SCIENCE in After-School

A BLUEPRINT FOR ACTION

Coalition for Science After School
March 2007

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PART I

After-School STEM:

A Response and a Plan

The Need and the Opportunity

Science, technology, engineering, and mathematics (STEM) are the currency of the 21st century. They are central to success in education and careers, advancement of innovation, preservation of economic competitiveness, protection of the environment, and participation in a democratic society.

Understanding what makes a good question, what constitutes valid evidence, and how science affects society are critical skills for a rapidly changing world—whether applied to research on the human genome, space travel, environmental shifts, or health and medical sciences.

Preparing today's children to be tomorrow's scientifically engaged adults requires that all children have opportunities to learn and practice science, develop scientific ways of thinking, and in some cases become the scientists who will help to create our future.

Such opportunities depend on children having multiple experiences in science in an array of settings. The recent National Research Council report, *Taking Science to School*, notes that students are able to develop scientific concepts and critical thinking skills at much earlier ages than previously thought.[1] Developing and maintaining early student interest in science is a critical factor in students' choices to pursue science.[2]

Studies such as these show that it is never too early to engage children in science. But the engagement must be joyful, intellectually challenging, purposeful and coherent. The need to coordinate opportunities across time and locations—including

1 Duschl, R.A., Schweingruber, H.A, Shouse, A.W., eds. (2007). *Taking science to school: Learning and teaching science in grades K-8.* Committee on Science Learning, Kindergarten Through Eighth Grade. Board on Science Education, National Research Council of the National Academies. Washington DC: The National Academies Press.

2 Tai, R. H., Liu, C.Q., Maltese, A.V., Fan, X. (2006) "Planning early for careers in science." *Science*. 26 May 2006. Vol 312, no. 5777, pp. 1143-1144. Washington DC: AAAS.

school, after-school, home, and community settings—has been shown to be critical in establishing a consistent framework within which students can be engaged, develop the necessary skills and knowledge to pursue science, and have access to successive levels of education, preparation, and connections to careers.[3]

Yet many children and young people do not have the chance to experience the excitement of science either in school or out. This is particularly true for students who come from high-poverty, ethnic and racial minority, disabled, and female populations, all of which continue to be significantly underrepresented in the sciences. The result is low levels of interest and engagement in science and a dwindling number of qualified students pursuing science academic and career pathways. In an era when the majority of jobs require STEM knowledge,[4] the future of young people as well as the future of the nation depends on reversing this trend.

Exponential growth in after-school programs has resulted in a viable and extensive system within which to offer exciting STEM experiences. Between 1992 and 2002, federal government support of after-school programs through the 21st Century Community Learning Center program increased from approximately one million dollars to more than one billion dollars. Increase in state and local support for after-school programs has accompanied the federal emphasis and funding stream. These programs work with large numbers of children from high poverty and minority communities across the country. As the scale of after-school funding has grown, so has an emphasis on producing high quality programming that contributes to academic enrichment and positive youth development.

After-school programs offer the kind of STEM learning that is likely to interest and motivate: less restricted uses of time and settings, strong roles for youth that encourage their participation and voice, mastering skills on individual timelines and in response to interests, mixed aged groups with the chance to mentor and tutor peers, and access to partnerships with community science resources. Intentional, coordinated approaches that give young people license to tinker and explore, get involved in pursuing their own questions, "mess around" with a rich array of materials, over longer periods of time—can foster the kinds of engagement and skills needed to support science participation. It is time to seize the moment and act.

This report addresses these needs and opportunities and lays out a blueprint for how to build a sustainable system of after-school STEM opportunities at a scale that makes a difference for young people, their communities, and the nation.

3 Jolly, E., Campbell, P., Perlman, L. (2004). *Engagement, capacity, continuity: A trilogy for student success.* GE Foundation.

4 National Science Board (2006). *Science and engineering indicators 2006.* Arlington: VA: National Science Foundation (Chapter 3).

"After-school programs offer an ideal setting for nurturing the potential scientist in every student, as well as for reinforcing the science taught during school hours. Compared to the school day, these programs' smaller groups, longer time slots, and less-formal settings provide opportunities for young people to visit museums, study neighborhood environments, cultivate gardens, perform laboratory experiments, and have their love of discovery awakened in countless other ways."

Lucy Friedman, The After-School Corporation and Jane Quinn, Children's Aid Society [5]

As after-school programming grows to scale, efforts to assure quality and address the full student learning day as one unit are emerging. *A New Day for Learning*[6] is the latest of a series of reports calling on new and better uses for youth time, combining the goals of the formal school day with youth development. Ensuring quality use of this additional time, however it is structured, is a great challenge.

Among after-school programs funded by 21st Century Community Learning Centers, 90% report offering math activities and 69% report offering science. Yet the degree to which they draw on the existing knowledge base is limited and the quality of these programs varies. Nor are large parts of relevant communities aware of the potential of out-of-school STEM experiences. A system for sharing knowledge and resources for STEM in after-school is critically needed.

After-school and community youth programs have demonstrated that they can help young people discover and develop their interests, foster healthy lifestyles, prevent truancy and school-leaving,

5 Friedman, L., Quinn, J. (2006, February 22). "Science by stealth." *Education Week*, 25(24), pp. 45, 48, 49.

6 Time, Learning and Afterschool Task Force (2007). *A new day for learning.* From www.edutopia.org/anewdayforlearning.

raise self-confidence, and contribute to academic motivation, improved attendance, parental involvement, and in some cases, academic achievement.[7] These programs are appropriate settings for teaching skills of communication, problem solving, and teamwork. Researchers Richard Murnane and Frank Levy have called these the "new basic skills." Students who leave school with such skills are much more likely to earn incomes sufficient to support a family.[8] In a 2004 presentation, they add:

> We believe high quality afterschool programs can play important roles in helping students develop essential skills for the new economy. Students only acquire expert thinking, complex communication, and other new basic skills by practicing them. Afterschool programs can provide students opportunities to practice these skills both individually and in teams and to apply them to areas of possible interest.[9]

The programs that Murnane and Levy reference, though not STEM-focused, have all the elements of typical informal hands-on science and technology activities that promote inquiry, innovation, exploration, and connections to the expanding number of careers that require background in STEM.

For more than a century, community and youth organizations, including 4-H, Girl Scouts of the USA, Girls Incorporated, Boys and Girls Clubs of America, YMCA, and many more have engaged young people in discovering the natural and physical world. Well-designed and intentional programs such as Girls Inc. Operation SMART® and Fair Play! (Girl Scouts of the USA) connect youth with STEM learning opportunities and have staying power because they are integral to the mission of their host organizations.

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7 Kane, T.J. (2004). *The impact of after-school programs: Interpreting the results of four recent evaluations.* A working paper of the William T. Grant Foundation.

a. Policy Studies Associates, Inc. (2001). *Building quality and supporting expansion of after-school projects: Evaluation results from the TASC after-school program's second year.* New York: The After-School Corporation.

b. Policy Studies Associates, Inc. (2005). *Quality, scale and effectiveness in after-school programs.* New York: The After-School Corporation.

c. Vandell, D.L., Shumow, L. (1999). After-school child care programs. *The future of children: when school is out,* 9(2), pp. 64-80.

d. Miller, B.M. (2003). *Critical Hours: After-school programs and educational success.* Quincy, MA: Nellie Mae Education Foundation.

8 Murnane, R.J., Levy, F. (1996). *Teaching the new basic skills: principles for educating children to thrive in a changing economy.* New York: Free Press.

9 Murnane, R.J., Levy, F. (2004). *Preparing students to thrive in 21st century America: The role for after-school.* Presentation at Reimagining After-School symposium. From http://www.publicengagement.com/afterschoolresources/paandc/docs/advoc/cswork.pdf.

As fertile an environment as after-school can be for science, it has limits and constraints that must be acknowledged and factored in to the planning of any major initiative—under-supported staff, fragile organizations, lack of time for planning and reflection, limited budgets for materials, and, in some cases, lack of dedicated space, including storage space for the hands-on materials that can make science come alive.

The potential benefits of connecting after-school and science make it worth the effort. If high quality science demands creativity, imagination, investigation, time, communication and above all the identification and accumulation of evidence, then after-school environments that encourage young people to ask questions, take a chance on something new, learn to sift through competing explanations, and make sense of the world around them may be valuable resources for recapturing a generation's interest in science.

In 2004, leaders from the science education, after-school, and youth development communities joined forces to identify how their combined efforts could make a difference. With funding from the National Science Foundation (NSF), the leaders of three major science research and development organizations—the Exploratorium in San Francisco, the Lawrence Hall of Science at UC Berkeley, and TERC in Cambridge, Massachusetts—convened 40 representatives from science and after-school communities to explore common ground. Representatives from the different fields discussed their respective goals, capacities, and hurdles with regard to expanding science learning for young people.

This meeting, which took place in Santa Fe, New Mexico, in January 2004, uncovered a remarkable degree of agreement across the different organizational fields. Participants recognized strong synergy between the goals for youth development and those of inquiry-based science education. In both cases, students are at the center of the learning and development process. Students engage with the world in authentic ways, grapple with real-world problems, and develop conceptual understanding through interactions with peers and adults. Students build confidence and competence through acquisition of skills and knowledge, and paths to success through connections to peers and adults and cultivation of mentors and networks. In both arenas, equity of access, treatment, and outcome is central.

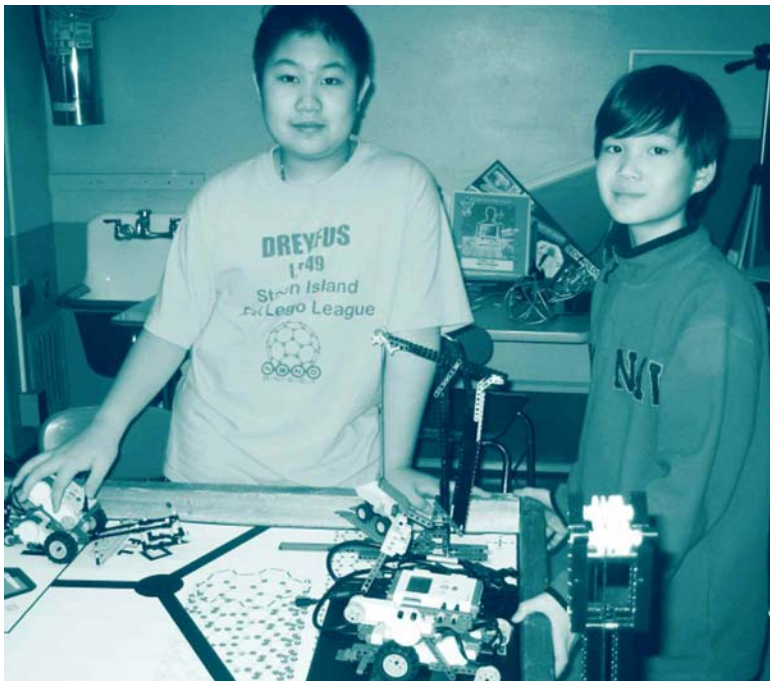
A steering committee was formed, including leaders from the three convening science organizations (Goéry Delacôte, Exploratorium; Elizabeth Stage, Lawrence Hall of Science, who served as chair; and Dennis Bartels, TERC) and three from the after-school and youth development community (Lucy Friedman, The After-School Corporation; Jane Quinn, the Children's Aid Society; and Mark Carter, the National Afterschool Association). This group, supported by an acting director, Bronwyn Bevan, of the Exploratorium, took responsibility for initial efforts, including issuing a conference report, establishing a website, and securing funding to convene the Coalition for Science After School a second time and support a dedicated staff.

A second NSF-funded conference was held in Marina Del Ray, CA, in January 2005. The 40 original participants were joined by representatives of 20 additional organizations. The conference focused on what was needed to increase quality and availability of support and resources for science in after-school. This conference produced a preliminary strategic plan to advance the field by building a sustainable and supportive infrastructure. The plan set goals and actions in five areas:

- Research
- Program and curricula
- Professional development
- Parent and community involvement
- Policy and advocacy

There was consensus about the importance of building on and adapting the extensive existing body of high quality science learning materials and strategies, and drawing on prior efforts in informal as well as formal science education, literacy, service learning, and youth development and employment. Participants urged linkages with existing networks and integration into ongoing efforts.

These conferences resulted in the formation of the Coalition for Science After School dedicated to coordinating the efforts to advance the field of after-school STEM. The Blueprint for Action that follows lays out the priorities identified by the Coalition as necessary to this effort.



THE VISION: Young people from all backgrounds have access to high quality STEM learning experiences during out of school hours.

THE MEANS: Purposeful, coordinated, strategic efforts that make full use of available knowledge, research, resources, and materials.

Realizing this vision requires the integration of the expertise and experience of multiple fields—after-school learning, youth development, and informal science education, as well as the disciplines of science, technology, engineering, and mathematics.

The Blueprint calls for action in three areas with a charge to:

- Provide engaging and intellectually challenging programs, curricula, and activities
- Build staff capacity
- Develop appropriate assessment and evaluation measures

Six drivers undergird action in all three areas:

1. After-school STEM incorporates up-to-date science content, scientific processes, and tools; and emphasizes the centrality of STEM learning to the acquisition of essential 21st century skills.
2. Equity is a driving force, and representation by all groups is a priority for all projects. As much as possible, materials and programs are multilingual, culturally sensitive, and accessible to persons with disabilities.
3. New efforts build on existing materials, models, and research in science education, learning and cognition, and youth development. Individual efforts contribute to a growing literature base to promote sharing and understanding of promising practices.
4. Community involvement and roles for parents and families are included from the outset of projects and initiatives.
5. Professional development honors the knowledge and commitment of the after-school workforce, and creates paths for advancement of individuals as it raises the quality of the field.
6. Project evaluations draw from a framework with an accepted, common set of outcomes. These outcomes reflect the broad goals of the fields as well as research on optimal roles for after-school STEM.

The Blueprint lays out goals and tasks in each area that will advance the field of after-school STEM.

Provide engaging and intellectually challenging programs, curricula, and activities

After-school settings offer an opportunity to experience science up close, using interesting materials, simple scientific tools, and methods of scientific investigation. With intentional programming, content-rich activities, and hands-on materials, they can foster an environment of questioning, experimentation, exploration, conversation, and reflection—practices consonant with the process of scientific inquiry. They can get young people excited and personally involved in subjects that might have seemed distant and irrelevant, and expose young people to the wonder of noticing and discovering what is all around them.

In after-school programs, young people can conduct sustained science inquiries about issues that matter to them. They can research and present evidence about topics of particular concern to themselves and their peers, such as the effects of tobacco, air quality, or headphone use. They can conduct environmental surveys in their communities and advocate for healthier and safer conditions based on the data they collect. They can explore the built environment as well as the natural world. Through partnerships with science-rich institutions, they come into contact with scientists and engineers and use the resources of science museums and research institutes to see how science is done and the technologies and scientific instruments that extend scientific capacity. For many young people, especially those whose access to high quality science has been limited, these can be priceless opportunities that expand their vision of themselves and their futures.

Over the past four decades, there has been significant investment in high quality science learning resources—curricula, programs, pedagogical approaches, partnership arrangements, and standards that outline what it is important for students to know and be able to do.[10] Many of these products, funded largely by the National Science Foundation, are inquiry-based and draw on current research about child development and science learning. Although most are designed for the classroom, they offer a strong starting point for adaptations to the increased social interactivity and multiple pathways to learning in the after-school setting.

The National Science Foundation has also made significant investment in the development of youth and community programs. Since 1984, that portfolio has expanded significantly, and produced multiple models, guides, activities, curricula, and materials that need to be harvested. Exemplary programs such as those described in Part III are a powerful resource for the field.

10 The standards organize what young people need in order to move from one level of education to the next, and to be ready for college or careers. While developed for the formal education system, at least a portion of these are appropriate foci for the after-school community. Primary national standards include:

a. National Research Council (1996). *National science education standards*. Washington DC: The National Academies.

b. American Association for the Advancement of Science (1993), *Benchmarks for science literacy.* Washington, DC: AAAS.

c. National Council of Teachers of Mathematics (1989, 2006). *Principles and standards for school mathematics*. Reston, VA: NCTM.

d. International Technology Education Association (2000). *Standards and benchmarks for technological literacy.* Reston, VA: ITEA.

Program and curriculum goals

- Make it easy for practitioners and developers to find information about programs and curricula that they can readily implement in their own contexts.
- Combine the best efforts to date with new developments grounded in research.
- Build consensus and critical reflection about high expectations for quality programs, curricula, and activities that have documented effects.

Program and curriculum tasks

- Identify exemplary programs, promising and effective practices, and curricula and activities appropriate for after-school.
- Organize existing programs into a central database with easily searched keywords and fields, constructed with input from program developers and practitioners.
- Create rubrics for identifying and assessing high quality and appropriate STEM program and curricular materials so providers can make informed choices based on their capacity and emphasis.
- Set up physical locations for easy access to the hands-on materials and supplies needed for high quality STEM exploration; establish lending arrangements with libraries and science museums; and, establish on-line relationships with educational and scientific supply houses.
- Share experience and knowledge about the challenges of implementation and replication of programs. Set up feedback mechanisms for developers, practitioners, and evaluators to report how curricula and programs have worked in different settings, and add that information to the database.

Build staff capacity

Youth workers and after-school staff are experts in youth development—committed to provide what young people need to grow up strong and prepared. At their best, they create supportive environments in which young people are encouraged to question, think for themselves, take initiative, and reflect on who they are and where they are going. Science educators are experts in promoting understanding about the physical world and how we know what we know. At their best, they present science as a dynamic quest for evidence, an enthusiastic exploration of questions of interest and import, and an enterprise that demands skepticism and critical thinking.

The intersection of the attributes of youth workers and science educators is an area of rich potential for after-school STEM, one that can foster habits of mind of questioning and reflection, out-of-the-box ideas and approaches, and discovering that serious subjects like math and science can be sources of deep satisfaction and fun. In after-school programs everyone is a learner of science—adults and children—and everyone has experience, expertise, and valid participation to contribute to the enterprise.

Yet there are significant challenges in the training, compensation, educational backgrounds, and tenure of after-school staff. This blueprint proposes actions that can work within the current realities.

Staff capacity goals

- Create and support a highly-qualified, professional after-school STEM workforce that takes account of the strengths, diversity, and constraints of the field.
- Implement staff development and instructional models that use current knowledge about science teaching and learning as well as youth development.
- Establish a system of support, technical assistance, and access to professional development.

Staff capacity tasks

- Chart the range of experience and capacity of after-school staff. List the expertise and resources after-school staff need to deliver high quality programming. Analyze the gaps. Identify what kind of training is needed to enhance skills and knowledge across the field.
- Identify existing professional development models that are already addressing these needs, models that can be readily adapted, or areas where new models are needed.
- Map the available professional development organizations and trainers that could be mobilized nationally, regionally, locally, virtually. Identify gaps in location and content.
- Work through existing professional development networks and organizations to incorporate approaches and training for after-school STEM. Introduce youth development principles and practices to science educator professional development and science education principles and practices to after-school trainers.
- Set up a network/system to disseminate models, share information, and offer advice, and make referrals matching those needing professional development with training providers.

Develop appropriate assessment and evaluation measures

While most student assessment tools are geared toward the classroom setting, more learning assessments are now being developed for informal settings, including museums and media as well as community and after-school programs. There are also reliable measures of interest in and attitudes toward STEM, effects of participation in voluntary science activities, and effective practice as well as outcomes in mentoring and internship experiences.

The after-school setting is frequently organized around goals that span both formal and informal learning strategies. Student learning toward academic achievement is important, especially in programs structured as extended day activities, but so are student engagement and interest in STEM and how young people see themselves as participants now and in the future. Further, the ways in which students grow socially and emotionally is especially important in after-school settings, but there are few measures to gauge the relationship of developmental outcomes to STEM participation, persistence, and capacity. What combination of experiences propels young people along STEM pathways? How can we understand the synergy of multiple experiences and the importance of various components of the science infrastructure in young people's lives?

Measuring success in after-school settings is not straightforward, and not inexpensive. Long-term results are as important as short term gains. Existing tools for measuring individual outcomes need to be gathered and reviewed, and new ones developed.

With cogent logic models and theories of change, evaluation of curriculum and staff development and an assessment of their appropriate implementation is one strong strategy for measuring progress and a proxy for measuring outcomes. Such an approach allows programs to select the materials appropriate to their particular contexts which may stress different student learning goals—such as problem-solving, inquiry skills, or science content.

In the meantime, extensive research and evaluation of goals, strategies, and measures must be undertaken for this burgeoning field. It will be critical to draw from both formal and informal settings, as well as science education and youth development, to develop appropriate measures.

Evaluation and assessment goals

- Institute evaluation practices that are commonly accepted across the field and that measure progress with respect to individual, programmatic, and field goals.
- Connect relevant fields of research to produce greater understandings about learning STEM in after-school settings.
- Create an energetic and reciprocal relationship between research and practice.

Evaluation and assessment tasks

- Develop/select theories of change and conceptual frameworks, and test them within projects, to provide common language and bases for comparison across the diverse range of after-school STEM activities.
- Identify, circulate, review, and establish consensus about appropriate outcomes that can reasonably be achieved, and what constitutes "high quality" content, program and staff in after-school STEM programs.
- Develop benchmarks and indicators of progress that individual projects use to identify their contribution to the field as a whole.
- Collect, adapt, and develop evaluation tools to measure process, progress, and outcomes.
- Organize in person and on-line exchanges between practitioners and researchers.
- Create an expandable database of evaluation tools and methods useful for after-school settings.
- Promote interdisciplinary research that connects cognitive scientists, social scientists, and educational researchers with practitioners.

- Work with universities, research institutes, and evaluation organizations to create research opportunities for graduate students and post-doctoral students, and publishable theses and dissertations that help to advance their careers and the field of after-school STEM.
- Use continuous feedback from research to inform projects and guide new studies.

To provide students with the strongest science in after-school programs, the Coalition believes that these three interlocking domains—curriculum, staff capacity, and assessment—must be addressed in tandem. Much of the groundwork has already been laid, but efforts are not yet integrated. To create an effective, coherent system of science in after-school, this new field needs also to concentrate on the development of an infrastructure that can sustain the work necessary to achieve critical outcomes.

To transform the Blueprint into a movement for long-term change, new policies, resources, and networks of support are needed. Reaching the goals in the three action areas above is a necessary but not sufficient condition to fulfill the vision. The field needs deliberate action to connect efforts and share knowledge, cutting across individual projects and institutions. In a sustainable infrastructure:

A clearly defined field of Science After School provides common ground for individuals and institutions to collaborate. A landscape study will provide a baseline of status and needs of the field. Further syntheses of key issues within each of the goals above will add to the shared knowledge base, including:

- Research questions: What we know, don't yet know, and still need to find out.
- Impact on youth: What works for whom and under what conditions.
- Effect of different staff capacities: Who can deliver what and under what conditions.
- Indicators of quality curriculum: Materials and activities that have demonstrated success and the conditions that support this success.
- Sustainability and replication: Common characteristics of programs and materials that are used on a wide scale.
- Impact on and implications for institutions beyond after-school, youth development, and informal science, such as formal education, communities, and families.
- Impact on issues of national concern: educational participation, graduation rates, workforce, and prevention of negative outcomes for youth.

Simply gathering knowledge in a documented form is important, but communities of practice are needed to create true collaboration and sustainable best practices.

A receptive policy environment is fully informed and fully involved. The current environment acknowledges both after-school and STEM learning as critical for youth success. The field needs to demonstrate that a solution is available through a combination of both. Effective advocacy must transcend individual projects and

institutions. After-school and STEM leaders need to become advocates for a united field with a broad base of support:

- Mount a campaign that makes the case for after-school STEM, analyzing current trends, future projections, and centrality to scientific, economic, and educational policy goals.
- Advocate to include and expand after-school STEM in legislation and policies related to the workforce shortage, educational inequities, and STEM education.
- Enlarge the community informed about after-school STEM through presentations, issue briefs, and reports to policymakers and leaders in after-school and youth development, science and science education, and equity and access.
- Engage scientific and engineering professionals, academics, and industry leaders in the potential of after-school to promote STEM learning and careers.

Expansion of funding streams and opportunities results from a shared effort to educate funders about the potential for collaborative work. Access to a common source of information about the field, building on the common goals and measurements, enables funders to select high-quality projects that are part of a larger system. Collectively, leaders from after-school and STEM should:

- Enlist major foundations and government funders in expanding resources and funding streams.
- Review requests for proposals and funding guidelines and recommend language that incorporates attention to after-school STEM.
- Communicate funding opportunities and support proposals and funded projects by providing networking, dissemination, and collaboration opportunities.
- Develop models for operating after-school science programs using existing funding streams and market forces.

A support system for staff development, technical assistance, and acquisition of materials drives continuous improvement as the goals above are met. Regional networks build on the new understandings about staff capacity, programs, and curriculum. Experts support these networks and connect with the communities of practice in the field to ensure common understandings for providing assistance to programs.

Coordination and alignment with the formal education system must be done deliberately at all levels, including national and local projects as well as cutting across projects and sharing between experts in after-school STEM and formal education.

- Create relationships for sharing knowledge and opportunities among the Coalition, its members, and education leaders, including policy makers, STEM educators, and related professional organizations.
- Track trends and identify points of intersection and influence with respect to international, national, and state assessment and accountability measures.

A research and evaluation infrastructure connects practitioners with the research on best practices and provides continuous feedback to researchers. Research efforts include connections to practice. Project evaluations are shared widely to encourage use in development of new projects.

Bringing it all together

The field is full of terrific ideas, committed people, engaging activities, and model programs. The challenge is coordinating, communicating, and establishing mechanisms to amass, share, and extend these resources, both in the immediate future and for the long-term.

PART II

The Coalition for Science After School:

Coordinating the Efforts

Statement of Purpose

VISION

Young people from all backgrounds and all parts of the country have access to high quality STEM learning experiences during out of school hours.

MISSION

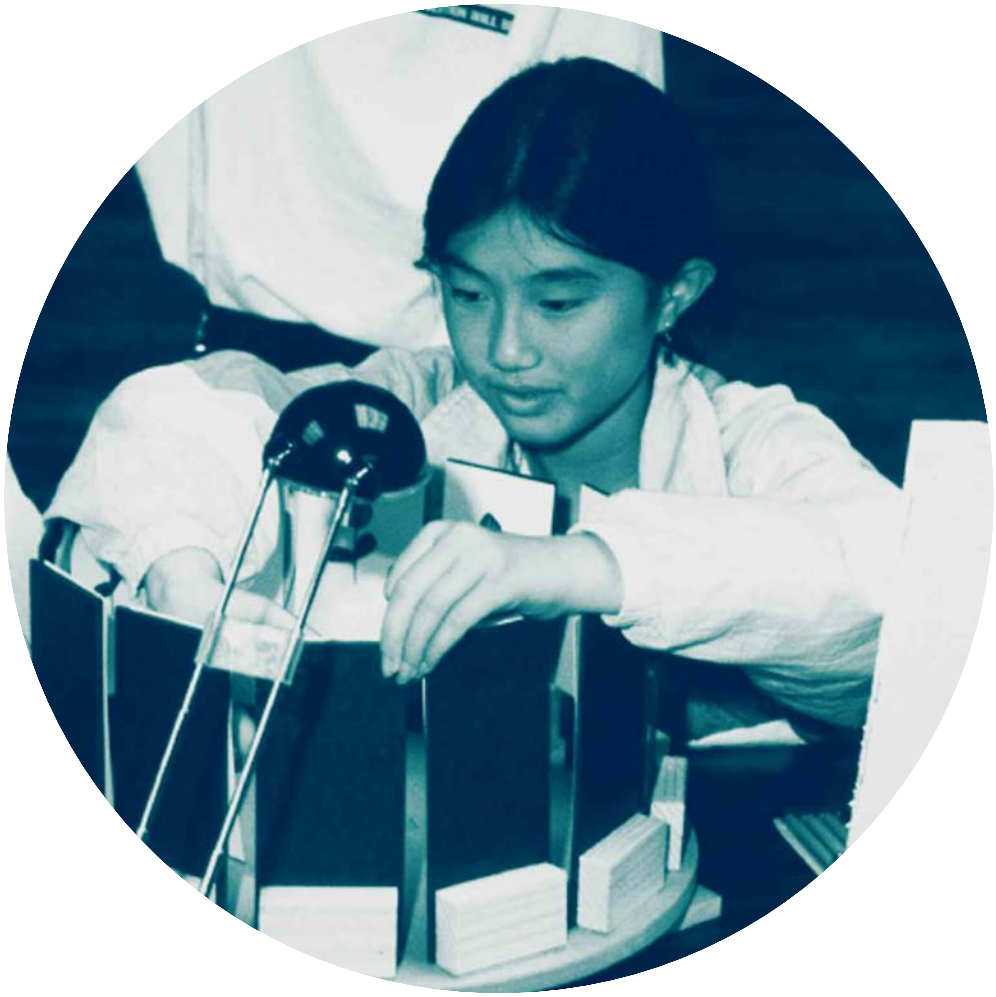
The Coalition for Science After School coordinates and mobilizes community stakeholders to strengthen and expand opportunities for young people to do and learn science in after-school settings.

AREAS OF FOCUS

- Programs and curricula. Promote adoption, adaptation, and implementation of high quality programs, curricula, and pedagogy based on research, evaluation, and consensus about what works for whom and under what conditions.
- Staff development and organizational capacity. Coordinate professional networks for capacity building, staff development, and ongoing instructional support.
- Research, evaluation, and dissemination of knowledge. Compile and share literature, reports, and studies from salient fields. Organize evaluation frameworks and measures, and build consensus about common outcomes and data collection. Identify areas for development of new tools and further research.
- Infrastructure. Advocate for policies and funding that expand resources and support to sustain the field of after-school STEM education.

OUTCOMES

- A body of research-based knowledge, practices, curricula, and activities readily available for use by after-school programs across the country.
- A variety of effective models for after-school STEM that can be adapted or replicated. Some of these will enhance and augment in-school learning, while others will provide open-ended learning experiences. All will be designed to engage students and build their capacity in STEM fields, leading to more advanced opportunities in the future.
- Access for all after-school programs to capacity building, program development and renewal, and research and evaluation for after-school STEM.
- Increased funding and policy support for after-school STEM.
- Expanded and strengthened STEM learning opportunities particularly for young people from communities underrepresented in STEM fields.



MEMBERSHIP

The Coalition for Science After School is a network of experts, committed individuals, and institutions from the fields of STEM and after-school education and youth development. Membership is open to any individual or organization that accepts the Statement of Purpose. Members of the Coalition benefit from the connection to other members, and in turn agree to add their own efforts and expertise to the Coalition network.

GOVERNANCE

A full-time director, Jason Freeman, previously in the Office of Education at NASA, was hired in April 2006. A six-member executive committee built on the original steering group serves as a governing body. The steering committee was expanded to 20 members and serves as the Coalition's advisory council, consulting on major decisions and initiatives before involving the full membership. The director is housed at The After-School Corporation (TASC), and administrative and fundraising functions are shared by TASC, Lawrence Hall of Science, and the Exploratorium.

FUNCTIONS

The functions of the Coalition management are to build a sustainable network for action on behalf of STEM after-school, and to advance the field of STEM after-school.

Build a Sustainable Network for Action on Behalf of After-School STEM

Coalition staff work to create a robust and interactive community, establish easy and continuous mechanisms for communication, and foster partnerships that join the expertise of the diverse organizations and individuals involved in STEM after-school.

Coalition staff is charged with the following functions:

- **Convene meetings, in person and electronically.** Coalition staff organize forums and host meetings of practitioners, researchers, and policymakers on key issues. Meetings during 2007 include a series of small group strategy and consensus building sessions. Coalition staff will plan for a plenary meeting of the full Coalition in 2008.

- **Foster communication.** Coalition staff create discussion forums, project sharing sites, and feedback loops to enable Coalition members to provide immediate reactions to utility of information, resources, or proposed activities. The Coalition also produces regular online mailings, including newsletters, recent reports and research, policy initiatives, funding opportunities, and invitations to participate in projects.
- **Support the development of regional networks within the national effort.** The Boston area has already formed a network with periodic meetings and structures for collaboration on proposals and projects. Coalition staff will help member organizations in other parts of the country to coalesce and set up working structures.
- **Connect and organize members for action.** Coalition staff members serve as matchmakers to bring together expertise and form partnerships. These efforts are both formal, for example when proposal and project opportunities are identified as appropriate for Coalition action; and, informal, such as when a Coalition member is looking for a particular kind of expertise in relation to its after-school STEM efforts.
- **Advise and support Coalition member proposals and projects.** Coalition staff and executive committee offer consultation on proposal and project development, and provide letters of commitment related to Coalition functions and dissemination networks.

Advance the Field of After-School STEM

In the next two years, Coalition areas of focus will be knowledge, capacity, and advocacy. Coalition staff will:

Support the generation, aggregation, and dissemination of knowledge about STEM in after-school

- Join with Coalition member research and development efforts to identify the research base and key roles for after-school STEM.
- Advise national efforts to advance STEM education. The Coalition works with the National Research Council's consensus study, "Learning Science in Informal Environments" to develop practical applications of the findings.
- Produce research and program briefs on key topics for the field.

Build program and professional development capacity in the field

- Compile existing programs, curricula, and staff development strategies for after-school STEM. Where possible, STEM information will be added to existing databases.
- Produce consensus plans for program and professional development, including developing criteria for what constitutes high quality after-school STEM.
- Develop and conduct STEM strands for national after-school conferences and after-school strands for national informal science education conferences.

Get after-school STEM on the agenda of policy leaders and the youth and education communities

- Work in collaboration with the Afterschool Alliance to include STEM as a primary topic within the after-school policy agenda.
- Support leaders of major after-school and youth development organizations in including STEM in their efforts, and leaders of major science and mathematics education organizations to include after-school in theirs.
- Produce issue briefs for policymakers and leaders.
- Publish an annual "state of the field" update.

MODEL FOR COLLABORATION

To fulfill its role as network hub and convening force, the Coalition conducts its work in partnership with member organizations and experts. One model for collaboration has been piloted in initial projects. It starts with examination by staff and consultants of the extensive body of existing materials, models, and research in science education, learning and cognition, and youth development. Recognized experts offer recommendations for action based on this evidence. The Coalition then assists its members in developing partnerships and projects.

Topics for action

Topics follow from the priorities described in the Blueprint for Science After School. The Coalition asks funders to support collaborative efforts to address the topics that are likely to have high impact. The order depends in part upon Coalition member efforts: if members wish to address one of the topics, the Coalition will support their work.

Comprehensive review

Each collaborative effort identifies a leading researcher to synthesize the research, evaluation, and experience related to the topic. This review provides the foundation for the rest of the project. In most cases, there is a substantial body of scholarly literature on the topic or related issues. In addition, there are often project evaluations, local activities, and other efforts that may not be published but offer insights for future work.

Position papers in response to review

Response papers are commissioned to apply the evidence cited in the background paper. These suggest courses of action, strategies, program approaches, or directions likely to be fruitful for action on the chosen topic. Selected authors reflect expertise in youth development and after-school programming, informal and formal science education, equity and access, and research and evaluation. The papers assess the evidence and experience, detail the implications for each of these areas, and suggest possible actions for the field.

These commissioned papers provide the action teams with the foundation for their work, described next.

Action Teams

Action teams composed of existing Coalition members and additional experts are formed to develop the commissioned papers into collaborative projects. Three teams of five to seven members draw from a cross-section of the science after-school community—after-school and youth development professionals, informal and formal science educators, researchers, equity experts, parents and community members, and funders and other policymakers.

Working together in a collaborative on-line environment and then in a conference setting, teams develop plans that follow from the commissioned papers. Team members use these plans in one or a series of proposals for follow-up projects. Teams also list research and evaluation questions that need to be addressed, setting a research agenda to parallel the action steps.

Conference

An in-person conference of the action teams, Coalition staff, and additional advisors is convened that addresses:

- In-depth discussion of papers, including presentation by the authors, roundtable discussions, and recommendations for additions and changes to ready the papers for publication and dissemination.
- Final development of action plans. Action team leads are responsible for compiling and writing the final action plan for their group. The plan includes targeted outcomes, steps that lead to those outcomes, timeline, anticipated resource needs, list of tasks, and suggested partners.
- Creating coherence between action plans. The Coalition director compiles the action plans and identifies synergies within these plans, merges overlapping tasks, reports back to the conference, and creates a publishable final document.

Publication

The Coalition publishes the position papers and proceedings from the conference. An electronic forum is established through the Coalition website to continue the discussion and assist the actions that follow.

As of January 2007, Coalition members, with participation and advice from Coalition staff and Executive Committee, have mounted projects to address central questions for the field in each of the core areas.

PROGRAMS AND CURRICULA

The Coalition is organizing the extensive resources that already exist into a central and expandable database, and figuring out how best to help programs introduce or ramp up the science in their programs. Activities to date include:

The Consumers Guide to Afterschool Science Resources

This web-based resource shares information collected from instructors, program leaders, parents, participants, and evaluators about sources of hands-on science activities and content for after-school programs. Coalition members with expertise in youth development and science content reviewed all nominations and selected those that seemed most promising. They produced concise, informative summaries of materials and curricula that can help after-school programs find something to support their efforts to offer after-school science, no matter what their budget, science backgrounds of staff or grade levels of participants.

Funded by the National Partnership for Quality Afterschool Learning at Southwest Educational Development Laboratory (SEDL) and the U.S. Department of Education, the Coalition executive committee selected the Lawrence Hall of Science to serve as the lead agency. The guide will ultimately be part of a larger vetted collection of resources and links.

Why Science

A Coalition-funded research project, TERC and The After-School Corporation are pilot testing a process to help programs define their science learning goals. As organizations consider the nature and impact of science after school, they often have to confront deeper questions about the learning goals of such programs. Are the programs nurturing student interests in science? Developing specific content knowledge? Helping improve science test scores or grades? Promoting linkages between science and other domains? Without clear answers to these questions, it is difficult to design and

implement responsive program models and study their effectiveness. The project is conducting in-depth discussions with program leaders and staff in Boston and New York, asking about a range of goals from affective behaviors to content knowledge, scientific thinking skills, social interaction, and exposure to inquiry and exploration.

Inquiry-based science materials and professional development

The Exploratorium and the Lawrence Hall of Science (LHS), with funding from the Bechtel Foundation, are investigating the characteristics of successful inquiry-based science instructional materials and professional development approaches in Bay Area after-school settings through two exploratory initiatives. One looks at how to adapt inquiry-based science curriculum materials (developed by LHS for classrooms) for the after-school setting. The other looks at professional development needs for staff implementing inquiry-based science in the after-school setting.

Database of existing programs and curriculum

Coalition staff has begun to identify and document projects supported by NSF, NASA, Department of Education, private foundation initiatives, and national and local youth organizations to create an expandable and accessible database. Where possible, STEM information will be added to existing databases (e.g., SEDL's National Partnership for Quality Afterschool Learning) and linked back to the Coalition site. Creating the most useful database fields and search mechanisms will be a multi-year iterative process involving input from and testing by Coalition members.

STAFF DEVELOPMENT AND ORGANIZATIONAL CAPACITY

Between April and December 2006, Coalition staff organized multiple workshops and presentations for the after-school, informal science, and policy communities. At the 2006 21st Century Learning Centers summer gathering of leaders and after-school providers from federally-funded programs across the country, the Coalition conducted formal and informal gatherings to spread the word about the value of science programming in after-school settings.

The Coalition is currently developing STEM strands—workshops, plenaries, presentations, institutes, poster sessions, receptions—for major, national after-school conferences (e.g., National Afterschool Association, Foundations Inc., 21st Century Community Learning Centers), and science education conferences (e.g., Association of Science-Technology Centers, National Science Teachers Association, National Council of Teachers of Mathematics).

Great Science for Girls

With NSF support, the Educational Equity Center (EEC) at the Academy for Educational Development (AED) is developing extension services to support gender equity through science in after-school. Working with local and regional after-school intermediaries, EEC will build a national network to provide professional development.

Coalition Role: The Coalition director is an advisor to the project, helping to recruit participants and identify quality resources for science learning in after-school. Several Coalition members are participating in or providing support to the network of extension services.

National Partnerships for After-School Science

Education Development Center (EDC) and the Lawrence Hall of Science (LHS), are leading a national initiative for long-term professional development for after-school program providers. A national network of trainers drawn from informal science institutions and 4-H affiliates receives mentoring from regional experts (at LHS, the Boston Children's Museum, and the Science Museum of Minnesota). Trainers help community-based organizations implement high-quality, hands-on science and engineering projects with children.[11]

Coalition Role: The principal investigators began project development following the initial Coalition meetings. The effort to connect multiple organizations and spread their knowledge through a national network is closely aligned with the Coalition's mission.

11 National Partnerships for After-School Science. (2006) Retrieved February 9, 2007, from Education Development Center Web site: http://cse.edc.org/profdev/N-PASS/

RESEARCH, EVALUATION, AND KNOWLEDGE DISSEMINATION

The Coalition and its partners have focused initial efforts on surveying the field and collecting baseline data.

Informal Learning and Science Afterschool (ILSA)

The ILSA research project investigates the nature of informal science in after-school programs around the country. The three-year study consists of surveys of 1,000 programs, in-depth interviews with a subset of 50, and case studies at eight sites. The study seeks to document the nature of student participation and learning in science activities in "typical" (non-science-specific) after-school programs, and the infrastructure required to support these programs. "Infrastructure" includes curriculum, staff recruitment and support, and program leadership and structures. Funded by the National Science Foundation, the study is managed by a team from Harvard University, the Exploratorium, the Lawrence Hall of Science, and Reginald Clark and Associates.

Pathways to Advanced STEM Coursework

The Coalition leads this project under the auspices of SEDL with funding from the U.S. Department of Education. It seeks to analyze and capitalize on the potential for after-school programs to provide early support leading more young people to opt for advanced science and mathematics courses, a prerequisite to continuing in STEM and a central issue in ensuring equity of participation. The project has three components: synthesis of the research, including factors that support participation in advanced STEM courses and the role of after-school programming in promoting that participation; organizing a network of after-school science leaders to act on the research and encourage young people to participate in advanced STEM courses; and creating an ongoing forum for communication in support of after-school initiatives to promote young people's participation in the science track and advanced STEM courses. Commissioned papers will be published on line and the work will be merged with the body of knowledge accumulated by the National Partnership for Quality After-school Learning.

Learning Science in Informal Environments

A consensus study by the National Research Council (NRC), sponsored by the National Science Foundation, the study draws "together the disparate informal science literatures, synthesize the state of knowledge, and articulate a common framework for the next generation of research on informal science learning."[12]

Coalition Role: The Coalition staff and executive committee serve as advisors to this effort, and are helping to develop practical applications following the report's publication. Several Coalition members and partners are part of the NRC panel.

INFRASTRUCTURE

The Coalition is raising awareness and providing information about the role and benefits of after-school STEM in relation to national education, workforce, and youth development goals. The Coalition supports its partners in pressing policy leaders for the inclusion of after-school STEM in legislation, strategic plans, requests for proposals, and other critical documents. Current efforts include:

Collaboration with the Afterschool Alliance

The Coalition and the Afterschool Alliance are working together to include STEM as a primary topic within the after-school policy agenda. In September 2006, the Alliance and Coalition hosted a briefing for the STEM and Afterschool Congressional Caucuses on Capitol Hill, and published an issue brief on Afterschool STEM. Priorities for 2007-08 include securing the role of after-school STEM in the reauthorization of No Child Left Behind as well as continuing support of education priorities within NSF, NASA, and other agencies. The Coalition and Afterschool Alliance will also support state and local policies that encourage high quality STEM programs in after-school and collaborations between informal science and after-school education.

12 http://www7.nationalacademies.org/bose/Learning%20Science%20in%20Informal%20Environment.html

Partnerships with major after-school, youth development organizations science and mathematics education organization

The Coalition is collaborating with national youth organizations to get STEM on their after-school agenda, to ramp up existing efforts, and/or to serve as models and share their knowledge with the rest of the field. Partners include 4-H Afterschool, Girls Incorporated, and Girl Scouts of the USA. The Coalition's director is a participant on the National Science Teachers Association's informal education committee and is involved in the Association of Science-Technology Center's efforts related to youth development.

Reports and issue briefs

The Coalition is producing materials for policymakers and leaders on topics such as:

- Making the case: Why STEM in after-school?
- What are reasonable goals and outcomes for after-school STEM programs, and how do they mesh with current education and workforce initiatives?
- What can after-school STEM programs do to promote equity, reduce underrepresentation, and decrease the gap in achievement and participation?
- What funding resources and policy supports are necessary to ensure high quality after-school STEM?

An annual "state of the field" reports on progress toward outcomes and the state of knowledge about the role and capacity of after-school STEM. It is a joint effort of Coalition staff and advisors and consultants from the Coalition membership and larger policy arena.

PART III

A Sample of Exemplary Programs and Promising Efforts

Informal, community based, and youth programs in science, math, technology, and engineering have been supported by the National Science Foundation and others since the mid-1980s. More recent efforts to build capacity on a regional and national scale have turned resources and attention to professional development and organizational support. Research and evaluation of free choice and informal learning has advanced significantly in the past decade.

In addition to the projects in Part II that involve the Coalition in some role, the following efforts represent both long-lived and new initiatives. The list is in no way comprehensive, and while those that are presented are of very high quality, there are countless others that could have been featured.

PROGRAM AND CURRICULUM PROJECTS

Girls Incorporated

Established in 1984, Girls Inc. Operation SMART® (science, math and relevant technology) has engaged 617,000 girls and young women ages 6-18 in the hands-on, inquiry-based fun of exploring the natural world. At over 1,000 Girls Incorporated® program sites in the United States and Canada, girls are front and center, getting comfortable with power tools and computers, and investigating "weird stuff" as they become scientists.

Girls work directly with scientists, engineers, and other professionals—archaeologists in Girls Dig It®, computer professionals in Eureka!®, environmental scientists and astronomers in Thinking SMART®. Evaluations conducted by Girls Inc. affiliates indicate that girls who gain skills and confidence in doing math and science are more likely to consider careers in these fields.[13] The scientists, engineers, and mathematicians among Girls Inc. "graduates" credit their days in Operation SMART with expanding their minds and their options.[14]

4-H SET Initiative

Building on its long history of informal science education (originally based in agricultural roots), 4-H has initiated a national effort to "engage 1 million new young people in 4-H Science, Engineering and Technology (SET) programs over the next five years. The result of this national initiative will be improved science grades, increased interest in SET careers and more volunteers trained to deliver SET projects during the out-of-school time."[15] Science, engineering and technology learning takes place in the context of positive youth development, with youth/adult partnerships a key element of the 4-H approach to science, engineering and technology.

Youth Exploring Science (YES)

The St. Louis Science Center launched the YES program in 1997 to provide low-income, minority teens from community organizations with four years of opportunities to explore scientific concepts through inquiry-based experiences and then to teach others. As part of their teaching duties, YES teens facilitate science and mathematics activities in the community, including at other after-school programs. YES teens start as volunteers but eventually become Science Center employees and earn wages. Of the 35 high school seniors in the 2006 program, 24 have been accepted into one or more colleges. One former student has graduated with a degree in biology from Grambling State University and hopes to go to medical school. Others have graduated with teaching degrees.

13 Girls Incorporated (2004). Girls Inc. Operation SMART® Results. Indianapolis: Girls Incorporated.

14 Weiss, F.L., Millett, C.M., & Nicholson, H.J. (2005). Girls' communities and high expectations: From Girls Incorporated® to college and beyond. Paper presented at the annual meeting of the American Educational Research Association, Montreal, Quebec, Canada

15 California 4-H Youth Development Program website (2006). "4-H Science, Engineering, and Technology." Retrieved from: http://www.ca4h.org/projresource/SET/.

Kinetic City

A program of the the American Association for the Advancement of Science, Kinetic City began as a radio program and is now an interactive web environment for young people. Students learn standards-based science content while helping combat the "knowledge-eating viruses that are destroying our world's science." A recent evaluation of Kinetic City After School found significant increases in reading and writing proficiency along with science skills. The children also showed more interest in science careers, and were more likely to have engaged in science activities "just for fun."[16]

Afterschool Science PLUS and After-School Math PLUS

Developed by the Educational Equity Center (EEC) at AED, with support from the National Science Foundation, Afterschool Science PLUS is an inquiry-based science program for after-school centers serving students aged 6-14. It helps centers facilitate activities that are fun to do and at the same time develop higher-order thinking skills such as problem-solving, creative-thinking, decision-making, and spatial relations. The activities promote equity by providing positive role models, presenting career opportunities, and dispelling stereotypes about who can do science. The program has demonstrated positive outcomes for group leaders and students.

Following the success of Science PLUS, EEC created After-School Math PLUS, a program designed to find the math in everyday experiences and create awareness about the importance of math skills for future career options. This standards-based model and set of materials involves museum partnerships with after-school programs.

16 Kinetic City website (2005). Retrieved from: http://www.kcmtv.com/evaluation.htm.

PROFESSIONAL DEVELOPMENT AND ORGANIZATIONAL CAPACITY PROJECTS

Science Linkages in the Community (SLIC)

In 1993, the American Association for the Advancement of Science (AAAS) launched its project to improve access to high quality science education by connecting community-based organizations with the scientific community and the formal science education system. AAAS provides training and technical assistance in the delivery of inquiry-based science to trainers, volunteers, teachers, educators, administrators and leaders in community-based organizations and school.

Afterschool Training Toolkit

In support of the 21st Century Community Learning Centers program, the National Partnership for Quality Afterschool Learning has developed a toolkit for training after-school staff. The kit helps staff use promising practices to build students' academic skills through fun and engaging activities. Material in the toolkit is based on current after-school and content area research in six areas, including science, math, and technology. Each subject area includes five or more promising practices, such as "Investigating Science Through Inquiry" and "Exploring Science Through Projects and Problems." Practices are then demonstrated through detailed description, video segments, and sample lesson plans. Further resources include standards-based content goals, assessment strategies, and links to related websites and research.[17]

ISEOST Professional Development Model

The Out-of-School Time Resource Center (OSTRC) at the University of Pennsylvania is developing a collaborative professional development model to connect informal science education (ISE) with out-of-school time (OST). The model emphasizes reciprocity, putting the two fields on equal ground. It enriches staff from both fields by creating a community of practice, enhanced by trainings, staff exchanges, and access to quality resources. The model is being developed in the mid-Atlantic region, but is intended for larger distribution if proven successful.

17 http://www.sedl.org/afterschool/resources/toolkit.html

RESEARCH AND EVALUATION PROJECTS

NASA and Afterschool Programs

In 2005, the American Museum of Natural History reviewed the research, programs, and curricula on after-school produced by NASA and NSF. The report concludes that after-school is an ideal setting for NASA to reach the next generation of scientists and engineers and recommends that NASA take steps to support after-school programming. It includes a review and synthesis of research and resources that support efforts to implement after-school STEM. Essays from relevant leaders provide further understanding of and support for the connections between STEM and after-school learning.[18]

18 Walker, G., Wahl, E., Rivas, L. (2005). *NASA and Afterschool: Connecting to the Future*. New York: American Museum of Natural History.

A great deal of knowledge is at our disposal, and there is much good work to build on. If we can create a cohesive and coherent system of after-school STEM that is readily accessible to practitioners, researchers, and policymakers, and expand and strengthen the availability and quality of these offerings, it will benefit hundreds of organizations, thousands of staff, and millions of young people for whom science, math, and technology are a pathway to the future.

List of Conference Participants

(This list reflects the organizations represented by participants as of January 2005.)

Afterschool Alliance, Washington, DC, Jennifer Rinehart, Associate Director.
After School Matters, Chicago, IL, Maggie Daley, Chair.
American Association for the Advancement of Science, Washington, DC, Shirley Malcom, Director, Education and Human Resource Programs; Judy Kass, Project Director.
American Museum of Natural History, New York, NY, Myles Gordon, Vice President of Education.
Arnold's All Stars, Los Angeles, CA, Gary Moody, Executive Director; Eve Moody, Director of Curriculum.
Association of Science-Technology Centers, Washington, DC, DeAnna Banks Beane, Director, Partnerships for Learning.
***Boston Public Schools**, Boston, MA, Dishon Mills, Director of After-school Programs.
Carnegie Corporation of New York, New York, NY, Andrés Henriquez, Program Officer.
***Children's Aid Society**, New York, NY, Jane Quinn, Assistant Executive Director for Community Schools.
Citizen Schools, Boston, MA, Ned Rimer, Managing Director and Co-Founder.
Clark and Associates, Claremont, CA, Reginald Clark, President.
Developmental Studies Center, Oakland, CA, Eric Schaps, President.
Editorial Projects in Education, Bethesda, MD, Virginia Edwards, President and Editor, Education Week and Teacher Magazine.
Education Development Center, Newton, MA, Bernie Zubrowski, Project Director, Design-It, Explore-It.
Education Equity Concepts, New York, NY, Maryann Stimmer, Coordinator, Science Programs.
***Exploratorium**, San Francisco, CA, Goéry Delacôte, Executive Director; Rob Semper, Executive Associate Director; Bronwyn Bevan, Director, Center for Informal Learning and Schools.
Foundations, Inc., Moorestown, NJ, Gail Meister, Executive Director, Technical Assistance and Grants Administration.
Girl Scouts, USA, New York, NY, Sharon Hussey, Senior Vice President, Program Membership and Research Group.
Girls Incorporated, Indianapolis, IN, Jan Stanton, Director of National Programs.
Harvard University Program in Education, Afterschool & Resiliency, Cambridge, MA, Gil Noam, Director.
Ewing Marion Kauffman Foundation, Kansas City, MO, Margo Quiriconi, Director, Research and Policy.
Office of Senator John Kerry, Washington, DC, Jeff Jacobs, Legislative Assistant.
LA's BEST, Los Angeles, CA, Mike Theodore, Director of Education.
***Lawrence Hall of Science, University of California**, Berkeley, CA, Elizabeth Stage, Director; Jacquey Barber, Associate Director for Curriculum Research and Development; Terry Cort, Administrative Specialist, GEMS; Kevin Cuff, Curriculum Developer; David Goldstein, Associate Director, Research, Evaluation, and Assessment.
Liberty Science Center, Jersey City, NJ, Ellen Wahl, Senior Director, Program Development
Museum Management Consultants, Inc., San Francisco, CA, Diane Frankel, Senior Vice President.
National 4H After-school, Chevy Chase, MD, Eddie Locklear, National Director.
National Aeronautics and Space Administration, Washington, DC, James Stofan, Director, Informal Education Division.
National Institute on Out-of-School Time, Wellesley Center for Research on Women, Wellesley, MA, Ellen Gannett, Co-director.
National Science Foundation, Elementary, Secondary, & Informal Education Division, Arlington, VA, Sylvia James, Program Officer; Julie Johnson, Program Officer.
Science Museum of Minnesota, St. Paul, MN, Eric Jolly, President.
St. Louis Science Center, St. Louis, MO, Diane Miller, Senior Director, Public and Community Programs.
***TERC**, Cambridge, MA, Dennis Bartels, President; Daniel Barstow, Director, Center for Science Teaching & Learning; Carolyn Nelson, Research and Development Specialist.
***The After-School Corporation**, New York, NY, Lucy Friedman, President.
Thirteen/WNET, New York, NY, Macenje Mazoka, Director, Youth Outreach, Cyberchase.
University of Arizona, Tucson, AZ, Marta Civil, Professor of Mathematics.
University of California, Berkeley, CA, Karen Kenney, Dean of Students.
U.S. Department of Defense, Washington, DC, Karen Morgan, Youth Specialist, Military Youth Programs.
U.S. Department of Education, Washington, DC, Robert Stonehill, Director, 21st Century Community Learning Centers.
The Wallace Foundation, New York, NY, Sheila Murphy, Senior Program Officer.
YMCA of the USA, Chicago, IL, Barb Taylor, Program Director, Association Resources.
Unaffiliated, Brookline, MA, Judy Caplan, After-school Programming Consultant; Winter Springs, FL, Linda Armstrong, Child Development Specialist; Omaha, NE, Shannon C'deBaca, Science Educator.

*Denotes member of the Coalition's Executive Committee as of January 2007

ABOUT THE COALITION FOR SCIENCE AFTER SCHOOL

The Coalition for Science After School is a strategic alliance among individuals and organizations from STEM education, youth development, and out-of-school time programs. Membership is open to organizations and individuals who agree to the Coalition purpose and vision that all young people from all backgrounds and all parts of the country will have access to high quality STEM learning experiences during out of school hours. Members of the Coalition benefit from the connection to other members and in turn agree to add their own efforts and expertise to the Coalition network efforts.

The Coalition collaborates with its membership to advance the field of after-school STEM and build a sustainable network for action. It promotes the adoption and implementation of high quality programs and curricula, networks and strategies to build staff and organizational capacity, and efforts to increase research and knowledge. It convenes meetings, fosters communication, connects members, advises and supports members' proposals and project development, and advocates with funders and policymakers to dedicate attention and resources to after-school STEM.

The National Conference on Science After School was funded by the National Science Foundation, Grant #ESI-0441289. This report was funded in part by funds from the United States Department of Education.

All opinions, findings, conclusions and recommendations expressed herein are those of the authors and participants and do not necessarily represent the view of the National Science Foundation.

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To cite this report:
Coalition for Science After School (2007). *Science in After-School.* New York, NY: The After-School Corporation.