

A Watershed Moment

The First National Conference
on Science and Technology
in Out-of-School Time

September 17-19, 2008



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Produced by Project Exploration
and the Coalition for Science After School

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Electronic copies may be downloaded from:

Project Exploration - www.projectexploration.org/watershed/

The Coalition for Science After School - www.scienceafterschool.org

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Foreword

March 2009

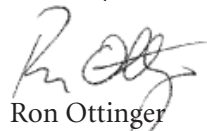
Dear Colleagues,

The Noyce Foundation was pleased to support the first National Conference on Science and Technology in Out-of-School Time in September 2008. We are equally pleased to share with you this publication, aptly entitled *A Watershed Moment*, which contains the key findings of the conference. From Dr. Eric Jolly's inspiring keynote address, to the informal breakout sessions, to the culminating panel of experts that surfaced the big ideas, the conference reinforced the Noyce Foundation's conviction that out-of-school science, technology, engineering and math (STEM) experiences can be the spark that leads to a life-long passion for discovery and innovation.

Recent research suggests that kids make choices about career direction as early as their middle school years. The Noyce Foundation believes that out-of-school, engaging, high quality, and hands-on STEM experiences will stimulate a larger percentage and wider cross-section of our nation's youth to pursue STEM careers and become lifelong scientific thinkers. We are focused on helping build an out-of-school STEM field that is consistent with the conference's major thematic areas. Together with other grantmakers, we are enabling the organizations that make up the Coalition for Science After School to realize the vision and aspirations represented at the conference in September. The stories from the conference and ideas in the thoughtful papers included in *A Watershed Moment* help translate these ideals into action.

We would like to offer many thanks to the conference participants and publication authors for pushing the frontiers of this critical work forward; we offer thanks as well for the leadership provided by the Coalition for Science After School and Project Exploration in bringing us together in September and documenting the conference.

Sincerely,



Ron Ottinger
Executive Director, Noyce Foundation

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Introduction: A Watershed Moment

At a time when the nation's economy demands greater science literacy and technical know-how from its workers, fewer students are embracing careers in science and technology. Overburdened schools under pressure to increase test scores are narrowing their curricula, often at the expense of science. Meanwhile, parents are working longer hours, and are seeking out-of-school time programs.

Museum educators, youth workers, teachers, and others interested in science beyond the classroom are seizing after-school, weekend and summer opportunities to engage young people's sense of wonder and curiosity. Over 300 strong, they responded to the "fierce urgency of now" by coming to Chicago's Navy Pier, September 17-19, 2008. The national Coalition for Science After School and Chicago-based Project Exploration joined forces to organize a conference to address both the big-picture and hands-on issues facing those who help youth access science and technology beyond classroom walls. It was a chance to push the questions: Who is science for? How do young people access science? This gathering heralded the birth of a new field: science and technology learning in out-of-school time.

This nascent field faces many challenges. Scientists want to engage young people but often don't know how. After-school staff thoroughly versed in youth development may feel at a loss when asked to integrate science and technology into their programs. Small but excellent programs often lack the necessary champions and resources to scale up and sustain themselves for the long haul. Funders need help evaluating programs and convincing their stakeholders that supporting STEM within and beyond the classroom can be mutually reinforcing without losing focus.

Practitioners came to the conference eager to learn. They came to share ideas and strategies that work. They asked honest questions of each other: how to improve what they offer, how to train staff, how to assess their work and its impact. Most importantly, they came to connect. At least one participant ran out of business cards from meeting so many potential partners.

From the kickoff reception at the Adler Planetarium, framed by Chicago's skyline, through Dr. Eric Jolly's keynote address, plenary sessions, workshops, hosted dinners around the city, and impromptu discussions in the hallways during breaks, the energy stayed high and focused. What follows are highlights from the first National Conference on Science and Technology in Out-of-School Time.

This publication is intended to offer a snapshot of the conference—the ideas, issues and themes that emerged—as well as document the moment in which hundreds of people came together from around the country to mark the beginning of something new for young people and for science. In the reflective essays and recommendations that follow, conference presenters, many of whom have been working for a decade or more to engage young people with science, offer a glimpse into what is on their minds at this very exciting "watershed moment." To see the September 17-19, 2008 conference program, visit www.ScienceAfterschoolConference.org/pdf/ScienceConferenceProgram.pdf.

Sincerely,

Gabrielle Lyon
Cofounder and Executive Director
Project Exploration

Jason Freeman
Director
Coalition for Science After School

The Conference: A Summary

1. Welcome and Charge to Participants



Photo B. Garamella

The Adler Planetarium buzzed with conversation during Wednesday night's opening reception. Some conference participants arrived early to take part in a daylong training session at the Museum of Science and Industry. Others had just checked in and were ready to network. All were eager to hear from the University of Chicago's Edward "Rocky" Kolb, who combined an engaging synopsis of the history and current state of our knowledge of the universe with a charge to the assembly:

"I believe there is a child out there with the imagination, genius and curiosity to discover answers to our mysteries of the universe, and more importantly, discover new mysteries of their own. It's up to you to get that child interested in science and keep that child going through grade school, high school and into college."



Photo M. E. Perez

Eileen Sweeney of conference co-sponsor Motorola Foundation also welcomed participants and praised their efforts to address the lack of a pipeline to STEM careers, which she said is endangering U.S. competitiveness in the global economy. "We think it is a crisis when we can't hire Americans. We think it is a crisis when we have to use all our visas to get engineers. We think you're part of the solution to that crisis."

2. Keynote: There's No Time When They're Not Learning



Photo C. Gustafson

Eric Jolly is known for his contributions to mathematics and science education. A psychologist by training, he is the author of numerous books, articles, and curricula for students and teachers across the educational spectrum, including a comprehensive resource for teachers of Limited English Proficiency students, *Bridging Homes and Schools*. In 2004 he co-authored *Engagement Capacity and Continuity: A Trilogy for Student Success*. In this paper, Dr. Jolly argues that even successful individual reform efforts have led neither to broader increases in student achievement at high levels nor to more young people entering scientific and technical fields because most reforms focus on one element of the trilogy without linking to all three.

As president of the Science Museum of Minnesota, Dr. Jolly has led innovative efforts to reach beyond the "usual suspects" who visit museums, to try new approaches to applying science content in informal settings, and to collaborate with schools and school districts. Prior to joining the museum, he served as senior scientist and vice president for the Education Development Center in Newton, Massachusetts. He is also a life member of the Society for Advancement of Chicanos and Native Americans in Science.



Photo B. Garamella

Out-of-school programs have distinct advantages in hooking kids on science, Dr. Jolly observed. One key advantage is available time. "I've never been able to find the switch on a kid's head that says, 'I'm in school. I'm out of school.' There's no time when they're not learning." While a traditional six-hour school day and 180-day school year occupy about nine percent of children's lives, 42 percent of their time remains "unprogrammed by anyone other than the makers of Nintendo. I need you to be better than the makers of Nintendo."

“We spend millions on engagement, millions more on capacity-building and billions on continuity. How is it that so much success leads to so little progress?” he asked. While schools traditionally handle capacity, and out-of-school programs have shown evidence of success in engaging students in science, their efforts are uncoordinated and continuity gets lost. “Finding the ways to assure that all three are present at the same time, that’s a part of what’s essential for success.”

“I’m not talking about augmenting school,” Jolly cautioned. After-school science doesn’t have to look like an in-school science class to build continuity. His advice to fellow practitioners: “Lay out the problems, the stuff of their world, and help them explain it.”

Though out-of-school programs have an important role to play in helping kids access all three elements of the trilog in age-appropriate ways, he noted, “We can’t do it all. We can’t even see that it all gets done. How can we do that when we can’t do it all? Do what we can do well, find partners who can make the rest happen.”

3. Workshops & Breakouts

At the heart of the conference lay the 21 workshops and breakout sessions. Workshops were organized into four themes: programs, curricula and activities; staff development; assessment and evaluation; and infrastructure and systemic change. The conference also included two open-scheduled breakout sessions where participants could gather and conduct their own conversations, deepening workshop discussions and introducing new topics of their own. Here’s a sampling of workshop topics, activities, key ideas and continuing questions.

In formal workshops and informal discussions, key questions about science after school arose repeatedly:

- As after-school providers, how much do we allow young people’s choices and interests to drive curriculum?
- To what extent is our content inquiry-based?
- Does what we do engage young people while also providing the scientific knowledge and skills they need?

“How do we pull this work off with a mostly transient workforce that doesn’t have a science background?” asked Ron Ottinger, of Noyce Foundation.

Over nearly two decades, Community Science Workshops have grown from one man’s garage in San Francisco’s Mission District to a dozen in California and new sites sprouting up in Boston, Houston, Miami, New Orleans, Newark, N.J. and Washington, D.C. Curt Gabrielson, who runs the Workshop in Watsonville, California, advised others who want to scale up like this to “find a champion.” He also warned that scaling up informal science education doesn’t necessarily equate to franchising. “It’s not like Starbucks. It’s got to be so integrated with the community that it comes from the community.”

Summer science programs encourage students to use their creativity in hands-on challenges like the one presented to workshop attendees: in ten minutes, build a bridge out of popsicle sticks, yarn, cardboard and tissue paper that can hold two weights of two-and-a-half pounds each.



Photo M. Her



Photo M. E. Perez



Photo M. Kelleher



Photo M. Kelleher

Coalitions like the National Girls Collaborative Project (NGCP) are helping after-school programs break through the usual patterns of operating in isolation and competing for scarce resources. The NGCP offers an online directory that helps groups find each other to partner and use the strengths of one group to meet the needs of another, and vice versa. In an opening exercise, workshop participants were invited to role-play different groups trying to partner, such as a technology company and an inner-city youth program, and create a project that could be done on a \$1,000 budget.



Photo C. Gustafson

Later in the same workshop, panelist Robert Russell of the Self-Reliance Foundation offered some reflection questions to consider before beginning any partnership. “Before collaborating, consider: do you have the capacity? Are you overwhelmed on other things? Who gets to do what?”

Whether or not one agency ultimately decides to collaborate with others, the skills to partner well must be used inside agencies as well as among them. “Collaboration and coalition building don’t just happen between organizations. Anyone who’s worked inside large organizations knows that,” said Jason Freeman of the Coalition for Science After School.

4. Panel: Equity and Access

On Thursday afternoon, panelists Harold Asturias and Diane Miller spoke with moderator Jane Quinn about the meaning of equity and access and their experiences of working with museums, communities, teachers and school systems to help underrepresented young people engage with math and science.

Panelists and Moderator: Harold Asturias is the director of the Center for Mathematics Excellence and Equity, Lawrence Hall of Science at the University of California, Berkeley. Diane Miller is the senior vice president of school and community programs and partnerships at the Saint Louis Science Center. Jane Quinn, moderator for this panel, is the assistant executive director of community schools for The Children’s Aid Society in New York City.

Take-Away: Equity

- Equity does not mean offering everyone the same thing; it means knowing each one well enough to tailor offerings to meet individual needs.
- “You want to get to know people, understand people,” said Miller.
- “Equity means serving those who have been underserved, doing it deliberately, looking not at the group but at each of the individuals and their needs. That is easier said than done,” said Asturias.

Take-Away: Access

- Access means constantly evaluating whether what is being offered meets the needs of the widest possible range of people.
- “Access is finding what the barrier is and not just making some token adjustments but actually eliminating it,” said Miller. “It’s not just thinking about it when a particular group shows up but thinking about it all the time.”
- To provide access, Asturias suggested asking ourselves, “Are we providing the right programs, the right experiences? What do people need to enjoy those experiences?”

Take-Away: Partnership

Asturias offered some insights on working with schools and districts from his experiences in teacher and principal training. “With many state standards, it’s hard to deduce what’s most important to learn.”

Developing coherence is key both for policymakers and for school staff on the front lines, he added. “Thinking about coherence means thinking about who’s doing the math? Who’s doing the science? Who’s using the language of math and science? It’s useful for teachers and principals. What am I looking for when I’m in your classroom? How do we support that? Then we can go talk to after-school providers.” Coherence also operates in terms of the organization at large: “Have you put together a plan to develop the next level of leadership to replace you?” asked Kenneth Hill, of the Chicago Pre-College Science and Engineering Program

Partnership is not “me showing up when I need a letter for a grant,” Miller noted. It requires time, patience and a willingness to extend oneself to meet needs even when they weren’t anticipated.

Miller told a story of working with a museum that wanted to partner with a particular neighborhood, but had reservations. “We don’t want to go down there. Can’t we hire someone?” they asked her.

“How are you going to work with people you are afraid of?” she asked back. “Maybe that’s not the community you want to start with.”



Photo B. Garamella



Photo B. Garamella

5. Panel: Scientists in Action

On Friday morning, panelists Dr. Lisa Egbunu-Davis, Dr. Leon Lederman and Dr. Paul Sereno spoke with moderator Laura Washington about their own journeys to become scientists and their views on how best to develop public understanding of science and the next generation of scientists.

Panelists and Moderator: A former vice president with pharmaceutical giant Pfizer, Dr. Lisa Egbunu-Davis currently works to reduce the health and educational disparities faced by minority and disadvantaged youth. Dr. Leon Lederman is Director Emeritus of Fermilab in Batavia, Illinois, Pritzker Professor of Science at the Illinois Institute of Technology, and recently served on the National Science Board Commission on 21st Century Education in Science, Technology, Engineering and Mathematics. Dr. Paul Sereno is a paleontologist at the University of Chicago, an Explorer-In-Residence with National Geographic and the co-founder and president of Project Exploration. This panel was moderated by nationally-acclaimed Chicago Sun-Times journalist Laura Washington.

Take-away: Underfunded school systems, ill-prepared teachers, and disengaged young people all point to the need for science outside schools. Out-of-school time settings offer students who may not succeed in formal academic settings an opportunity to find success and inspiration.

“I’m a product of out-of-school science. I was pretty much failing out of school at various points. I did all the science I remember from plant collecting, bug collecting, building go-carts,” said Sereno. It wasn’t until well into college that he discovered his vocation in paleontology by taking a behind-the-scenes tour of a museum. “That journey, which is really rooted in the out-of-school-science experience, is an American story.”

“We’re not approaching teaching right,” observed Lederman. “Teachers come out of their schools ignorant, afraid of math and science, and they transmit that to the kids. If you’re going to teach kids you’ve got to have people who have a sense how science works.”

“It’s not easy for a lawyer running a tennis program to find somebody who can help him teach science through physics or the epidemiological issues in community problems,” said Egbuonu-Davis. But it can be done. Young people collaborated with researchers at the Albert Einstein College of Medicine to investigate health disparities in the Bronx and developed a mental health intervention project. “That’s science. That’s what really matters to them. The challenge is to find out what the target population is interested in and help them use science to deal with some of those issues.”



Photos B. Garamella



Photo B. Garamella

Take-away: Good science programs in and out of school can spark wonder and help young people, their families, and communities solve real-world problems. Spreading the word that these programs exist is key.

“The glory of science is the joy of doing science...the fantastic emotional reaction to making a discovery that nobody knows. This should be an important part of the teaching of science at all levels,” said Lederman. This won’t happen until parents push for change, he noted. “We’ve got to get to the parents. We need parents’ classes. Parents will determine how the schools evolve.”

“Out-of-school time on science is a secret to most parents. They don’t see it. People don’t know what the options are,” said Sereno. To address this, Project Exploration put together an online and print guide to summer science opportunities entitled Discover Your Summer. Their experience with families shows strong engagement once they know about a program. “A single parent, two parents, a grandmother, they are very, very interested once you get them in. It makes a huge difference in engaging that kid. It helps to give them some responsibility to take their kids somewhere to get them engaged. Then they’re going to be dragging their next sibling in and their friends’ kids in.”

“I would try to multiply these peer-to-peer efforts, as well as the connection to more senior scientists,” said Egbuonu-Davis. “If we could multiply that over and over again, we would change the expectations and aspirations of these young people. Let’s scale it; let’s multiply it.”



Photos B. Garamella

Take-away: Changing the face of science and education will require deliberate strategies likely to be led by out-of-school time providers.

“People like to say we’re in a post-racial society. We’re not. If you ask people to draw an image of a scientist, it looks like Leon [Lederman], OK? It doesn’t look like me. You have to counteract it with images of scientists who are female, of color. That has to be done in after school because the rules about what’s in and out of curriculum in school are too difficult to deal with. We have to deal with those assumptions and we have to deal with them explicitly,” said Egbuonu-Davis.

“We need to stand up and say, ‘We need a 21st century educational system that includes out-of-school time and includes adults. We need a system that supports learning from birth to death,’” said Lederman.

“Keep doing what you’re doing. Keep these conferences rolling,” Sereno advised. “What is now a small field will have to become a much bigger player in the game. We have a great opportunity for creativity in this country that other countries don’t have.”

Continuing Questions

“I’m alarmed that a lot of young women do leak out after they get a Ph.D. How can we help address that?” Anita Krishnamurthi, NASA Goddard Space Flight Center

“How do we provide meaningful incentives to faculty [to mentor young people]?” Paul Sereno, panelist



Photo B. Garamella

6. Big Ideas and Next Steps

To close out the conference, Project Exploration’s Gabrielle Lyon moderated a Friday afternoon panel on the “big ideas” in science learning and youth development, which included a brainstorming session in which panelists and the audience collectively proposed the next steps for the field.

Panelists and Moderator: A trained physicist, Dr. Alan Friedman, formerly the director and CEO of the New York Hall of Science, now serves on the National Assessment Governing Board, which sets policy for the National Assessment of Educational Progress (NAEP), “the nation’s report card.” Lucy Friedman (no relation) is president of The After-School Corporation (TASC), which seeks to promote universal after-school programming as a public responsibility across the United States. Robert Horton is Professor of Educational Design at The Ohio State University, provides direction for the creation of Ohio’s 4-H Youth Development curriculum materials, and was elected to the Worthington Board of Education. Moderator Gabrielle Lyon is cofounder and executive director of Project Exploration.



Photo B. Garamella

Panelist Reflections

“I predict in 30 years people will remember this meeting. There’s a critical mass here, and it assembled very rapidly. No one would have thought to have a meeting about science after school ten years ago.” Alan Friedman

At 4-H, “students’ interests drive the curriculum. They have a personal relationship with a caring adult. It’s a safe environment; they feel protected. There’s peer-to-peer learning. Kids are going to seek out these nurturing kinds of things whether they are positive or negative. That particular set of behaviors can also explain why kids join gangs. That is the negative kind of youth development we are trying to fight against.” Bob Horton

“There were two conversations: one connecting to school and curriculum, and one connecting to the social issues of kids. They are different, but there is a range where they intersect very fruitfully.” Alan Friedman

“What is really core about science? It isn’t a set of formulas, it isn’t basic facts. It’s a habit of mind. Part of human development is learning multiple ways of looking at the world. We’re giving kids another way of looking at

the universe.” Alan Friedman

“Why science? I couldn’t say it any better than Alan. It strengthens the after-school world to bring in those habits of mind: problem solving, critical thinking, access to technology, teamwork.” Lucy Friedman

“We know that kids of color probably have some models of artists and political leaders in their communities, but we know science is a place where they don’t see people who look like themselves. I’m more convinced than I ever was about the importance of science for the after-school movement.” Lucy Friedman

Congress already has two relevant caucuses: one on STEM and one on after-school programs. *“We should be taking advantage of those Congressional leaders who have already indicated interest in one or another of the fields.”* Lucy Friedman

Lucy Friedman also offered a set of challenges to the movement:

- Change the attitudes of principals and community organizations about the possibilities of doing quality science outside the classroom.
- Involve families more.
- Strengthen this community of practice.
- Recruit those not already engaged, especially skeptics and people of color.
- Organize for policy advocacy.
- Avoid becoming too much like school.
- Take a hard look at efforts that failed “so we don’t repeat mistakes.”

Continuing Questions

“How do we get from evaluation as something that we need to prove this stuff works to [something we use] to see whether it works?” Bob Hirshon, American Association for the Advancement of Science

“We’ve got this wonderful theory: engagement, capacity, continuity. We’ve got to put it into practice. Are there communities that have the capacity to put this together?” Ron Ottinger, Noyce Foundation

After the Conference

After the conference, participants were invited to join <http://scienceafter-school.wikispaces.com>, a collaborative web site where they could continue to share information and converse online.

During the final session on Friday, participants suggested a number of next steps, which directly addressed Friedman’s challenges and which were captured by Project Exploration staff for future reference. And many attendees echoed the sentiment: *“Let’s do this again next year!”*



After-School Science And Technology Fact Sheet

From the Coalition for Science After School

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80% of future careers will demand knowledge of science and technology.

Scientists do not all work in labs, and not all engineers build bridges. Science and technology are needed in almost every career now and in the future—from doctors, nurses, and lab technicians to architects, designers, and construction workers. If children think science and technology is not for them, they will find themselves left out of most careers.

Being interested in science may be more important than being good at science.

It is no surprise that children will not pursue something that they do not find interesting or do not think is available to them. Interest in science among 8th graders is proven to be a better indicator than test scores for predicting future career choices. A child may get A's in science and math in school, but he or she may not make the connection between the classroom and the future.

Schools alone cannot create future scientists and engineers.

Science in school is necessary but not enough to support students' interests in science. Children need time to explore and discover on their own, and with the help of programs that take place out of school. Playing with robots, blocks, bugs, and plants will help students when it comes time to learn physics, chemistry, and biology—and will help them stay interested in science over time. After-school, weekend, and summer programs are important opportunities for students to explore and discover science and technology.

There are thousands of resources available to build science and technology programs for kids before and after school and in the summer.

By combining the forces of hundreds of hands-on science centers with the youth-serving experience of 4-H, Girls Incorporated, Girl Scouts and many more organizations seeking to connect youth with high quality learning experiences, the Coalition for Science After School can meet any demand for science and technology programs. However, communities must take the lead in using these available resources in ways that are appropriate locally.

How can parents support science and technology learning outside of school?

- Ask your child about their ideas and how they think things work; encourage your child to ask questions.
- Take your child and his/her friends to a park or museum; encourage them to “play” with science.
- Encourage your child's after-school program or summer camp to include science and technology.
- Volunteer to build relationships between the after-school program and local science and technology resources, such as museums, businesses, colleges, and universities.
- Educate public officials about the potential for after-school science learning.

How can after-school programs include science and technology?

Commit to science and technology as part of regular programming. Program staff can and should teach science. There is a lot of “fun” stuff on the internet to help. When it comes time to teach kids science, evidence shows that sequential and focused programs are most effective. The important thing: focus on kids' questions and ideas rather than specific facts.

Find a partner.

Your local science museum is probably eager to help. Many youth-serving organizations now have science components, such as 4-H Science, Engineering, and Technology, Girls Incorporated's Operation SMART, and Girl Scouts' Design and Discovery.

Get help.

Seek training opportunities at national and regional conferences; science and technology is now part of many after-school professional conferences. There are also resources available online specifically to help after-school organizations with science and technology programming. The Coalition for Science After School (www.ScienceAfterschool.org) provides a starting point for your search.

Contact the Coalition.

If you need support in adding science and technology content to your program or your staff development opportunities, contact the Coalition for Science After School: ScienceAfterschool@gmail.com or (510) 642-8106.

The Onus Is On Us

By Gabrielle H. Lyon

About the author: Gabrielle Lyon is cofounder and executive director of Project Exploration, a nonprofit science education organization that develops and implements programs to ensure underserved communities, particularly minority youth and girls, have access to state-of-the-art science education, regardless of academic achievement. Prior to founding Project Exploration, Lyon served as the director of the School Change Institute at the Small Schools Workshop at the University of Illinois at Chicago and was a Fellow with the Southern Poverty Law Center's Teaching Tolerance project. Together with Jason Freeman, she co-organized the conference.

Carla, a 10th-grade Guatemalan-American girl, is sitting at a computer at her local library. She's looking for a science program, something that will let her do chemistry, maybe even chemical engineering, during summer vacation.

She started her search enthusiastically with a list of key words she'd brainstormed the night before. But two hours have gone by, and she only has a handful of possible programs. Most are out of state. But that's not what worries her. All the programs are for "high-achievers," and all but one have a hefty price tag. There is one program that is free and especially for girls, but it requires a 3.5 grade point average, something she doesn't have. She's doing well in math and science, but she's struggling in her other classes, especially ones that require a lot of writing or public speaking.

Adults at her school haven't been much help. Her chemistry teacher encouraged her to look for an out-of-school science program after her lab presentation last week. Yet he didn't know of any chemistry programs in the area, although he was pretty sure there was a summer astronomy program at the city planetarium. Her guidance counselor knew even less about science opportunities. "I wasn't very good in science in high school," she'd laughed when Carla came in to ask for advice.

Carla's Internet session time is up. She's disheartened and not sure whom she can ask for help. "This probably just isn't going to work out. Maybe chemistry just isn't for me," she thinks as she signs off the computer session and closes her notebook.

When I started Project Exploration nine years ago, I had no idea how difficult it was for students like Carla to get involved with science, though I had a sense that there weren't very many opportunities.

My own entree into the world of science was through the back door. In the midst of working on Chicago school reform, I became involved with paleontological expeditions to Africa and South America, first invited to serve as an expedition "scribe," and eventually, to help organize epic endeavors across the Sahara. These were spectacular adventures, and I returned from each expedition eager to find ways to share my experiences in the field with the students and teachers I worked with in my "day job" at the University of Illinois' Small Schools Workshop.

As I continued to participate in dinosaur expeditions and the subsequent press and scientific announcements around new discoveries, I was increasingly struck by how few "regular" people had the chance to actually interact with scientists.

Museums worked on a "macro" level with programs designed to reach thousands of people each day, but visitors mostly interacted with artifacts and science in an abstract way. Special programs existed for students, but they either needed to perform in the top 10% academically or come from a family that could pay for a program. In both scenarios, the science programming being offered was usually secondary to the host institution's primary mission. The more I looked around, the more it seemed it was no one's main job to ensure that regular students could get involved with science, and the programs that were available weren't designed with students' lives at the center.

In response, I cofounded Project Exploration, with my husband Paul Sereno, a nonprofit organization dedicated to making the wonders of science accessible to the public—especially minority youth and girls—through personalized experiences with science and scientists.

As Project Exploration got off the ground, we worked to develop and implement science programs that would not only GET students interested in science, but also KEEP students interested in science and equip them with skills and experiences that would enable them, should they want to, to pursue science in college and beyond. We focused on figuring out how to foster long-term relationships with our students. Not only was each student known by name, they had opportunities to explore their own interests, talents and skills. In these programs, scientists taught content based on their active research; our students entered a conversation about big ideas and authentic questions. Reading and writing together was a key component for reflecting on and sharing our experiences and ideas. Public presentations became key ingredients in every program.

Most of all, we worked hard to engage students otherwise overlooked, specifically students who might not be academically successful but who were open-minded and curious. This required us not only to think about the programs themselves but how to connect students' successes to their academic lives so that their experiences with Project Exploration could serve as a springboard for being known for their talents, skills, and successes in their schools and families. For many of our students, Project Exploration was their first successful academic experience.

All the while, we didn't really fit in to a familiar organizational category. As the questions of how we were doing and how we would know that became more pressing, we weren't exactly sure how to compare ourselves to others or what measures to use.

After five years, we conducted a longitudinal evaluation of the impact of our programs on kids' lives. It was our first attempt at a rigorous snapshot of who we were serving and what was happening with them over time. Between 1999 and 2005, Project Exploration served over 500 students ages 12-17 from 45 communities across Chicago.

- Approximately 85% of students were from low-income families.
- Programs served a diverse group that reflected Chicago Public Schools demographics: 65% of students were African American, 25% Latino, 10% Caucasian.
- 73% of students were girls; 27% were boys.
- 81% of students maintained a relationship with Project Exploration two years after their first program experience.

Given the context of our students' lives, our longitudinal evaluation of students engaged in our science field programs revealed three remarkable facts:

- 96% of Project Exploration seniors had graduated from high school;
- 61% of students involved with our field programs enrolled in a four-year college;
- 34% of all students and 43% of all females who graduated from high school as Project Exploration field alumni were majoring in science.

The net impact of participating in a Project Exploration field experience was a dramatic increase in the likelihood that a given student would seek an undergraduate degree in science.

While this quantitative information reassured us we were doing good work, it was what students told us in focus groups and interviews that gave us direction about our future program growth and development. Students' statements were humbling and inspiring for everyone involved with Project Exploration. We'd had no idea just how profound some of our students' experiences had been. They talked about how valuable writing had been for them in all arenas of their lives. They told us Project Exploration wasn't really a program because it never ended. They told us that we were the only program they'd done where people knew their names. They told us their experiences with Project Exploration affected the way they thought about decisions. They said we were their family.

These ideas challenge us—and anyone who cares about creating spaces for students to do science—to think deeply about what it means for young people to engage with science alongside caring adults who know them. Our

students' experiences tell not only that science is possible for all students but also that it should be for everyone. All of this begs the question, why would a relatively small, relatively new organization preoccupied with serving students in Chicago get involved with co-organizing a national conference? Because we're selfish. We need help! There is SO much to do!

- Developing programs
- Implementing programs
- Documenting our work
- Recruiting students
- Retaining students
- Recruiting scientists
- Preparing scientists
- Budgeting
- Evaluating
- Reporting
- Communicating with stakeholders
- Reaching out to teachers
- Involving parents
- Sharing successes
- Raising money
- Raising money
- Raising money
- Learning from our work
- Honing our practice
- Assessment
- Disseminating our work
- Collaborating with colleagues
- Leveraging opportunities on behalf of our students
- Planning
- Reporting
- Responding to students' needs
- Staff professional development...

The work is hard. There are a lot of questions. We can't be the experts at everything. It's too much to do by ourselves, and it's not in the best interests of our students. Our organization, like the students in our programs, is growing, changing, learning. It's why the National Conference on Science in Out-of-School Time was so critical for us.

Project Exploration partnered with the Coalition for Science After School to launch the first national conference on science and technology in out-of-school time because ignorance is not bliss. Convening colleagues we didn't even know we had was exciting. Meeting people from around the country who are asking many of the same questions was comforting and compelling. But most of all, the conference gave us a chance to see, for the first time, the world we are working in.

We want to be able to tell Carla about programs that might be a fit for her. But ultimately we want to help shape the conversation about who science is for and what we need institutionally, locally, and nationally, if we are to change how opportunities happen for our students, for your students. For us the issue is one of access and intentionality.

Despite an acknowledgement of the need for investment in science and education, there are limited options for science in out-of-school time for most students. Perhaps equally of concern is the shape that these programs continue to take, despite decades of research that suggests short-term programs and programs which target—explicitly or implicitly—academically successful students ultimately continue to disenfranchise the students the nation must engage in the interests of equity and democracy.

We have learned from our students that many of the obstacles to participating in science can be changed. Some of these obstacles include:

- eligibility requirements that use academic achievement as the primary filter;
- fee-based requirements for application and participation;
- impersonal experiences that fail to connect to students' lives outside of the program or fail to offer students ongoing opportunities to connect with science; and
- lack of easily available information about science programs.

Project Exploration is trying to address these kinds of access issues in our own practice; we believe we have promising results and that we need to understand these results better. If we are to recruit and retain students least likely to get involved with science—minorities, girls, English language learners, students who struggle academically—the onus is on us. The onus is on all of us who work in science and education, and most of all those of us who work to create opportunities where otherwise none would exist.

Carla is waiting.

To learn more about Project Exploration visit www.projectexploration.org. If you wish to share or cite this essay, please use the following citation:

- Lyon, G. (2009) *The Onus Is On Us*. Chicago, IL: *A Watershed Moment: The First National Conference on Science and Technology in Out-of-School Time*. www.projectexploration.org/watershed/

Finding the Balance

By Pam Garza

About the author: Pam Garza is the National Project Director for Professional Development at the National 4-H Council. In this role, she coordinates professional development through workshops and online education for the nation's largest youth development organization, with a particular focus on STEM. Since its founding over a century ago, 4-H has evolved from focusing primarily on rural youth to serving over 6.5 million young people through programs in STEM, healthy living, and citizenship. Through a wealth of projects, including ones focused on rocketry, GPS mapping, and DNA analysis, 4-H youth learn leadership, citizenship, and life skills. The following paper summarizes Garza's conference presentation, "Staff Development: Finding the Balance."

Youth programs are essential to engaging young people in STEM, especially those from underrepresented groups, but the after-school field has struggled with how best to provide professional development to offer high quality STEM content. The after-school field needs capacity-building mechanisms that are based on research, easy to implement, durable and repeatable, reach large numbers of staff, and communicate critical knowledge and skills. Yet there is relatively little research to guide the selection of effective professional development approaches for after-school STEM, and few studies that have assessed these practices with respect to outcomes associated with high-quality informal science education.

Despite the lack of research, after-school programs are out there preparing their staff and volunteers and have been doing it for a long time. After-school programs are determining each day the balance they provide between science content and the context of youth development. As we prepare our staff and volunteers, we need to be clear on what is critical to our organizations. The professional development workshop presented by National 4-H Council called *Finding the Balance* used 4-H to illustrate how the nation's largest youth organization, with an articulated commitment to educational programming in sciences, is working to find the balance of content and context in a manner that supports both science learning and positive youth development. This illustration was used to continue the significant discussion for informal educators on this controversial subject.

By using a hands-on "experiment," Dr. Bob Horton led participants through an activity and modeled the fine balance of science content with a hands-on, learning-by-doing approach that 4-H has been using throughout its long history. Participants worked with simple, everyday items like disposable diapers, water and measuring cups and spoons. They explored what was in the diapers that made them superabsorbent (polymers called hydrogels). The discussion helped take their experience with everyday items to think about how scientists and engineers might use hydrogels to care for our most vital resource—water—as well as the implications of their use. This "experiential" approach was critical to the discussion to engage others in how they were preparing their own staff and volunteers. It included the significance of being intentional about each organization's decision about the importance of the science content, the needed science inquiry skills that are critical, and a youth development approach. The participants began to discuss and tease apart the complexity of this significant topic. Unfortunately, this deep a topic could not adequately be covered in such short a time.

In addition, National 4-H Council shared with participants a checklist of the components deemed critical to doing 4-H SET (STEM) and the beginning draft of competencies for staff and volunteers working with youth as informal educators in STEM. (See attached Checklist.) These tools are critical to 4-H building a sustainable infrastructure that focuses on the professional development of staff and volunteers to deliver high quality SET. The opportunities to have these rich discussions and share tools across organizations remain invaluable in being able to move forward, learn from each other and strengthen everyone's efforts to prepare those who work with youth as informal educators, so that we all can have a significant impact on the youth we reach.

To learn more about the National 4-H Council visit www.fourhcouncil.edu. If you wish to share or cite this essay, please use the following citation:

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4-H SET (Science, Engineering, and Technology) Checklist

To meet the needs of children, youth and the nation with high-quality science, engineering and technology

	<p>Are you providing science, engineering and technology programs based on National Science Education Standards?</p> <p>Science education standards are criteria to judge quality: the quality of what young people know and are able to do; the quality of the science programs that provide the opportunity for children and youth to learn science; the quality of science teaching; the quality of the system that supports science leaders and programs; and the quality of assessment practices and policies. http://www.nap.edu/readingroom/books/nse/</p>
	<p>Are you providing children and youth opportunities to improve their SET abilities?</p> <p>Predict, Hypothesize, Evaluate, State a Problem, Research Problem, Test, Problem Solve, Design Solutions, Measure, Collect Data, Draw/Design, Build/Construct, Use Tools, Observe, Communicate, Organize, Infer, Question, Plan Investigation, Summarize/Relate, Invent/Implement Solutions, Interpret/Analyze/Reason, Categorize/Order/Classify, Model/Graph/Use Numbers, Troubleshoot, Redesign, Optimize, Collaborate, Compare</p>
	<p>Are you providing opportunities for youth to experience and improve in the Essential Elements of Positive Youth Development?</p> <ul style="list-style-type: none"> • Do youth get a chance at mastery—addressing and overcoming life challenges—in your programs? • Do youth cultivate independence and an opportunity to see oneself as an active participant in the future? • Do youth develop a sense of belonging within a positive group? • Do youth learn to share a spirit of generosity toward others?
	<p>Are learning experiences led by trained, caring adult staff and volunteers acting as mentors, coaches, facilitators, and co-learners who operate from a perspective that youth are partners and resources in their own development?</p>
	<p>Are activities led with a hands-on, experiential approach to learning using inquiry to foster the natural creativity and curiosity of youth?</p>

Science in Out-of-school Time: A World of Possibilities

By Eda Davis-Lowe

About the author: Eda Davis-Lowe directs The Science & Math Investigative Learning Experiences (SMILE) Program at Oregon State University. The SMILE Program, now in its 21st year, seeks to increase the number of students traditionally underrepresented in STEM disciplines who graduate high school prepared for and interested in careers in science, mathematics, engineering, healthcare and teaching. SMILE partners with fifteen communities and twelve school districts to provide after-school clubs that promote science and mathematics enrichment and college readiness. SMILE not only helps students increase their content knowledge, but strives to address their motivation, attitudes and behavior about learning and pursuing higher education. At the conference, Davis-Lowe described SMILE's successful efforts to expand its reach in the session, "Scaling up from Grassroots."

As director of The SMILE Program, I am proud of my efforts and successes in expanding the role of the program. As a regular participant in local, state, regional, and national conversations, I hope to bring the effective practices and learned lessons of SMILE into broader efforts to expand the types and elevate the quality of out-of-school time (OST) science programs supporting youth. During the conference, I was excited to share the SMILE model and to highlight the essential attributes that frame program planning and operation.

Even as the work and success of The SMILE Program remain my top priority, I recognize and embrace a responsibility to help others optimize and sustain their efforts and impact. (After all, no one program has the capacity or reach to address all the unmet needs in OST science.) I gained both personal and professional satisfaction in facilitating a conversation about scaling up and sustaining program growth through targeted elements, strategic planning, and collaborative synergies. It is through this frame that I see OST science as a world of possibilities through opportunity, challenge, and imperative.

The opportunity in OST science is capturing the support for after-school learning and leveraging it into a range of sustained, high-quality OST science experiences for youth that support both their academic success and their educational attainment. Since SMILE started in 1988, the diversity of OST learning opportunities for youth has exploded. What has grown much more slowly is the inclusion of high-quality science programs in OST. However, a number of factors—globalization; science, technology, engineering, and mathematics (STEM) workforce; and American competitiveness—have created a context in which developing communities of practice are forming to legitimize OST science and respond to the opportunity to extend high quality science learning through robust OST venues.

The challenge in OST science is helping to frame and sustain effective programs through the dissemination and implementation of research-based, practice-informed strategies. The goal in this challenge is to elevate the quality of OST science programs that are likely to lead to the desired outcomes for youth. Effective programs employ a range of strategies, offer a variety of contexts, and provide an array of experiences for youth. A report from Building Engineering and Science Talent (BEST 2004) identified critical design principles intended to complement and enrich what schools are able to provide. These principles in the context of The SMILE Program become:

- academic enrichment in science and mathematics;
- contextual learning that enhances personal meaning and motivation to learn;
- college readiness experiences through on-campus or other college-connection events ;
- substantive, ongoing professional development in science and mathematics for teachers, including ongoing contact with content experts; and
- broad-based, collaborative partnerships that promote high expectations and a college-going culture.

Undoubtedly, the design principles applied to another OST context would look different; however, these principles offer an excellent starting point for OST science in meeting the challenge of assuring high quality, effective programs.

The imperative in OST science is helping to assure increased system capacity, in order to broaden the participation and success of individuals from groups still underrepresented in STEM courses and careers. Although many things have changed in the landscape of education in the United States, sadly, some challenges have not been resolved. The gap in STEM participation and achievement remains an intractable situation. Much research has focused on the barriers for underrepresented students and has examined effective practices that support their success (Clewell, et al 1992). Overall progress in addressing this issue has been slow and limited in scope. A recent report from Child TRENDS (2008) highlights what may be a key element in this lingering concern, the ongoing separation between academic content preparation for college and workplace readiness and holistic youth development within a context of mattering. The relevance of the content, the relationships that frame the context, and the validation of identity, skills, and aspirations are critical factors requiring deliberate, well-considered responses if OST science hopes to meet the imperative to broaden participation in STEM courses and careers.

I chose science because a high school physics teacher shared with me his thoughts about who I was at that time and his expectations of who I might become. He placed before me a possibility I had never considered previously. As I reflect on that relationship, I realize that I mattered enough to my teacher that he was willing to caringly intrude into my world and disrupt what I thought I knew about myself and my future. I spent my entire senior year in his physics class, blossoming under his encouragement, and discovering the scientist within me. While I had known for many years that I was going to college, it took the care and urging of a significant adult to help me develop a more expansive awareness of the things at which I excelled and to acknowledge the unrealized potential within me.

Through my work with The SMILE Program, I see repeatedly how important it is for caring adults to help youth expand their thinking and capacity about who they are, what they know and are able to do, and who they might become. OST science offers engaging and rich venues for a range of programs and initiatives through which youth might realize critical outcomes in the cognitive, affective, social, and behavioral realms. While The SMILE Program is just one of many such programs, I am pleased to be part of a burgeoning community intent on exploring, preparing for, and sustaining a world of possibilities through OST science.

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To learn more about The SMILE Program visit <http://smile.oregonstate.edu>. If you wish to share or cite this essay, please use the following citation:

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Collaboration as a Means to Building Capacity: The National Girls Collaborative Project

By Karen Peterson and Brenda Britsch

About the authors: Karen Peterson and Brenda Britsch are the Principal Investigators for the National Girls Collaborative Project, a National Science Foundation-sponsored effort to increase the capacity, impact and sustainability of girl-serving STEM projects across the United States by developing local collaboratives. Using the American Association of University Women (AAUW) regional framework to organize oversight and support, the project has so far expanded to fourteen collaboratives in five regions spanning the entire country. The NGCP has intentionally and successfully nurtured local collaboratives by helping them structure their operations to leverage each other's strengths. The NGCP also offers mini-grants and extensive online training to support local efforts. Peterson and Britsch presented the work of the NGCP during the conference session, "Building Coalitions of Support that Promote Equity and Science Learning."

The National Girls Collaborative Project (NGCP) brings together girl-serving organizations, informal science organizations, education, and business to compare needs and resources, share information and plan strategically to expand science, technology, engineering, and mathematics (STEM) related opportunities for girls. The NGCP began as the Northwest Girls Collaborative Project in 2002, a pilot designed to connect girl-serving STEM organizations in Washington and Oregon in order to encourage collaboration and leveraging of resources. The project has expanded nationally and currently supports fourteen regional collaboratives across the country. Many staff working with girls in STEM are isolated, lacking access to other professionals, up-to-date research, and promising practices. The NGCP model was developed to help address these barriers and strengthen the capacity of local programs to more effectively serve girls in STEM.

Collaboration, as an interactive process, enables professionals across projects and communities to generate and carry out creative solutions and strategies that maximize benefit beyond that which each entity could accomplish. The strength of the NGCP model lies in the strategic methods and activities for engaging participants and facilitates collaboration by creating and sustaining an online and in-person community for those doing this work, and providing professional development and incentives (mini-grants) for collaboration both regionally and nationally.

Regional collaboratives, led by an organization invested in gender equity in STEM, are developed and supported by NGCP across the United States. The NGCP Leadership Team works to create the individual regional collaboratives by identifying organizations that demonstrate "collaboration readiness." These organizations must display a history of local collaboration and be able to integrate participation in NGCP into existing organizational activities utilizing existing staff and resources. Typically, these organizations are seeking a leadership role in their communities and welcome the resources and tools the NGCP provides to further this goal. Once identified, NGCP provides training and mentoring of regional collaborative teams in how to create STEM-related collaborations and assists these collaborative networks in creating action plans that utilize research-based promising practices in the areas of informal learning and evaluation and assessment.

This Regional Collaborative team carries out the work of the Collaborative, which includes hosting local events, disseminating resources and promising practices via free professional development forums, and providing mini-grants to organizations. In addition to regional opportunities, NGCP realized the need to provide national services for those unable to participate in a Regional Collaborative, including a rich, interactive web site and regularly scheduled topical webcasts focused on working with girls in STEM.

The NGCP web site is key to building community, increasing the awareness that, if you're doing work in this field, you are not alone. The web site highlights girl-serving STEM programs and resources. Each regional collaborative has its own web site that allows easy access to local contacts, information about local activities and connects programs and organizations in the same geographic area. And finally, the Program Directory, currently at over 1,200 programs, clearly demonstrates the amount and variety of work being done across the country to provide opportunities to girls in STEM.

NGCP operates on the belief that collaboration is a way of thinking, not just a way of working. NGCP provides

professional development to organizations on how to collaborate in addition to funding incentives to collaborate. Each Regional Collaborative provides mini-grants to organizations that collaborate on a girl-serving STEM project. Not only does the funding serve as an incentive, but there are activities built in to the process that facilitate further collaboration, such as requiring programs to be in the Program Directory to apply for a mini-grant. Comments from mini-grant recipient reports indicate the funding was sufficient to enable a project and provide motivation to work with another program: “The mini-grant we received enabled us to do a project we wouldn’t have been able to do without some financial support. It also gave us the opportunity to collaborate with a group we had been wanting to collaborate with.”

When organizations come together in a collaborative setting and have the opportunity to meet and learn from each other, re-inventing the wheel becomes less necessary. If the skills of one organization complement those of another, each organization does not have to provide something that is out of their realm of expertise. By facilitating collaboration and broadly disseminating current research, promising practices and program models, NGCP strengthens capacity of these organizations to use existing resources more effectively and, ultimately, provide more high-quality opportunities for girls in STEM.

To learn more about the National Girls Collaborative Project visit www.pugetsoundcenter.org/ngcp/. If you wish to share or cite this essay please use the following citation:

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Questions for Reflection on Potential Collaborations

From the National Girls Collaborative Project

1. How will participating in this collaboration further your own organization's mission?
2. Who are your partners (confirmed or potential) in this collaboration? What is your rationale for working with these partners? What can they contribute? What track record have you already established around collaboration?
3. What leadership structure does your partnership or collaboration have or envision? (The National Girls Collaborative Project uses a leadership structure consisting of a lead organization and a collaborative leadership team made up of representatives of other collaborative members.)
4. What activities are you planning to undertake together? How large a geographic area do you plan to serve? What STEM programs or projects are already in place? How will your collaboration fill in service gaps, eliminate duplication of services, or otherwise improve service delivery in the area?
5. How will you work together to leverage resources? What in-kind contributions can each partner make (conference sites, materials, refreshments, printing/copying, volunteers, connections to underserved populations)?
6. Who will take the lead on project management? What is their experience with this kind of work?
7. What challenges to implementation do you anticipate? How do you plan to meet them?
8. How will your collaborative communicate? Conferences, face-to-face meetings, online tools? A newsletter? How will you reach out to additional groups or networks?

Helping Children Reach Their Potential Through Quality Programming: The Importance Of Evaluation in Out-of-School Time Science, Technology, Engineering and Mathematics

By Carolyn Dahlgren and Gil Noam

About the authors: Carolyn Dahlgren is the research assistant for the Program in Education, Afterschool and Resiliency (PEAR), a collaboration among McLean Hospital/Harvard Medical School, the Harvard Graduate School of Education, and a wealth of Boston-area community partners. Responding to the lack of quality evaluation tools available to gauge the success of out-of-school time (OST) science programs, PEAR created the Dimensions of Success for STEM Learning (DOS), an observational tool that was field-tested on programs serving a total of 1,700 students in a variety of settings. The tool aligns well with the National Science Foundation's "impact categories" and has received a positive initial response from practitioners in the field. At the conference, Dahlgren presented how the tool was used to evaluate a Kansas City summer program focused on math and science. Dahlgren and PEAR Director Gil G. Noam co-authored the paper below, which gives an overview of the field of evaluation in OST science and some details about the DOS.

The number of young people engaging in science, technology, engineering and mathematics (STEM) learning opportunities and beginning career pathways in these subjects has been steadily decreasing, a worrying trend when the nation's economy is becoming increasingly dependent on a STEM-specialized and STEM-literate workforce (NASA, 2003; NSF, 2004). How do we get children interested in STEM subjects and spark the desire to pursue these careers? After-school programming is increasingly viewed as an important delivery mechanism for providing engaging STEM programming (CSAS, 2004). There are approximately 6.5 million children in after-school programs across the country (Afterschool Alliance, 2004). If one factors in the number of children participating in summer enrichment programs, out-of-school time settings are spaces that can provide potential STEM learning opportunities for millions of children across the nation. The Coalition for Science After School hosted a conference, the National Conference of Science and Technology in Out-of-School Time, to provide a space for concerned practitioners, researchers, policy makers and other key members for the field to come together to discuss ways to better understand and utilize out-of-school time to bolster students' interest and engagement in STEM subjects. Researchers from the Program in Education, Afterschool and Resiliency (PEAR), along with colleagues from other organizations, presented findings from their research and practical experiences during interactive sessions at this conference. One of the main goals of these sessions was to highlight the vital role that evaluation plays in ensuring the quality of STEM programming and to discuss innovative new assessment practices that are being developed.

Out-of-school settings provide an ideal conduit for engaging children in STEM learning and increasing children's skills, interest and motivation in STEM. The philosophical views and goals of many after-school and summer programs align with the theories and conceptualizations of informal STEM learning (hands-on, youth directed exploration); out-of-school time programs are an ideal place to engage children in STEM learning (Schwartz & Noam, 2007). Additionally, out-of-school time programs provide youth with intermediary spaces designed to serve as bridges across developmental contexts (Noam et al., 2003). These programs are settings in which students can explore STEM subjects and connect their learning across a range of contexts such as school, home, community, and other settings.

An extensive literature on STEM in out-of-school time does not yet exist. Most research studies are limited and do not show specific outcomes for informal STEM learning or report results at scale. Additionally, many studies focus on atypical out-of-school time STEM programs, sites that only offer STEM subjects. The majority of children participating in out-of-school time programs attend sites that offer a range of different activities (i.e., art, recreation). Many of these typical programs want to expand their STEM offering and integrate STEM into their programs in ways that are consonant with youth development goals (Dahlgren et al., 2008). In order to do this, practitioners need a clearer understanding of what effective informal STEM learning looks like and methods

of measuring the quality of STEM programming that is offered at their sites. There is a scarcity of appropriate assessment tools for STEM learning in out-of-school time settings (Hussar et al., 2008). The few tools that exist are constrained by their narrow foci on specific domains (e.g., behavior management) or specialized content areas (e.g., advanced physics) that are not generalizable to other out-of-school-time programs within the broader STEM framework (Dahlgren, et al., 2008). There are numerous, reliable tools for assessing general programming at after-school sites (for a review, see Yohalem & Wilson-Ahlstrom, 2007), but these tools are too broadly focused, assessing STEM programming with the same criteria as those for art, recreation, or other activities. There is no instrument designed specifically to assess informal STEM learning that has been accepted by the field. As a consequence of this, most out-of-school time programs do not evaluate their science programming (Dahlgren et al., 2008). Programs that do assess STEM programming often create their own evaluation tool. While it is commendable for programs to take an active role in evaluation, the reliability and validity of self-created tools are rarely scrutinized. Also, assessment tools designed by specific programs are often only suitable for use by that program. As a result, it is impossible to contextualize evaluative findings from programs that use self-created evaluation tools within the broader field of out-of-school time STEM learning.

There is a clear need for a standardized tool assessment tool for evaluating STEM learning in out-of-school time. The PEAR research center has developed an observation tool, Dimensions of Success for STEM Learning (DOS), that is specifically designed to assess the quality of out-of-school-time STEM learning and evaluate programming. DOS was developed over a fourteen-month period, during which time PEAR researchers conducted in-depth observations of twelve after-school and summer programs that offered STEM activities. A subset of these programs was observed weekly for approximately five months as a part of the ongoing National Science Foundation (NSF) research project, the Informal Learning in Science Afterschool (ILSA) study. All together, the programs served approximately 1,700 children whose ages ranged from kindergarten through twelfth grade across a variety of settings in urban, suburban, and rural areas. The programs varied in location (e.g., school, museum, community center) and focus (e.g., career awareness, college preparation, exploration). As a group, these sites represent a wide range of out-of-school time initiatives.

During the development of the DOS tool, ten dimensions emerged as most salient: planning and preparation, materials, structure, space, engagement, fun, content learning, pedagogy, broadening perspective, and relevance. Each of these 10 dimensions are aligned with the “impact categories” for informal science education that are defined in the recent NSF report on assessment of science in after-school (NSF, 2008).

TABLE 1. Relationship between ‘Impact Categories’ from Framework for Evaluating Informal Science Education Projects (NSF, 2008) and Dimensions of Success for STEM Learning in OST Settings (DOS) (Dahlgren, et al., 2008)

“Impact Categories” from NSF Framework for Evaluating Informal Science Education Projects	Dimensions of Success for STEM Learning in OST Settings
Programmatic Features for Maintaining Structures and Support that are Complementary to and Facilitate STEM Experiences and Learning in OST	Preparation and Planning Materials Structure Space
Awareness, Knowledge or Understanding of STEM Concepts, Processes, or Careers	Content Learning Pedagogy
Skills Based on Engagement in STEM Activities	
Engagement or Interest in STEM Concepts, Processes, or Careers	Engagement Fun
Attitude Towards STEM-Related Topics or Capabilities	Broadening Perspective Relevance
Behavior Resulting from Engagement in STEM Activities	

The DOS tool generates both quantitative ratings of STEM programming and qualitative rationales for each rating. The DOS tool has a detailed rating rubric which operationalizes the dimensions, defining each dimension clearly in terms of observable phenomena. Utilizing the rating rubric during the assessment process creates consistency within quantitative ratings and has helped contribute to the high initial interrater reliability of the DOS tool, 94%.

The DOS tool has been utilized in various capacities since its development, including a 4-H curriculum assessment initiative, a peer evaluation network for the Kauffman Foundation Summer METS Initiative, and on-going research for the ILSA study. Initial responses to the DOS tool have been very positive, including high interest generated at the National Conference of Science and Technology in Out-of-School Time. If you would like more information about the DOS assessment tool or evaluation of STEM learning in out-of-school time, please contact the PEAR research center (PEAR@mclean.harvard.edu).

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For more information about PEAR visit www.pearweb.org. If you wish to share or cite this essay please use the following citation:

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The Fundamentals of Collaboration

By Robert Russell

About the author: Robert Russell serves as Science Advisor to the Self-Reliance Foundation (SRF), which fosters working relationships among local museums, community organizations, businesses, educational organizations, and the media. SRF uses the power of social marketing to provide Hispanic families with access to informal science in their community. One example of their work is Celebra La Ciencia (Celebrate Science), which facilitates interactive exhibitions, demonstrations, and workshops in a variety of settings and utilizes media, in the form of radio, newspaper, and Internet to engage Hispanics in science. At the conference, Russell participated in the panel “Building Coalitions of Support that Promote Equity and Science Learning.” The paper below outlines SRF’s approach to collaboration.

Many informal education projects involve collaboration. Some examples of significant museum collaboratives developed in recent years include many groups of museums collaborating on traveling exhibitions, a museum collaborative led by the Franklin Institute Science Museum and National Girl Scouts disseminating scout activities and training scout leaders, and many collaboratives between museums and schools in developing museum schools, curriculum, or other educational resources. Funders like collaboratives that can make the case that “the whole is greater than the sum of the parts.”

A collaborative relationship involves several elements:

- Organizations working together toward a common goal.
- Joint planning, implementation, and evaluation.
- Sharing information, ideas, resources, and responsibilities.

Organizations enter into collaborative relationships to meet needs, reach markets, or develop products (e.g., exhibits, educational programs, etc.) beyond their individual means. By combining resources towards a common end, collaborating institutions can often develop more effective programs, reach target groups more efficiently, and expand participation, end unnecessary duplication, combine expertise not available within one organization, and improve communication. The fruits of a collaborative may be a better program which reaches more participants and which results in a higher and more positive public image of participating institutions.

Organizations should evaluate the relevance, need, and benefits of a collaborative for their organizations and target audiences. Most importantly, organizations should determine if the collaborative project is consistent with their missions. Next, organizations can evaluate whether a potential collaborative project is compatible with the organization’s long-range plans and whether there are sufficient internal resources to fulfill commitments to the proposed collaboration.

There are dangers that can hinder collaboratives. Partners may be too competitive. There may be no clear leadership, or one partner may dominate. Decisions may take too long. An institution may find its own essential resources diverted to collaborative efforts, leading it to withdraw at a critical point. A crisis may challenge the existence of a collaborative. Cultural bias, stereotypes, or other such differences may also contribute to misunderstanding between partners.

Fights over “turf” are a major stumbling block for collaboratives. Partners can squabble over:

- The market: who gets access to which participants or what territory.
- Resources: who gets what proportion of the funds from a grant.
- Strategy: how to accomplish agreed-upon goals.
- Leadership: what individual or institution leads the project.
- Trust/Loyalty/Camaraderie: dedication of persons to goals; difficult or uncooperative personalities.
- Credit: who is publicly acknowledged when a program succeeds or fails.

There are some key areas which, when addressed successfully, can help resolve turf issues and contribute to the success of a collaborative:

- **Goals:** agreement upon clear goals and priorities.
- **Participation:** shared participation by all partners in developing goals and strategies.
- **Leadership:** sensitive leadership that provides clear direction in achieving goals, but remains open to participation by all in decision-making.
- **Needs Assessment:** a careful analysis of the need or market for a product or service provided by the collaborative.
- **Planning:** a clear “road map,” outlining tasks, responsibilities, strategies, and timelines.
- **Clearly defined roles:** roles or job descriptions of each partner should be clearly delineated (e.g., contributions of staff and other resources, share of funding).
- **Resources:** a budget outlining the income/expenses for collaborative activities, each partner’s share of each, and a strategy to obtain resources not available within the collaborative.
- **Structure:** established processes (e.g., regular meetings, operational procedures, planning process, etc.) for decision-making, communication, management, and implementation.
- **Commitment:** dedication and sense of responsibility of all partners to collaborative goals and activities.
- **Evaluation:** an assessment of the collaborative process and of the impact of collaborative services upon participants.

In a funding request involving a collaborative, you must clearly articulate the goals and rationale of the collaborative and describe how the collaborative will operate with respect to the issues outlined above. It is particularly important to describe the leadership structure and financial management of the collaborative.

To learn more about the Self Reliance Foundation visit www.selfreliancefoundation.org. For more information about Celebra La Ciencia, visit www.celebralaciencia.org. If you wish to share or cite this essay, please use the following citation:

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Are You Ready to Collaborate? (TAKE THE QUIZ!)

From Celebra la Ciencia

Y = Yes N = No ? = Not sure

- Is the proposed collaborative project consistent with your organization's mission?
- Does your organization have a strategic plan specifying program timelines, tasks, and responsibilities?
- Have you evaluated how the collaborative fits into your strategic plan and what staff members or departments will implement collaborative activities?
- Does the organization and at least one staff member have a strong commitment to the collaborative?
- Can your organization make the necessary commitments—financial and otherwise—to the collaborative?
- Does the collaborative have a clearly defined mission?
- Does the collaborative have clearly defined educational, program delivery, and/or service objectives?
- Does the collaborative have leadership?
- Does the collaborative have a plan outlining key tasks, timelines, and responsibilities?
- Does the collaborative have clearly defined “job descriptions” regarding what each participating organization will contribute?
- Has the collaborative defined how funding and other resources received by the collaborative will be shared amongst collaborative members?
- Does the collaborative have administrative structures and procedures outlining procedures and responsibilities for communication, evaluation, and financial management?

Score: 0-4 NO = Probably not ready to collaborate.

Score: 5-8 YES = Go ahead, but take care of business.

Score: 9-12 YES = Ready to collaborate, but still address every issue.

How Funder Collaboration Can Support Stem Learning In and Beyond School Time: A Preliminary Conversation

By Julie Walther and James P. Barnes

About the authors: Julie Walther and James P. Barnes are senior program officers at The Brinson Foundation in Chicago. The Brinson Foundation supports educational, public health, and scientific research programs that engage, inform and inspire committed citizens to face the challenges that confront humanity. Current grantees include Chicago-area museums, research institutions and youth development programs. Together with the Noyce Foundation and the Motorola Foundation, they convened a funder breakfast at the conference.

In partnership with the National Conference for Science and Technology in Out-of-School Time, a group of funders decided it would be an excellent opportunity to meet other philanthropy colleagues and learn from each other with the hope to communicate more openly and share knowledge in the future. The grantmakers gathered for an early morning funders-only, networking breakfast, convened by the Brinson, Noyce and Motorola Foundations. Twenty-four conference attendees agreed to come and share their organizations' ideas and strategies. In addition to the breakfast hosts, the other funders represented at the table were: The Boeing Company, David Gordon Louis Daniel Foundation, The Field Foundation of Illinois, Grantmakers for Education, Ewing Marion Kauffman Foundation, National Science Foundation, The David and Lucile Packard Foundation, and Siragusa Foundation. The hope was that the funders-only space would bring them to the table, and the conference would keep them learning and engaged in an experiential way.

For some of us, it was the first time we'd met each other or were exposed to the segment of Science, Technology, Engineering, and Mathematics (STEM) education that takes place in out-of-school time. We represented large and small foundations, family foundations and corporate giving programs. We hoped to create a safe environment for grant-makers to pose questions to each other about the work of issuing grants in the field and to begin a challenging dialogue that could continue after the conference had closed.

The conference organizers, Jason Freeman and Gabrielle Lyon, were on hand to provide some background to help us understand how our work fits into the developing field at large and the best role philanthropy can play.

Jason Freeman, from the Coalition for Science After School, shared some key research so each of us could be thinking about our own foundation's grantmaking practices during the meeting. Jason shared a 2004 publication, *Engagement, Capacity and Continuity: A Trilogy for Student Success*, co-authored by Eric Jolly, Science Museum of Minnesota President and conference keynote speaker, which offers a new way of thinking about how to recruit and retain students to science. He explained the need for engagement, capacity, and continuity for the students. Engagement means getting students excited about STEM; capacity involves making sure they have the prerequisite knowledge and skills to enter higher education and STEM learning; and continuity requires connecting engagement and capacity through appropriate guidance to help students navigate a seamless path of opportunity into STEM careers. These three elements in programming are critical not only to spur student interest and success in the sciences, but also to produce achievement. The funders were challenged to look at how we could continue to identify programs that incorporated Eric Jolly's criteria.

We learned that getting students excited about science is the critical piece of the work. Research shows that their interest in STEM is a better predictor of their eventual career choices than are test scores. Although many students are excelling, they are not considering these fields as career options. Despite stellar test scores, girls still aren't pursuing STEM fields.

After-school programs provide an important avenue to engage young people in STEM, and research shows they have an impact on students' lives. Currently only six million students are enrolled in after-school programs, but statistics show that more than fifteen million want to be a part of a program. There needs to be a substantial investment in order to grow the field. After-school programming provides the opportunity for organizations and individuals alike to take advantage of alternative resources.

Gabrielle Lyon, Cofounder and Executive Director of Project Exploration, followed with a snapshot of the field from the perspective of a program provider. Project Exploration is working to make science accessible to underrepresented populations and focuses on establishing long-term relationships with students and providing experiences led by research scientists. The organization is having a marked positive impact on participants' high school graduation rates and their pursuit of science in college and careers after school.

The Project Exploration model contrasts with much of the field locally, and perhaps nationally. Many "youth development" programs offered by museums and informal science institutions or universities are secondary to the primary mission of the individual organization. By contrast, Project Exploration puts the curiosity and development of youth at the center of its work, and connects youth to science by helping them answer their own questions and achieve their own goals. An increasing number of non-science organizations (including public schools and youth development organizations like the YMCA or Boys & Girls Clubs) want to do science or are incorporating science curricula in their offerings. Since we know that the excitement factor is a key predictor for STEM career development, this is a strong approach because youth get to bring their "whole selves" to the table. They learn to self-identify as a person who loves science and can do it!

A discussion about what considerations individual foundations are giving to funding in versus out-of-school STEM programming raised some good ideas and questions. Jason Freeman stated that there is an emphasis, in general, to connect in-school time with out-of-school time. However, helping teachers and youth workers (out-of-school time program staff) understand their role and become role models is a key piece of the work at hand. It continues to be important to create opportunities for the two groups to connect. This ongoing conversation promises to be an exciting challenge for philanthropy.

With the best of intentions, funders currently tend to function as "silos" as they make STEM-related grants. In this mode, they do not benefit from other foundations' thinking. In the schools, one funder may concentrate on curriculum development, teacher recruitment, or teacher professional development. Meanwhile, another funder might support one or more out-of-school STEM-related programs or a science-related program managed by a museum, academic institution, or a national research organization. Taken individually, each such program has merit at a tactical level. However, since they likely don't operate within an overarching strategic STEM education framework, they are probably less effective than they could be. Imagine a STEM educational framework that lays out a path of science knowledge acquisition that by design builds upon student learning in both a school setting and in the out-of-school setting. All of the funders' interests could be executed within that framework, and, at least in theory, we could be more strategic as a sector. Funders could pursue their individual interests knowing that their dollars are being spent on activities that strategically align with a larger framework.

Many questions still exist for funders as well as for the larger community about how to best support science development for youth. Are out-of school and in-school programs ever well-aligned, whether in Chicago or elsewhere around the country? Is there an alignment model that exists and is known to work? Within academia, is there a framework funders could use to gauge the relative quality of the programs they are considering supporting? Is there a well-defined body of general science principles and a sequence in which they might most effectively be learned that would help both funders and programs improve results for youth, or is the information about what works mostly anecdotal, relying on perception surveys rather than empirical data?

There is a potential for tension to grow between in-school programming and out-of-school time programming, in part because of expectations of funders. Funders increasingly recognize that their dollars may not be used as effectively as they would like them to be. To increase their effectiveness, they may think they must narrow their focus by choosing only one approach to support. Having a frame for how both in-school and out-of-school time support learning could help funders work to build a case for why out-of-school time is so valuable. Out-of-school and in-school activities should be strategically designed to reinforce one another and continue to build the field.

We believe the field needs to continue to be willing to talk about the benefits of STEM learning during both in-school and out-of-school time programming. There is also a need for funders to continue a discussion about strategies that excite them and to share their learning with the field, both grantseekers and grantmakers.

There is some positive movement nationally. Grantmakers for Education is working on creating a funder working group concentrating on STEM. In Chicago, Chicago Public Schools is engaged in a long-term project to create a cohesive STEM strategy that would develop a national curriculum spanning K-12, including effective teacher recruitment and effective teacher professional development. Private philanthropy will hopefully seek to play a more powerful role in buttressing the out-of-school time programming so youth have more access to learn in alternative settings. We hope the conversation begun at this breakfast will continue locally and nationally, and that more ideas and strategies are put on the table to challenge the funding community to think differently about how we do our work. We hope the organizations doing the work on the ground continue to bring us to the table and challenge us to think outside the box. We know the sector is changing, and we want to be on the cutting edge of that change.

To learn more about The Brinson Foundation, visit www.brinsonfoundation.org. If you wish to share or cite this essay, please use the following citation:

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Leadership for Science After School: Exploring the Power of People from the National Conference

By Jason Freeman

About the author: Jason Freeman directs the Coalition for Science After School, a strategic alliance among individuals and organizations from STEM education, youth development, and out-of-school time programs. The Coalition coordinates and mobilizes community stakeholders to strengthen and expand opportunities for young people to do and learn science in after-school settings. The Coalition web site provides a database of after-school science programs, evaluators, funders, partnerships, and publications. The web site also offers STEM curricula and activities as well as resources for staff development, evaluation, and advocacy. Together with Gabrielle Lyon of Project Exploration, he co-organized the conference.

In 2006, when I was hired as its first director, the Coalition for Science After School (CSAS) existed as a set of ideas and principles. The CSAS vision, that young people from all backgrounds and all parts of the country have access to high quality STEM learning experiences during out-of-school hours, emerged from the connection between two fields: informal science education and after-school learning. Leaders from both of those fields came together at the 2004 and 2005 meetings that founded CSAS. Many of these leaders were responsible for creating the fields they now represent, and it is their example that CSAS is now asking its members to emulate.

Looking at the list of attendees from the first two meetings, few, if any, were fully employed in providing after-school science. Many of the after-school leaders were considering a science initiative within a larger program, while informal science leaders were looking for partners to reach youth in after-school programs. These participants represented the highest levels of leadership from two distinct fields. It was only after CSAS began to expand that the crossover between the fields became evident.

Some participants at the first CSAS meetings were surprised to find that their counterparts were dedicated to very similar missions. Many after-school providers chose their careers due to a dedication to equality of opportunity for all youth. Meanwhile, some have referred to STEM as a new civil rights mission, giving all children opportunities to succeed through skills that are critical to future careers. In 2007, CSAS published *Science in After school: A Blueprint for Action*, which calls upon leaders from the two fields to merge their missions through the formation of a new field of after school STEM.

The ideas that led to formation of the Coalition and that were realized in the Blueprint can only take the new field so far. We need people—leaders at every level—committed to the vision that all children will have access to high quality STEM learning experiences in out-of-school time.

Attendees at the 2008 National Conference on Science and Technology in Out-of-School Time embody this new field. Forty-five percent of attendees self-reported that they work for a museum, university, or other science-rich institution; 44 percent reported working for a community-based organization, after-school provider, or national youth organization. Eighty-five percent listed networking with others in the field as their highest priority for attending (by far the most important goal for attendees). Before the conference, 45 percent reported a high or above average “sense of professional identity as part of the field of STEM in out-of-school time,” and 74 percent after the conference.

Some may view this conference as a call for leadership, but I prefer to see it as a demonstration of the leadership in a field that already exists. In the past three years, I have met hundreds of people who are creating, managing and seeking to expand the opportunities for youth described in the CSAS Vision Statement:

- Programs expanding to reach greater numbers: Since 1988, the SMILE program at Oregon State University has grown from four middle school sites serving 80 students to serve more than 700 elementary, middle, and high school students, along with 60 teachers, in 35 schools. Much of this growth has come under the leadership of Eda Davis-Lowe, whose commitment to the program and the youth it serves is an example for all who seek to take small programs to scale.

- Programs seeking to demonstrate the highest levels of quality: The Salvadori Center, already serving large numbers of students across New York City, has secured National Science Foundation funding to demonstrate that their programs can work in some of the most challenging settings, NYC Housing Authority after-school centers. By creating this project, Executive Director Leonisa Ardizzone is expanding the audience for the Salvadori Center's existing high-quality model and setting an example that others can replicate nationwide.
- Curriculum developed and improved through partnership: When Anita Krishnamurthi of the NASA Goddard Space Flight Center sought to create and distribute a curriculum targeting middle school students in out-of-school time, she did not just read about or survey after-school leaders. Dr. Krishnamurthi built a partnership with the DC Children and Youth Investment Trust Corp., where program staff helped test and revise the instructional materials. The resulting Afterschool Universe curriculum has received positive reviews, and Krishnamurthi's team continues to use partnerships to better distribute the materials and provide accompanying staff development.
- Staff development for youth leaders: By emphasizing the potential for community-based after-school staff to act as science activity leaders, Maryann Stimmer has expanded the field of people who can and should be leading after-school science programs. Empowering youth workers as science instructors expands the number of programs that can be offered, provides the workers with valuable skills, and demonstrates to the participants that science is for everyone. Stimmer's efforts to expand staff development opportunities, most recently through the Great Science for Girls program at the Educational Equity Center at AED and the Frontiers in Urban Science Education program at The After-School Corporation, set an example that many more should follow.

The conference demonstrated a critical need for a change of expectations and common practices at the highest levels of leadership. Dr. Alan Friedman noted that the conference included “two conversations: one connecting to school and curriculum, and one connecting to the social issues of kids. [The conversations] are different, but there is a range where they intersect very fruitfully.” In 1991, the Dewitt Wallace-Reader's Digest Fund funded the Youth ALIVE! program, which challenged science centers to break down barriers between their institutions and the larger youth-serving community. The most significant lasting impact of Youth ALIVE! is the set of individual leaders, including Diane Miller of the St. Louis Science Center, who work from an expectation that informal science and community outreach are connected.

That expectation—that science learning and community-based youth development can and should co-exist—has also become standard among youth organization leaders. By creating Operation SMART, Girls Incorporated expanded its service to girls by supporting their development in an area critical to future career opportunities. Girl Scouts of the USA has built partnerships with STEM organizations such as NASA and Intel, supporting its existing volunteer-led programs with appropriate content. Through its Science, Engineering, and Technology initiative, 4-H is continuing and expanding upon its tradition of educating youth about cutting-edge knowledge. As Youth ALIVE! expanded the number of individuals with expertise serving youth in the informal science field, these STEM initiatives have increased the number of leaders in the youth-serving field with understanding of STEM education practices. These leaders, such as Pam Garza of National 4-H Council and Michelle Hailey of Girl Scouts, work from an expectation that youth development and STEM learning are connected.

Those directly serving youth do not separate science content, inquiry processes, youth development, or any of the other myriad concepts that we use to differentiate our work at the national level. Those of us competing for a limited pool of funds at the national level feel pressure to differentiate our work, emphasizing uniqueness over quality. Our field needs to mature together through cooperative efforts and not out-compete ourselves into oblivion.

During the closing discussion at the conference, Ron Ottinger, Executive Director of Noyce Foundation asked, “We've got this wonderful theory: engagement, capacity, continuity. We've got to put it into practice. Are there communities that have the capacity to put this together?” The 276 Conference attendees from 29 states showed that after-school STEM is already flourishing across the country. These attendees must assume leadership roles that ensure each child has access to all of the supports necessary to engage in, develop skills and knowledge of (capacity), and find opportunities to continue with STEM learning.

With this leadership, one might imagine a community where a young girl:

- Engages in STEM learning and builds familiarity with the inquiry process at an early learning center provided by a community-based organization;
- Expands her knowledge and experience at a school-based after-school program;
- Joins a program at a local science organization that connects to future career opportunities; and
- Returns to support the community-wide STEM programs once she has completed her advanced degrees in engineering.

For this to happen, we as leaders must ask ourselves:

- Will we seek creative ways to partner among diverse organizations, supporting STEM learning in community centers and youth development at science centers?
- Will we support programs that fall outside our comfort zone—allowing STEM-focused funds to serve youth development outcomes and vice versa?
- Will we take risks on the individuals who will become the future leaders in our fields—trusting them to bridge the gaps between two unique fields?

If we do these things, then a robust field of STEM learning in out-of-school time will arise between our two existing fields. Every parent and child will have access to high quality STEM learning and will seek it out as an opportunity to engage their child's mind while also building skills for their future.

To learn more about the Coalition visit www.ScienceAfterschool.org. If you wish to share or cite this essay, please use the following citation:

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