"What About Us?" Designing Professional Learning For Educators in Science-Rich Educational Institutions

The Case of BaySci's SREI Learning Community

"What about us? How can we continue our learning so we can serve teachers and schools better?"

This question from a science museum education director became the clarion call of a group of informal science educators in the San Francisco Bay Area that formed the **Science-rich Education Institution (SREI) Learning Community**. Supported by a four-year grant from the Gordon and Betty Moore Foundation, the SREI Learning Community was created to provide professional learning opportunities for informal science educators who frequently do the same for formal educators, but rarely have the opportunity to focus on their own learning. This paper outlines the story of the SREI Learning Community, identifying key features of its design, highlighting the types of activities that evolved over time, and reflecting on lessons learned. We hope this account can benefit others interested in facilitating informal educators' opportunities to learn.

Helping informal educators help formal educators with NGSS

The SREI Learning Community came about as part of the BaySci (baysci.org) initiative, which was funded by the S.D. Bechtel, Jr. Foundation and Gordon and Betty Moore Foundation in 2008. Led by the Lawrence Hall of Science, Exploratorium, and Inverness Research, BaySci is a coordinated effort among science education leaders, Science-rich Education Institutions, districts, schools, and teachers to enhance the quantity and quality of K-12 science teaching and learning in Bay Area districts and schools. Out of this work emerged the idea that *informal educators* also need support for their professional learning. The SREI Learning Community was created as a new strand of BaySci in 2012.

The advent of the Next Generation Science Standards—in particular, the demands NGSS would make on local districts, schools, and teachers—provided a shared focus for the SREI community's collective learning. Education leaders at the SREIs believed this shared focus would strengthen their institutions' abilities to support implementation and convergence of NGSS and Common Core State Standards (CCSS).

> **SREI LEARNING COMMUNITY INSTITUTIONS**
>
> **Initial group**
> - California Academy of Sciences
> - Chabot Space and Science Center
> - The Exploratorium,
> - The Lawrence Hall of Science
> - Monterey Bay Aquarium
> - University of San Francisco Science and Health Partnership
>
> **Joined**
> - Bay Area Discovery Museum
> - Monterey Bay Aquarium Research Institute
> - Workforce Development and Education, Lawrence Berkeley National Laboratory
>
> **Hub organization**
> - Inverness Research

Key design features of the SREI Learning Community

How to build a professional learning community across multiple informal science institutions in a region? Much thought and reflection were put into this question from the time of the initial grant proposal through the four years of funding. Here we highlight what turned out to be key features:

➢ **A neutral hub**

Forming a learning community requires effort and coordination. The SREI Learning Community, in order to thrive, needed to promote collective identity around shared interests. To avert concerns about one institution named as "lead," Inverness Research coordinated the effort as neutral hub.

➢ **Shared leadership**

Inverness convened a **Design Team** of high-level education leaders from each institution. This team shared ownership by co-developing the vision. The Design Team's first decision was to engage a broader group of their institutions' educators in defining their interests for professional learning.

➢ **A compelling _raison d'etre_**

Real learning communities only form around compelling, shared interests. **Next Generation Science Standards** provided this focus for the SREI educators. NGSS was coming on line in California, and the institutions wanted to play a key role in advocacy and implementation in Bay Area districts.

➢ **Multiple modes of professional learning**

Professional learning involves engagement with multiple sources for learning, as well as a variety of structures for learning. The SREI Learning Community supported these modes of learning:

Outside experts. Informal educators are as isolated as schoolteachers. SREI Learning Community members were able to interact with experts in the field and study professional literature together.

Collective reflection. Informal educators have valuable knowledge that is often untapped. Learning community members were able to share their professional knowledge and practices with one another and reflect together on what they were learning.

Action research. Informal educators have few opportunities for low-risk innovation and learning. Mini-grants supported SREI teams in designing their own learning adventures and sharing results.

➢ **Flexibility**

Adapting activities to the group's interests and time constraints ensured relevance and feasibility.
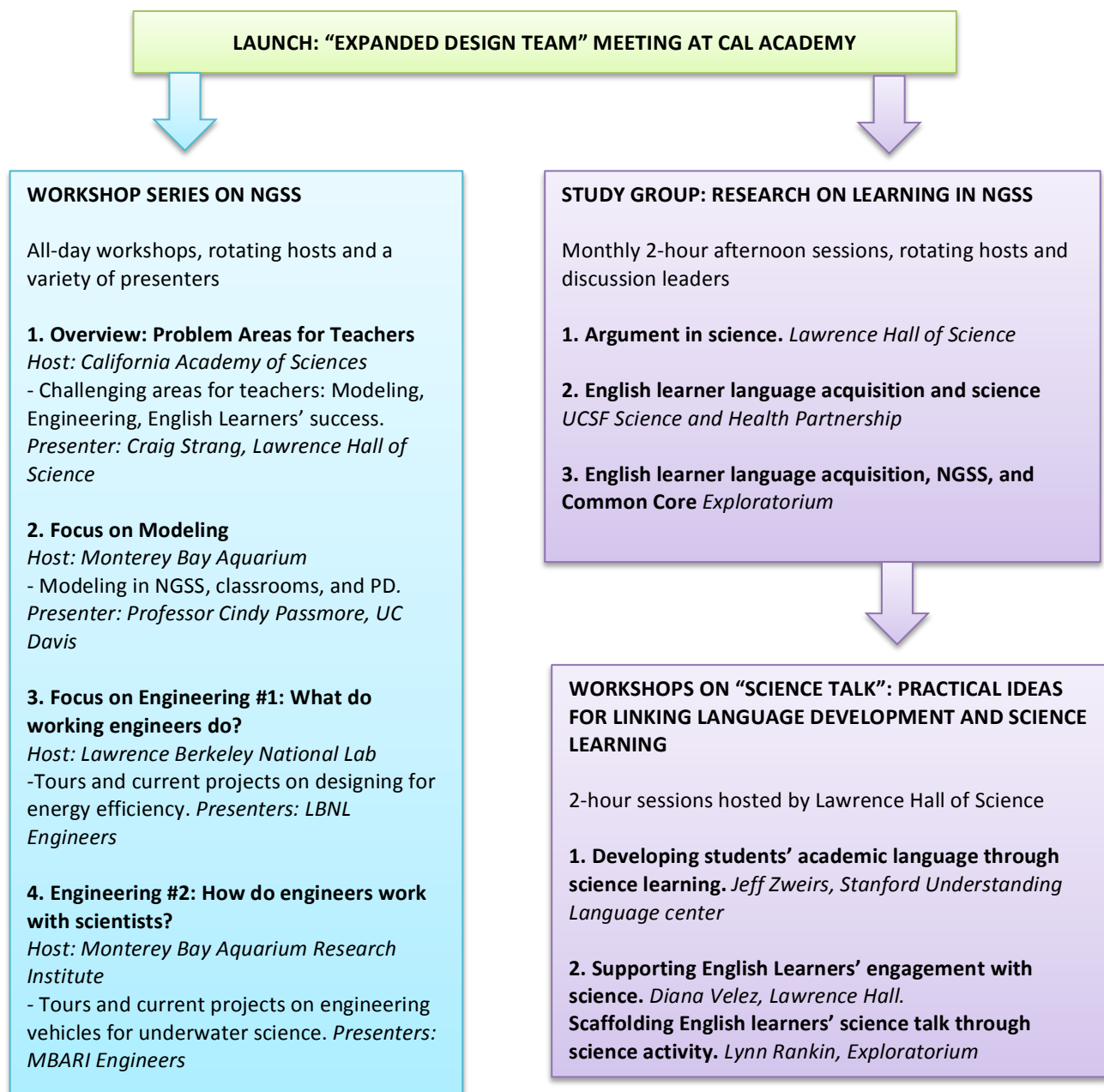
➢ **Continuous evaluation**

Evaluation included three components: 1) Participants rated the quality and value of every activity and offered comments as feedback. 2) The Design Team responded to an anonymous survey about the value of this investment for their institutions. 3) SRI conducted an independent external study.

SREI Learning Community activities unfolded in two phases over four years. Phase One activities emerged out of the first major convening of the Design Team.

PHASE ONE—Developing strands of professional learning

The SREI Learning Community was launched with a day-long meeting where 34 educators from the initial six institutions met at the California Academy of Sciences. After sharing a learning experience around the penguin pool, we engaged the educators in a series of cross-institutional envisioning conversations. These generated a list of topics that the educators wanted to study together. Below we display the strands of learning we designed in response to the educators' interests.

Figure 1. Phase One of SREI Learning Community Activities

LAUNCH: "EXPANDED DESIGN TEAM" MEETING AT CAL ACADEMY

WORKSHOP SERIES ON NGSS

All-day workshops, rotating hosts and a variety of presenters

1. Overview: Problem Areas for Teachers
Host: California Academy of Sciences
- Challenging areas for teachers: Modeling, Engineering, English Learners' success.
Presenter: Craig Strang, Lawrence Hall of Science

2. Focus on Modeling
Host: Monterey Bay Aquarium
- Modeling in NGSS, classrooms, and PD.
Presenter: Professor Cindy Passmore, UC Davis

3. Focus on Engineering #1: What do working engineers do?
Host: Lawrence Berkeley National Lab
-Tours and current projects on designing for energy efficiency. *Presenters: LBNL Engineers*

4. Engineering #2: How do engineers work with scientists?
Host: Monterey Bay Aquarium Research Institute
- Tours and current projects on engineering vehicles for underwater science. *Presenters: MBARI Engineers*

STUDY GROUP: RESEARCH ON LEARNING IN NGSS

Monthly 2-hour afternoon sessions, rotating hosts and discussion leaders

1. Argument in science. *Lawrence Hall of Science*

2. English learner language acquisition and science
UCSF Science and Health Partnership

3. English learner language acquisition, NGSS, and Common Core *Exploratorium*

WORKSHOPS ON "SCIENCE TALK": PRACTICAL IDEAS FOR LINKING LANGUAGE DEVELOPMENT AND SCIENCE LEARNING

2-hour sessions hosted by Lawrence Hall of Science

1. Developing students' academic language through science learning. *Jeff Zweirs, Stanford Understanding Language center*

2. Supporting English Learners' engagement with science. *Diana Velez, Lawrence Hall.*
Scaffolding English learners' science talk through science activity. *Lynn Rankin, Exploratorium*

Design principles for Phase One learning activities

We followed a simple set of core principles in designing the strands of learning activities for the community.

> ### Integrating institutional assets into workshops

We wanted the educators to learn more about the unique science-rich assets of one another's institutions. Thus, rather than hold workshops in generic spaces such as hotel conference rooms, part of our community-building design involved the member institutions hosting workshops. As part of the day's agenda, host educators engaged their colleagues in an experience that would open their eyes to a

signature feature of the institution. Some focused on floor exhibits and others on behind-the-scenes settings for doing science and engineering. This way, all educators personally experienced one another's workplace contexts wearing the dual hats of educator and learner. At the Monterey Bay Aquarium, we went behind the aquarium exhibits to see the science and engineering behind them, and at the affiliated MBA Research Institute, we toured the shops and pools where engineers build and test underwater apparatus that enable scientists to study the oceans. At the Lawrence Berkeley National Laboratory, we toured huge installations

of instruments that help engineers measure the tinest objects in the universe. Other special institutional assets are people, such the engineers at Lawrence Berkeley National Lab and Monterey Bay Area Research Institute. They not only presented to us, but sat and talked with us over meals.

> ### Building in time for planning

The full-day workshops typically included a 2-3 hour afternoon session devoted to making meaning from the morning's content-rich session. In cross-institutional groups, educators exchanged ideas about what they had learned, raised new questions, and considered implications. Institution-specific teams reflected on how they might integrate what they had learned into their programs for formal educators.

> ### Facilitating self-directed learning

The educators who wished to learn more about science-literacy connections let us know they wanted to start with the research, so we supported the formation of a study group. Educators at three institutions—Lawrence Hall of Science, the UCSF Science and Health Partnership, and the Exploratorium—hosted and led discussions. Meeting for two hours in the afternoon once a month for three months, the group focused on research underlying the NGSS. They started with connections between argument and science, then moved into English learners' language acquisition linked to science. All those interested were invited to propose readings and shared copies with all. The facilitator

from the host institution selected the articles to be discussed at a given meeting and facilitated the conversations. We archived the readings and discussion notes to create access for all.

After three sessions, the study group decided they wanted to dig into practical ideas about Science Talk, so we organized a two-part workshop series that probed into classroom practices for supporting language development through science and science learning through language development. Expert presenters came from both outside and inside the SREI community. The first workshop was led by guest expert Jeff Zwiers, professional development director of Understanding Language at Stanford University. The second was co-led by Diana Velez, curriculum developer and language development specialist at the Lawrence Hall of Science, and Lynn Rankin, director of the Institute for Inquiry at the Exploratorium. All of the presenters had worked with formal educators for years on some aspect of the language-science intersection, and were able to share insights about students' needs in that context.

Formative lessons of Phase One

The NGSS workshop series took place over an 20-month period, with 25-45 educators attending them. Concurrently, the study group and science talk workshops took place over a 12-month period, each session involving 10-15 participants, with 20 educators participating in three or more sessions. Here we share an early lesson, along with participants' views about the community as it formed.

➢ **Limited time and funds**

The original grant proposal had envisioned more Learning Community meetings over a shorter time period. The most immediate lesson we learned is that informal educators have even less time than formal educators to set aside for their own professional learning. The SREI Learning community grant was structured such that each institution was expected to fund, as in-kind support, the time for their educators to participate in workshops and study groups. Inverness Research used grant funds to provide stipends to workshop leaders and to institutions as compensation for hosting. Grant funds also covered expense for all, such as meals and participants' travel to and from meetings. This form of cost-sharing promoted joint investment in the community. However, for those institutions where all education staff time is supported by a specific grant, contributing the days for attendance was challenging. Furthermore, the educators were simply busy; they had no released time. We discovered there was a natural limit to the amount of time the educators could devote to their own learning in this context. Two-to-three days, or part-days, per year was the maximum.

➢ **Becoming a community**

Could we actually help build a learning community of informal educators? How would they respond to this opportunity? Participants' comments collected at every activity helped us track their experiences over the first two years. From the very first "expanded design team" meeting, we heard from the educators about their hopes for the SREI Learning Community. A sample of comments:

> *Looking forward to initiating and participating in study groups and other professional learning experiences to learn more, share, and build relationships and expertise.*

> *K-12 science education in the Bay Area and nationally is a moving target right now and we need to be proactive to stay out in front of all the changes.*

> *The cross-group brainstorming followed by sharing with my own group (working group sessions 1 & 2) was very valuable. I liked hearing ideas from other institutions and then hearing what resonated with/was exciting to my staff colleagues.*

As hopeful as they were, not all wore rosy-colored glasses. Veterans of earlier attempts to promote cross-institutional collaboration held a concern. One person said:

> *Definitely want to be a part of this. I'm concerned that the community building must somehow address the issues of competition in order to create collaboration. Without collaboration it will not be sustainable.*

Over time, participant comments showed continuing appreciation of opportunities to gain new understanding, to have away-from-home "brain space" to think with colleagues, and to learn with colleagues from other places. These are comments from the second NGSS workshop on Modeling, led by visiting expert, Professor Cindy Passmore from UC Davis.

> *Cindy's presentation and the group discussions were really helpful in pushing our thinking forward and surfacing some new ideas.*

> *Great shared brain space, and beneficial to hear multiple perspectives within our institution on NGSS and our relation/responsibility*

> *Modeling is a practice that we science educators have misconceptions of. It was valuable for me to see errors in my own thinking so I can better understand how teachers might view this practice. The vignettes and interconnections among practices were useful pieces of the day.*

By the time of the third workshop, Engineering #1, participant comments were showing signs of commitment to the SREI Learning Community.

> *I think the novelty and professionalism of the place [Lawrence Berkeley National Laboratory] and interaction with scientists was most useful. This was the most stimulating SREI session we've had - maybe b/c Engineering is a "new" (to us) component or b/c we've "warmed up" with the group, or the NLBL itself. Excellent!*

> *We should talk about the possibilities of continuing this work together even if funding isn't available.*

Intermediate outcomes of Phase One

Two occasions arose in Phase One where the SREI Learning Community drew from its new collective stance to make important statements—one to formal educators in the region, and one to the granting foundation.

Creating a joint statement to Bay Area educators

The NGSS workshop series came about because the informal science educators felt an urgency about helping those in the schools begin to implement the new standards. The workshops helped to gel the perspectives of educators across institutions about the NGSS. As coordinators, we saw an opportunity

here: to create a streamlined, user-friendly joint statement about NGSS to the schools from all of the Bay Area informal science institutions. Educators at each institution suggested they could use such a statement as a handout in their professional development programs to advocate for the standards and emphasize the role that all institutions could play in supporting districts, teachers, and schools in implementation. Forming the statement involved putting it through multiple rounds of reviews among educators in all institutions, a time-consuming but worthwhile process. An image is below.

Figure 2. SREI Learning Community Joint Statement on NGSS

Making a joint case for continued funding

The initial grant for the SREI Learning Community was for a 2-year period. Year 2 involved an effort to make the case for continued funding. Participant evaluation and attendance data provided evidence that an authentic community was forming and was of value to the educator participants. To build a stronger case, we added two other sources of evidence, both aimed at communicating to the funder that their investment in cross-institutional collaboration was paying off. This case was important because the funder had tried and failed to promote collaboration across institutions through earlier grants. The funder needed to know that the institutions wanted the funds to support collaboration—even though dollars for collective work could reduce dollars available for institution-only competition.

First, we solicited letters of support from high-level officers in each institution. All responded, providing their perspectives on the value of the learning community for educators in *all* Bay Area institutions.

Second, an independent evaluation team surveyed 13 education leaders in the institutions, asking them to rate and comment on the quality and value of the SREI Learning Community. The graph below shows the leaders' ratings.

Figure 3. SREI leaders' overall perspectives on value and implementation of learning community
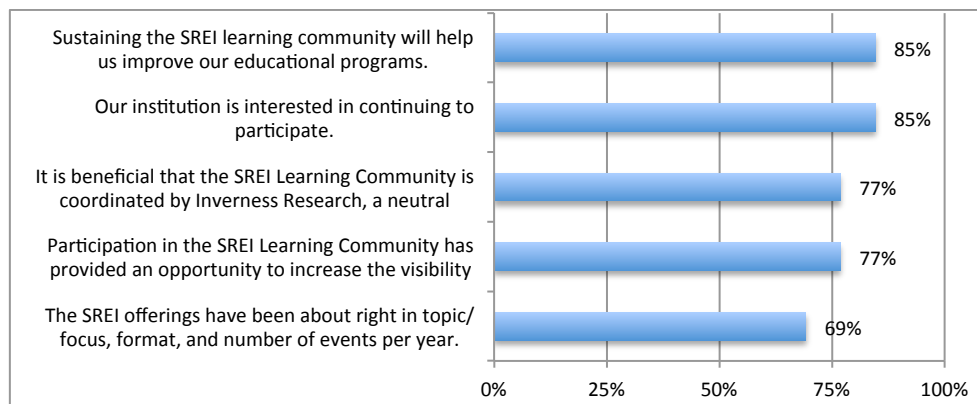
One respondent commented on the value of the newly established learning community and its potential to promote STEM improvement in the Bay Area:

> *For the past year and a half, the SREI strand has been the key player in the Bay Area for strengthening the capacity of SREI's to understand the NGSS and related endeavors - and thus impact the quality of professional development programs. Developing a robust learning community is a challenging task, but the SREI is off to a very positive start—and given the opportunity to continue, has the potential to profoundly effect the quality of STEM education that SREI's can provide.*

Another commented on how learning more about NGSS was of value to their institution:

> *Because of our knowledge and confidence with NGSS, we have been invited by districts and our local county office to design and deliver professional development programs for science teachers in our region. This has certainly increased our visibility in the formal education community.*

The survey helped us spell out the benefits of the SREI Learning Community for the leaders and their staff. It also suggested areas where they wanted to learn more.

Figure 4. Benefits of participation in the SREI learning community
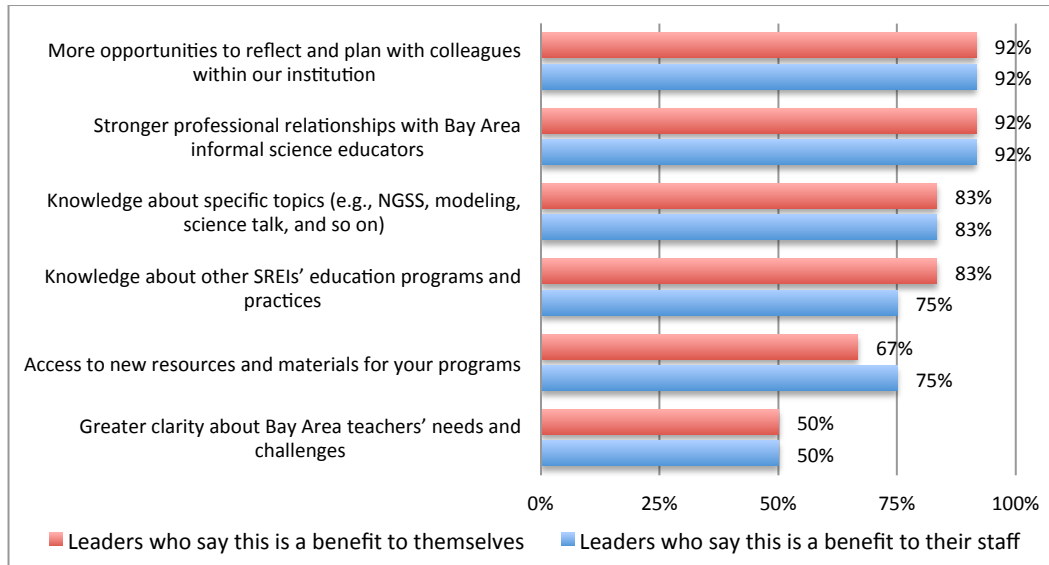
What about outcomes? The pair of comments below provided us and the funders with a realistic perspective on how the SREI Learning Community was contributing to the institutions. Educators were gaining new ideas, developing new shared language, and digging deeper into their work. Changes in practices and programs, however, were "subtle" rather than "dramatic":

> *Our staff has gained benefit from each of the SREI strands that we have participated in. The Science Talk journal clubs were very timely as we have been grappling with how to effectively promote Science Talk in the classroom. The readings, the discussions with colleagues from other institutions that continued in our office subsequent to the journal club meetings, helped to build a common language around Talk among our staff. It was also very helpful for all of us to learn what our colleagues from other institutions have tried (and what they are struggling with). We will be continuing to translate what we learned from these sessions into our work and professional development for teachers…*

> *We have learned new ways of thinking about science talk, modeling in the NGSS, and science and language (all of the sessions have contributed to our growth), and we have incorporated or started thinking about ideas from these sessions in all of our work—but shifts in our programs, practices, etc. have not been dramatic as a result...[our] programming has been dealing with all of these areas for some time—the SREI sessions have allowed us to dig a little deeper into our own work. So that has been very impactful. But the shifts have been subtle…*

This effort garnered funds for a second two-year grant.

When the initial grant was renewed for a second two-year period, the foundation alerted us that their priorities were changing and support would end after this grant. To shape the work of the second and final phase, we held a day-long retreat of the Design Team.

PHASE TWO—Action research to explore innovative "win-win" arrangements between informal and formal education

The Phase Two funding proposal had outlined a collective action research project focusing on innovative arrangements with formal education. Design Team members recommended that we adapt the structure of the action research, saying a very large collective effort would be too demanding on their staff's time. Instead, they suggested that institutions could choose to engage in smaller action research projects that focused on innovative arrangements between informal and formal institutions. Institutions could collaborate on studies if they wished. In parallel, we at Inverness Research would conduct a broader landscape study of informal-formal partnerships around the nation. The whole community would then come together to share their projects, results, and lessons learned in a culminating conference.

## Mini-grants: Low-risk, high-value investments in innovation

To fund institutional action research projects, we created a mini-grant program, based on the micro-funding model and the idea that small amounts of money can spur innovation when invested in strong organizations. To earn a mini-grant of $5,000, institutions had to meet simple criteria:
- ✓ Propose an idea **new to the institution** or a new dimension of something they had tried in the past. They could not use funds to operate existing programs.
- ✓ Explore a **formal-informal education arrangement designed to create a "win-win"** for both.

Institutions were encouraged to go out on limb and try something they wanted to do but could not support on their own. Thus the mini-grants were meant as a no- or low-risk investment for the institutions with the high probability of value for themselves and the community.

> ➢ **Lawrence Hall of Science and Alameda Unified School District: Guiding the formation of strategic partnerships to improve environmental education**

Lawrence Hall explored how—with its long history of working with district leadership teams on capacity-building for improved science education—they could serve as lead partner to help connect school districts with smaller, more focused SREIs in a region to form mutually supportive relationships. In the context of California's new Environmental Literacy Standards, the Hall brought in ChangeScale, an environmental education collaborative seeking to work more with school districts. The mini-grant enabled the Hall to connect Alameda district leaders with ChangeScale and to help facilitate a win-win partnership around environmental education. Sample visuals from their presentation:
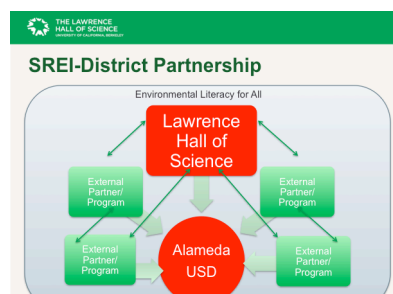
> ### California Academy of Science and Bay Area Discovery Museum: Joint seminars for Bay Area early childhood educators

Cal Academy and BADM collaborated to bring together more than 50 early childhood education leaders from a wide range of formal and informal learning organizations in the Bay Area. Over two sessions, they invited guest experts to share recent research on pre-K students' engagement in and learning of science. The sessions also served the purpose of connecting Pre-K educators Bay Area-wide and promoting science experiences for young children.

A senior education director from Cal Academy reached out to her counterpart at the Bay Area Discovery Museum, inviting her to collaborate on the mini-grant project so that, together, they could double their resources to $10,000. They could also share complementary areas of expertise in reaching out to Pre-K educators. The process of jointly planning and leading the two sessions brought floor educators from the two institutions together, enabling them to form greater mutual understanding. At the convening, they reported that they were continuing to find new ways to work together.

> ### Exploratorium and local "science champion" teacher leaders: Supporting classroom teachers' action research on the teaching of modeling as a science practice

The Institute for Inquiry (IFI) at the Exploratorium wanted to extend their inquiry into the teaching of modeling, following on the SREI Learning Community workshop led by UC Davis professor Cindy Passmore. IFI designed a tiered project that began with a day for informal educators to engage with visiting experts Maria Simani and Emily Miller to explore modeling as a way of learning science. This seminar was open to all in the SREI Learning Community and involved educators from five institutions as well as Inverness Research. IFI then invited a group of 40 local teachers—members of their BaySci leadership group—to participate in a workshop with Simani and Miller. From these, they invited eight teachers to apply for $500 mini-grants to design an action research project for their classrooms.

Here we feature the projects of two teachers who shared their studies with SREI educators at a conference that culminated the grant.

Modeling in 4th grade

A 4th grade teacher designed a modeling progression for her students. In sharing it with the SREI group, she commented on the opportunity to develop her professional knowledge through action research supported the Exploratorium:

> *I jumped on the opportunity to do the modeling project … modeling is a practice that I was avoiding. So much professional development is done with an artificial or previously determined outcome, especially for student achievement. This [action research] approach isn't like that. I love an authentic opportunity to do something like in BaySci, and then reflecting – it is huge.*
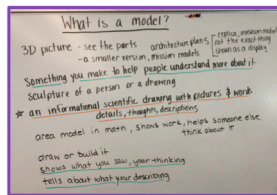
Sample visuals from her presentation:

Modeling Progression

Goal of progression: To allow students multiple entry points to express their understanding of the scientific concepts while engaging in investigations, discussion, notebooking, and modeling

Overview:
- What is a Model?
- Initial Model
- Explanatory Partner Model
- Revisit Initial Model

Value of Modeling for Students

Students recognize the value of modeling!
"My favorite part about science is making models because you get to put how you see it on paper." - Alessandra


Modeling in 3rd grade Title I

A third grade teacher working in a dual immersion English-Spanish program in a Title I school said the opportunity to develop her own approaches to teaching modeling in science empowered her to make a stronger case that her students could succeed in science:

> *My district is not being trained through BaySci, I just went. I've been at a Title 1 school my whole career, where we deal with high stakes accountability. I've been able to use my training to say, "I'm done with this curriculum - I'm doing this other stuff." There was some resistance at my school. This experience has given me tools and support to push back on that. I could not have done it on my own.*

Sample visuals from her presentation:
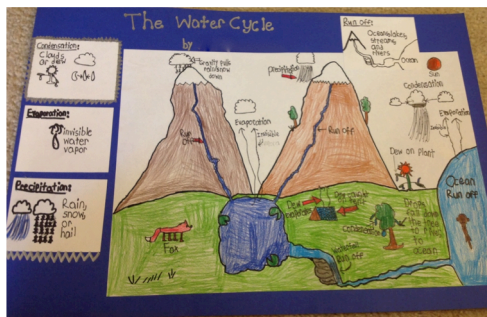
* Fully bilingual (IFEP) Spanish/English
* Strong literacy skills in English and Spanish
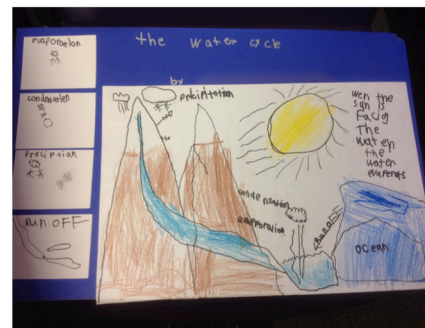
* ELL, Low SES
* RSP, ADHD, Occupational Therapy (3x a week)

A fourth mini-grant proposal, focusing on new ways to bridge in-school and in-museum teacher development with student field trips, was accepted. Unfortunately, the institution was undergoing transition in leadership and severe funding cuts, and could not conduct the project.

The results of the three funded projects showed that very small amounts of funding can reap significant rewards in the form of new knowledge, new relationships, new practices, and new capacity-building opportunities.

A landscape study: In search of effective partnerships among informal and formal institutions

Members of the SREI Learning Community wanted to know what they could learn from innovative partnerships outside the Bay Area. We at Inverness Research set out to document a variety of illuminative arrangements between SREIs and partner organizations. After interviewing leaders of the nine SREI institutions to capture their experiences and knowledge of partnerships, we identified 20 partnerships in other places that seemed innovative. We interviewed leaders and studied documents and web materials to learn more about their key features, the challenges they faced, and the benefits of such partnerships. Examples of the partnerships we studied include these:

Urban Advantage, funded by the city of New York, is a partnership among 8 informal science institutions in New York City, the New York City Department of Education, 370 8th grade teachers, and 35,000 students. The program started in 2004, when the American Museum of Natural History and the NYC department of education decided to work together to help students be more successful with the 8th grade exit projects for science and social studies. (This program is now called "long-term investigations.") Urban Advantage involves the SREIs in the partnership providing professional development for teachers (40 hours in the first year, 20 hours in years two and three, and at least 10 hours thereafter); $500 for supplies; vouchers for class field trips; vouchers for family visits; and three breakfast meetings per year for school administrators. Researchers at New York University have studied this program extensively, and have found that the partnership contributes to increased student achievement. Attempts are underway to replicate Urban Advantage in Denver, Boston, and Miami.

STEM Pathways is a partnership of Minneapolis Public Schools (MPS), the Minnesota Department of Education, and several Twin Cities STEM education organizations: the Bakken Museum, The Bell Museum of the University of Minnesota, the Minnesota Zoo, STARBASE Minnesota, and The Works. The partner organizations collaborated to create and deliver coordinated STEM education experiences to Minneapolis public school students. The program serves all 4th and 5th grade classrooms in six public schools. Pathways is coordinated by Beth Murphy, who had been working at one of the institutions but for this project, left that role and worked as the independent STEM Pathways coordinator. Positioning the hub leadership neutrally, rather than situating it in a lead organization, contributed to the success of the partnership. Evaluation studies show that collaboration among the organizations has been beneficial in providing professional development for education staffs at the SREIs and has enabled them to see themselves as part of a larger system that can make STEM outreach work in a way that is complimentary and strengthened by the expertise of the individual institutions.

We found a number of patterns in the range of partnerships we studied:

✓ They share a common mission of providing greater **access to science** with an emphasis on **equity and reaching under-served populations**.

✓ There are often **multiple partners** involved in school science improvement.
   - SREIs tend to be the partner that provides the **content**
   - Districts, schools, and out-of-school time organizations such as community youth organizations, libraries, etc., provide **access to youth**
   - Federal agencies, state agencies, school systems, philanthropies, and local community agencies provide **funding**
   - Government agencies also provide **policy** frameworks that motivate partnership formation

✓ Partnerships form around content this is at the intersection of what schools want and what SREIs can offer. SREIs must balance their unique strengths with schools' interests.

✓ The onus of initiation, recruitment, persistence, relationship tending, and communication lies more heavily on the SREI partner.

✓ SREIs only occasionally collaborate with other SREIs to develop and deliver content.

✓ Policy frameworks, governance systems, personnel regulations, and other conditions make partnering with the formal system more challenging than partnering with out-of-school organizations.

✓ Successful partnerships benefit both partners—they are win-win arrangements. They can:

Create access to science for under-served children;
Enable formation of new and more powerful professional communities of practice;
Enrich formal education with SREI unique assets—content, experiences, materials, pedagogy.

✓ There are a number of studies that show benefits to students and teachers.

Figure 4. Key design components of partnerships
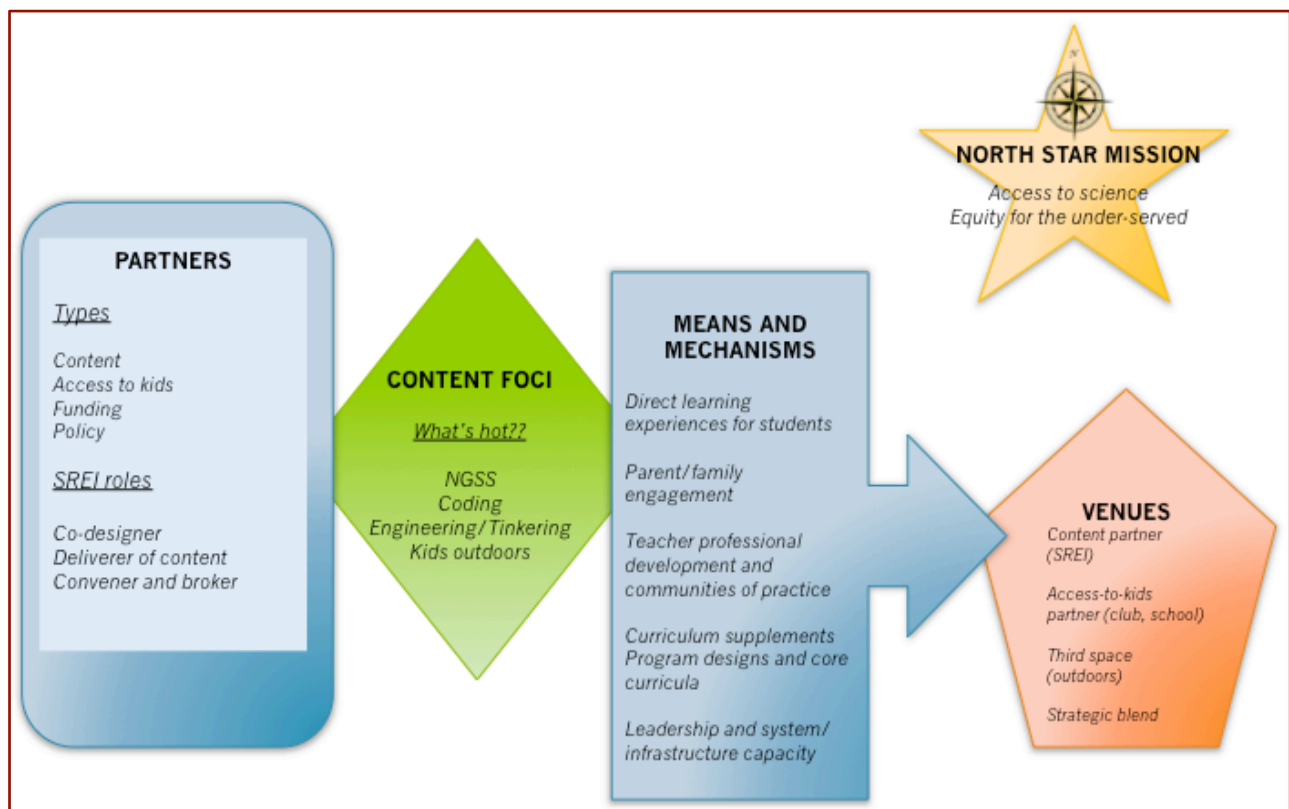
Bringing it all together

Members of the community closed out the SREI Learning Community grant with an all-day conference. The program centered on sharing the results, challenges, and lessons learned from the Mini-grant projects and the Landscape study that are described above. Special guest Beth Murphy, Director of the STEM Partnership in Minneapolis, shared her account of the formation and development of that partnership, as well as the challenges she faced and the lessons learned.

Beth's account of challenges she faced and how they were overcome resonated with the SREI Learning Community group. Challenges that most partnerships faced shared the theme of building a shared language among people in different contexts—shared language about NGSS, about the need for young students to experience and engage in science, about connections between language and science, and about the time, effort, and peristence it takes to form relationships across disparate organizations. All agreed that studying together, sharing practices, and exploring new ideas in a spirit of collaboration served as a way to begin building shared language.

A final reflection on need, feasibility and benefits

Science-rich institutions have the potential to make available uniquely rich science-rich assets to the formal system. Informal educators can play a vital role in the improvement of science teaching and learning. And yet SREI educators are at least as professionally isolated as their counterparts in the schools, perhaps more so. Like other professionals, they need and can benefit from opportunities to learn within a community of practice that spans institutions. With this grant, we learned that forming such a community is feasible and that it can generate a number of benefits.

SREI institutional realities mean that the support of cross-institutional learning communities requires a funding stream dedicated to joint work and collective benefit. Further, our experience suggests that such an enterprise requires coordination from a neutral hub that has the capacity to facilitate truly shared leadership and learning. While some large institutions enjoy endowments that sustain their operations, many institutions rely heavily on series of grants. This reality can create an inherent competitiveness among institutions in a service area, and it limits the time that educators can devote to their own professional learning.

The evolution of the SREI Learning Community shows that investing in cross-institutional professional learning can reap significant returns for the educators and their institutions—which ultimately benefits districts, schools, and teachers. Such communities provide a setting where SREI educators can direct their own learning, and where they gain valuable new knowledge, ideas, and practices. SREI educators also form new professional relationships that can lead to any of a number of innovations or joint ventures that would not have happened otherwise. This new human and social capital can be a key contributor to SREIs' capacity to help those in the schools strengthen science teaching and learning.