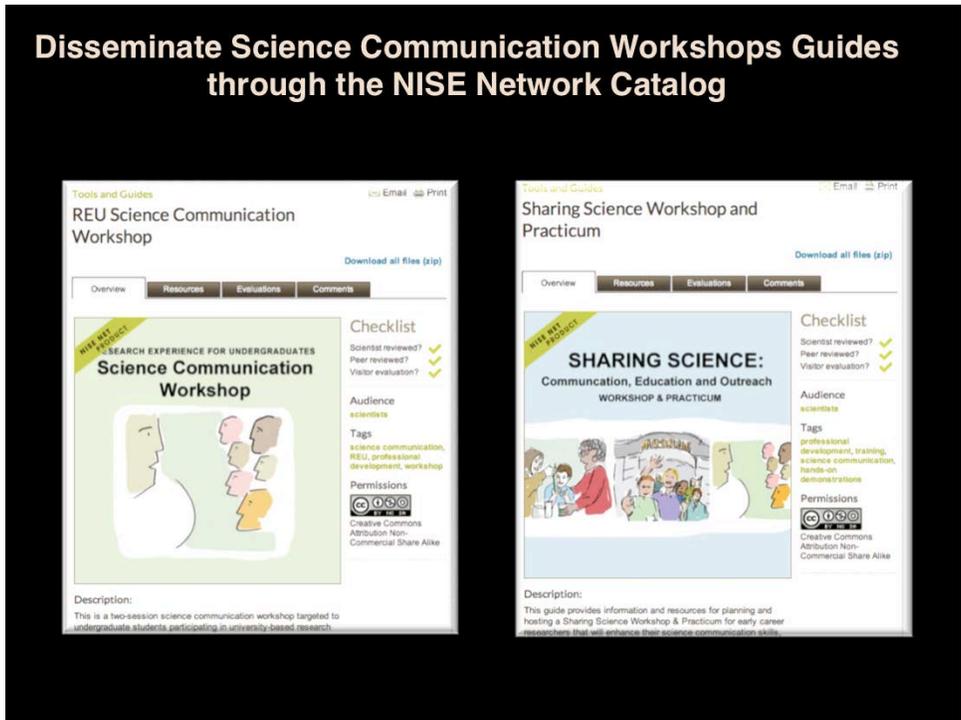


So, for instance, when my colleague Karine Thate develops a successful public presentation on some aspect of nanotechnology at the Museum of Science, we



Package it up with instructions, slides, and video, and made it available to science museums all over the country, where there educators can adapt and deliver the programs for their own audiences.

Disseminate Science Communication Workshops Guides through the NISE Network Catalog



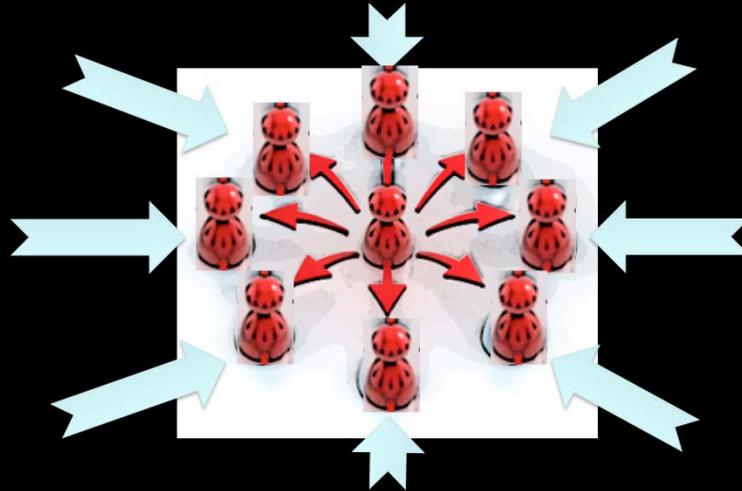
So we did the same thing for two of our Science Communication Workshops.

These guides are available online, and they contain all the slides, and activities, and signage, and everything needed.

But they weren't getting a lot of uptake.

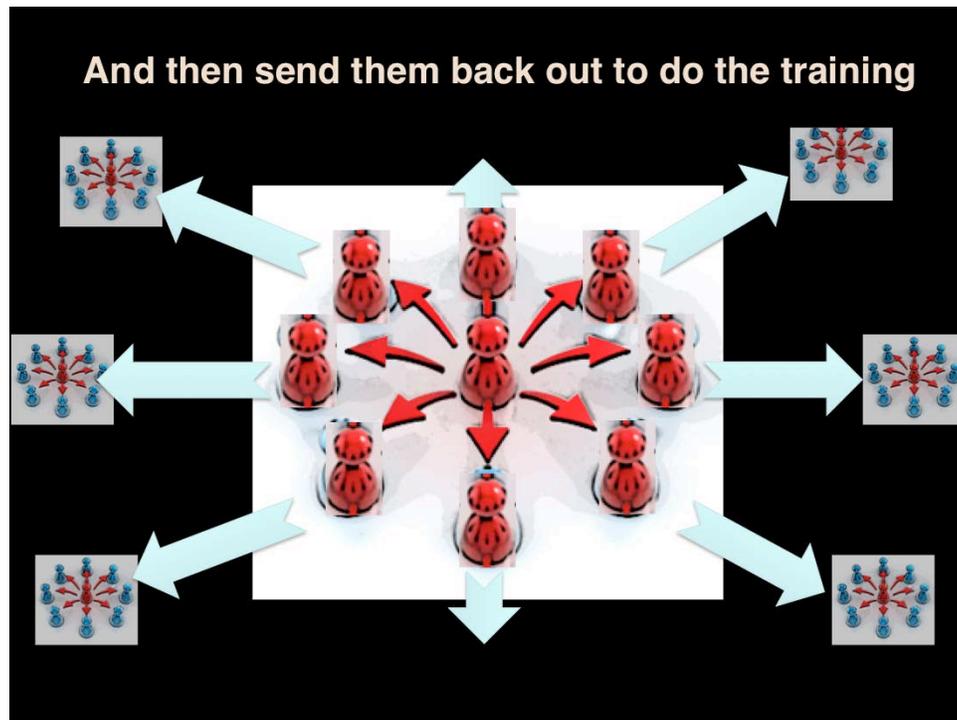
So, again with support from the NISE Net, we decided to offer a training for potential workshop leaders.

“Train-the-Trainer” Dissemination Models



Bring all the trainers to a central location...

Most “Train the Trainer” workshop models bring people to a central location and train them there.



and then the trainees go back to their several locations, and impact their many audiences.

But there's a problem with this model.

The content is important in a professional development workshop – but not as important perhaps –as the process of interacting with the participants, coaching them using their own material. It's the ability to tailor the training to the individuals in the room, to modify and adapt it for current circumstances, to know how to seize on something happening right then and there in the room and turn it into a teachable moment.



***Biggest teacher problems:**

- Taking too much or too little autonomy
- Failing to tailor teaching for their group
- Missing “the teachable moment”

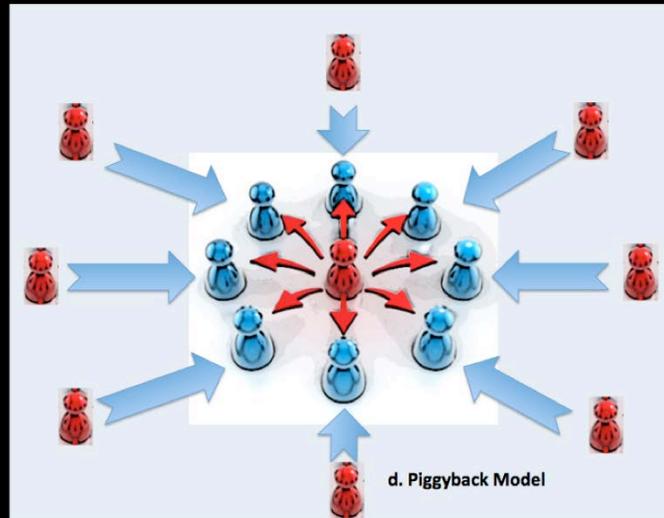
*<http://liphelonglurnerdok.wordpress.com/2012/02/10/terrific-train-the-trainer-to-teach>

For instance, when the train the trainer model is used with classroom teachers, they run into these kinds of problems:

...

So with funding from the NISE Network, we decided on a different kind of train the trainer process. A piggybacking model.

The “Piggyback” Train-the-Trainer Model



Where the trainees would come to Boston and witness our implementation of the workshop program as well as get training in how to use the materials.

The REU directors who were chosen would have to be able to commit to attending both sessions in Boston

They would also have to commit to implementing both sessions at their sites during the same summer and at least one following summer.

And they had to agree to participate in our evaluation studies of the work.

- in collaboration with the NNIN and a few NSF Program Officers, we launched an application process to choose who got to be these cool red players - and we accepted a class of 8 especially talented REU Directors from 8 different nano and materials science research centers.

Train-the-Trainers" iREU Workshop: Summer 2012

- ★ The Center for Nanotechnology/NNIN
University of Washington
- ★ Center of Integrated Nanomechanical Systems
UC Berkeley
- ★ Institute for Electronics & Nanotechnology/NNIN
Georgia Tech
- ★ NNIN/The UCSB Nanofabrication Facility
UC Santa Barbara
- ★ Lurie Nanofabrication Facility/
NNIN, U Michigan, Ann Arbor
- ★ Center for Energy Efficient Electronics Science
UC Berkeley
- ★ Engineering the Grid
North Carolina State University
- ★ TX Institute of Intelligent Bio-Nano Materials & Structures for Aerospace Vehicles (TiMS)



Train-the-Trainers" iREU Workshop: Summer 20122012



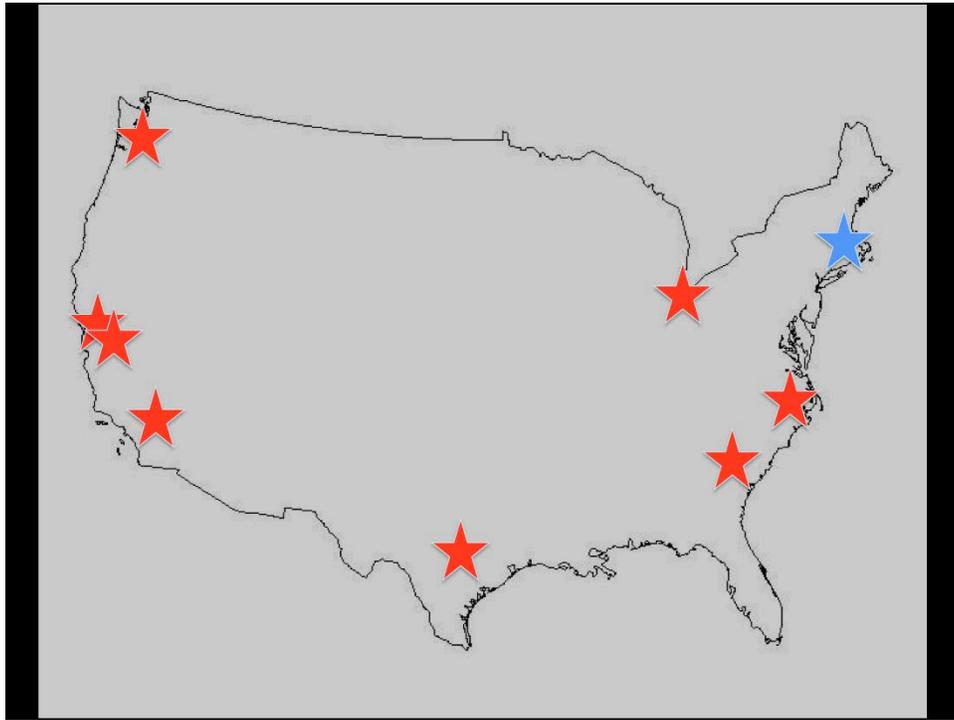
Sharnnia Artis, Mack Carter, Samantha Cruz,
Meltem Erol, Brandon Lucas, Leda Lunardi,
Leslie O'Neill, Jacques Richard

iREU Directors with CHN REU Students



And here they are with their co-trainers: a group of REU students from the three universities associated with the Center for High rate Nanomanufacturing, attending our Science Communication Workshop at the Museum of Science. And I should say that this happened with the generous collaboration of CHN's directors and faculty, and Jacqueline Isaacs and Carol Barry even met with the REU directors and provided experienced insight.

And then the REU directors went back to their campuses and implemented the program.



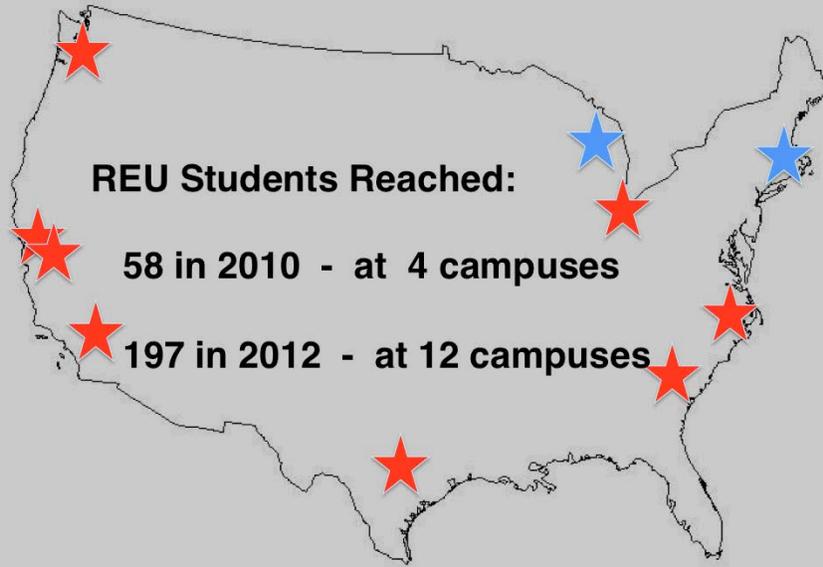
Preliminary Results (Formative)

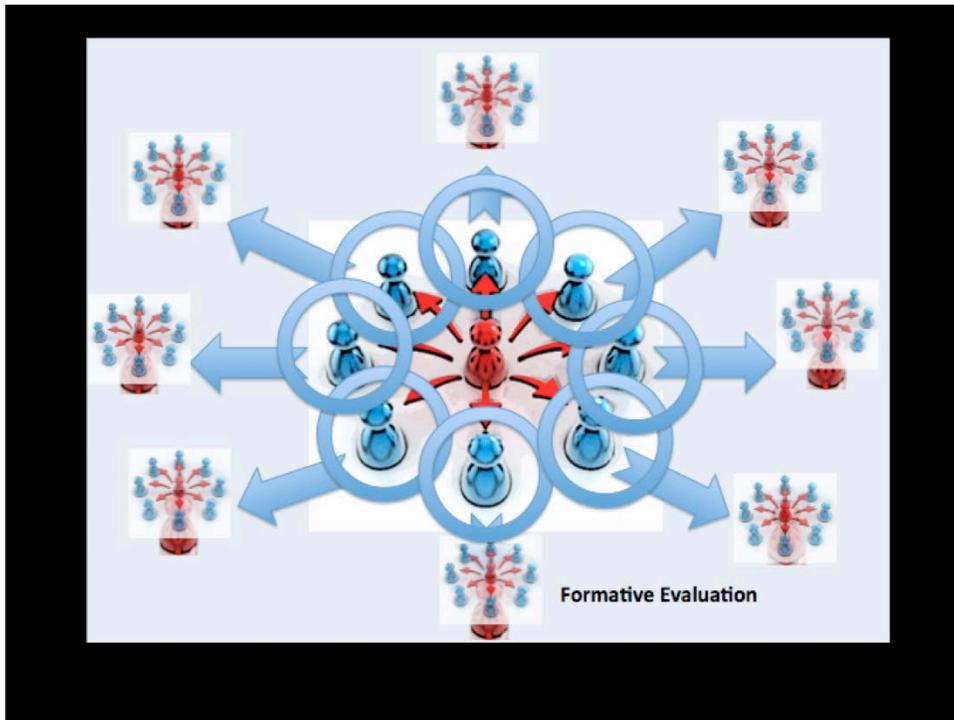
All eight REU Directors:

- Attended BOTH workshop sessions
- Rated both workshop sessions highly
- Implemented both workshop sessions in their programs
- (and their students) Participated in the same pre- and post-survey for each session
- All intend to implement the sessions next year
- Many intend to include other REU programs in the sessions and to train other trainers

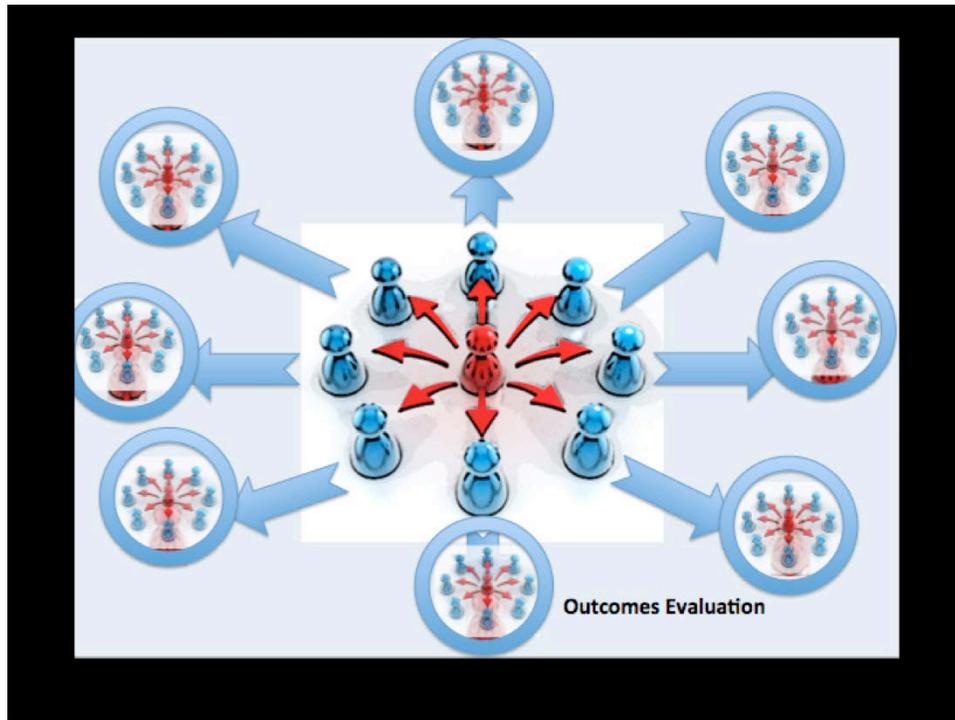
REU Students Reached: 58 in 2010 - at 4 campuses
197 in 2012 - at 12 campuses

Approaching Scalability

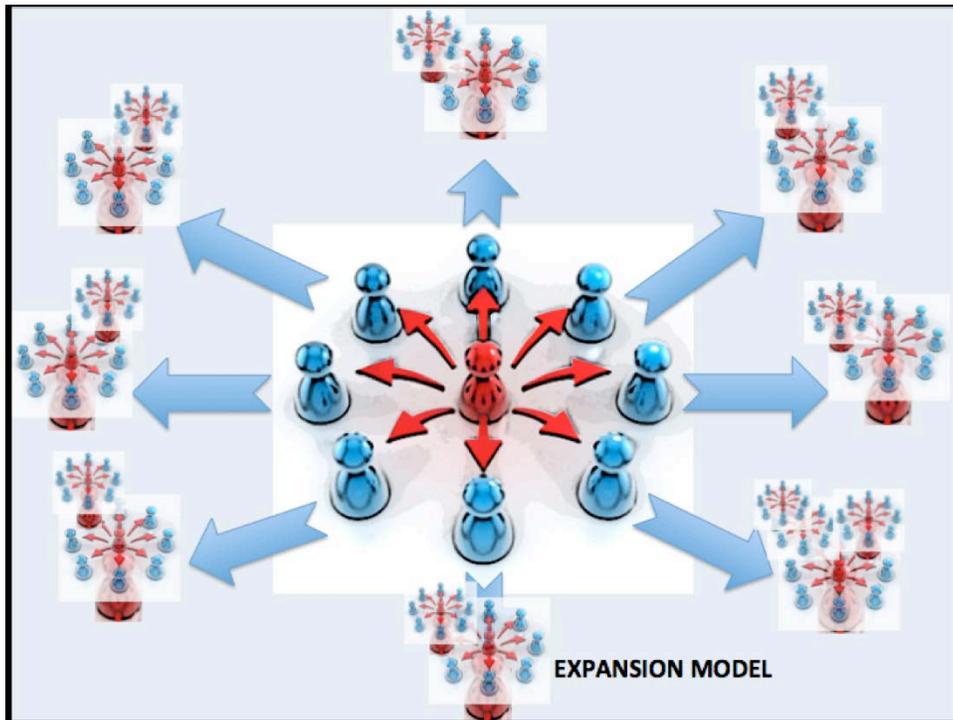




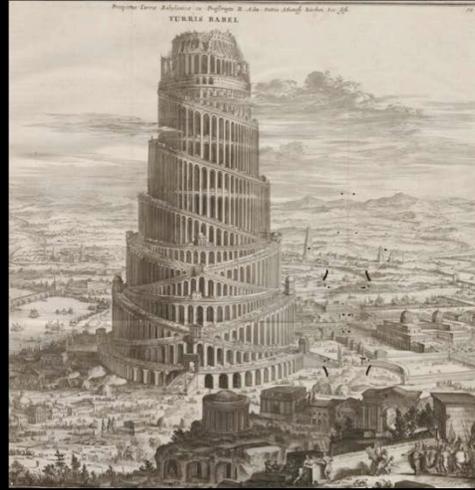
First stage of evaluation: formative, concentrating mostly on data from REU Directors.



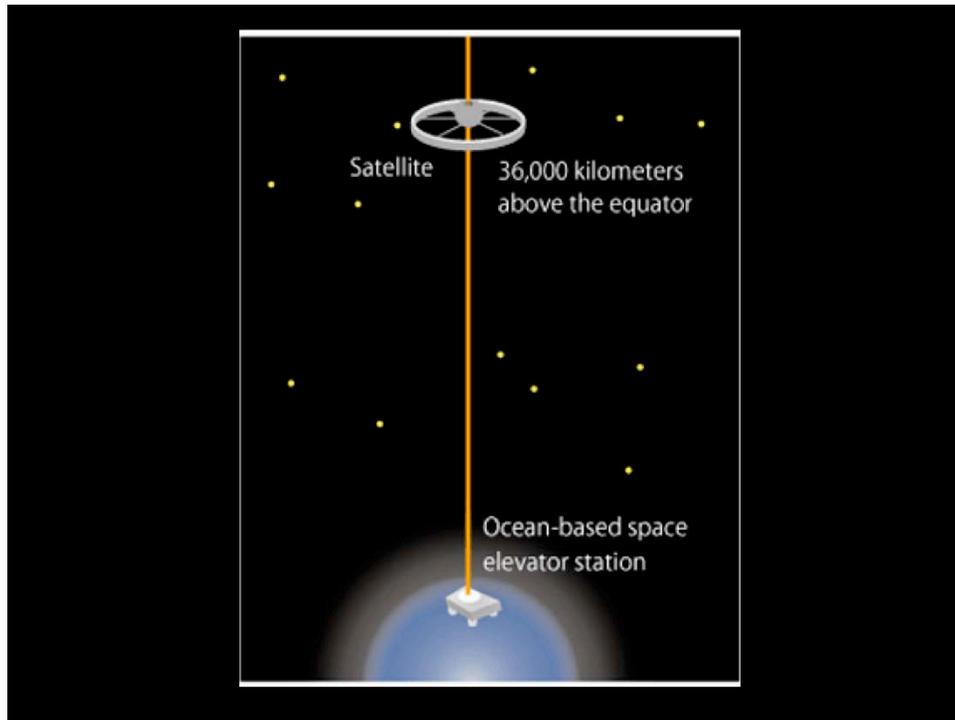
Thanks to the help of University of Washington's NNIN coordinator Mack Carter, we were able to use UW's online survey software to survey all the students at all the sites, including pre and post surveys for each of the two sessions. So we have a lot of data to swim through, but our intention is to analyze it all and see what kind of real impact we may have had on the students in all these programs.



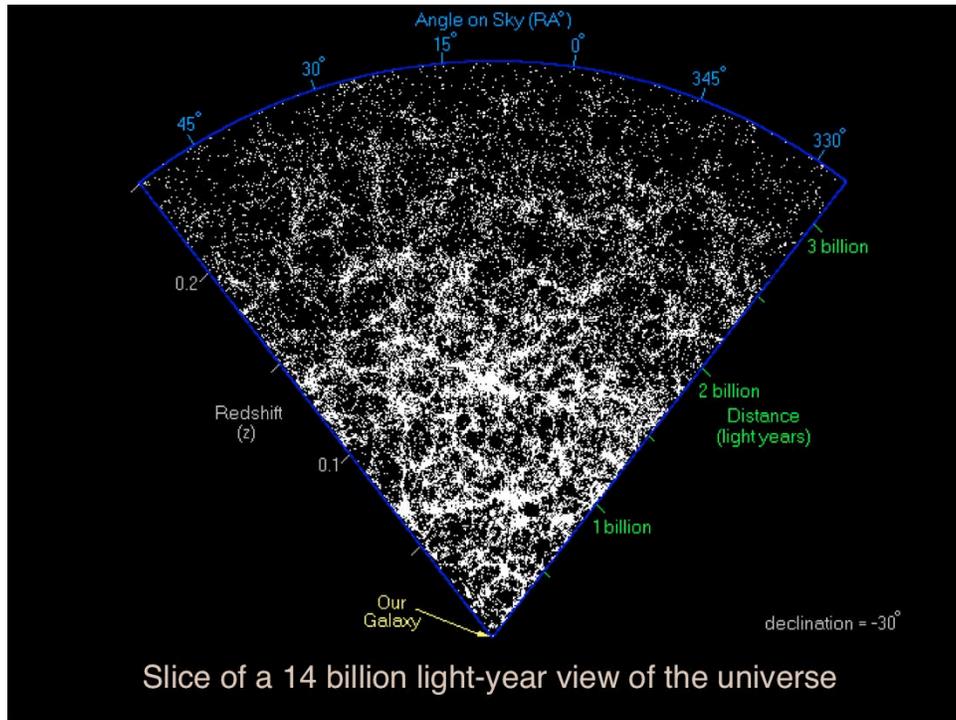
And, as the Directors continue to offer the workshops next summer, to see whether the workshop model begins to spread independently on these campuses. Several of the REU Directors have announced their intention to include other REU programs and train other faculty. Happily, we think the this “piggyback” workshop and dissemination model is also applicable to other professional development programs in the research centers of the NNI, including those around environmental and occupational health and safety, and societal implications.



And, the hope is, that the next time we use our ability to communicate and collaborate well with each other, to build a stairway to heaven ..



...with our new nanotech materials, we won't risk the ire of the almighty, because we have all begun to realize just how enormous the universe



Is, and just how far away heaven might be...

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Fun Resource Produced During 2012 iREU Workshop

YouTube

Browse Movies Upload

Edit Enhancements Audio Annotations Analytics

Undergraduate Students Unwittingly Subjected to World's Worst Research Presentation

NanoNerds [Subscribe](#) 145 videos



4:44 / 7:53

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Creating



Thanks to:
Karine Thate, Jeanne Antill, Larry Bell,
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Bob Westervelt, Eliot Levine

Sci Comm Training Guides: nisenet.org/catalog
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Thank you very much for your time and attention today.

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