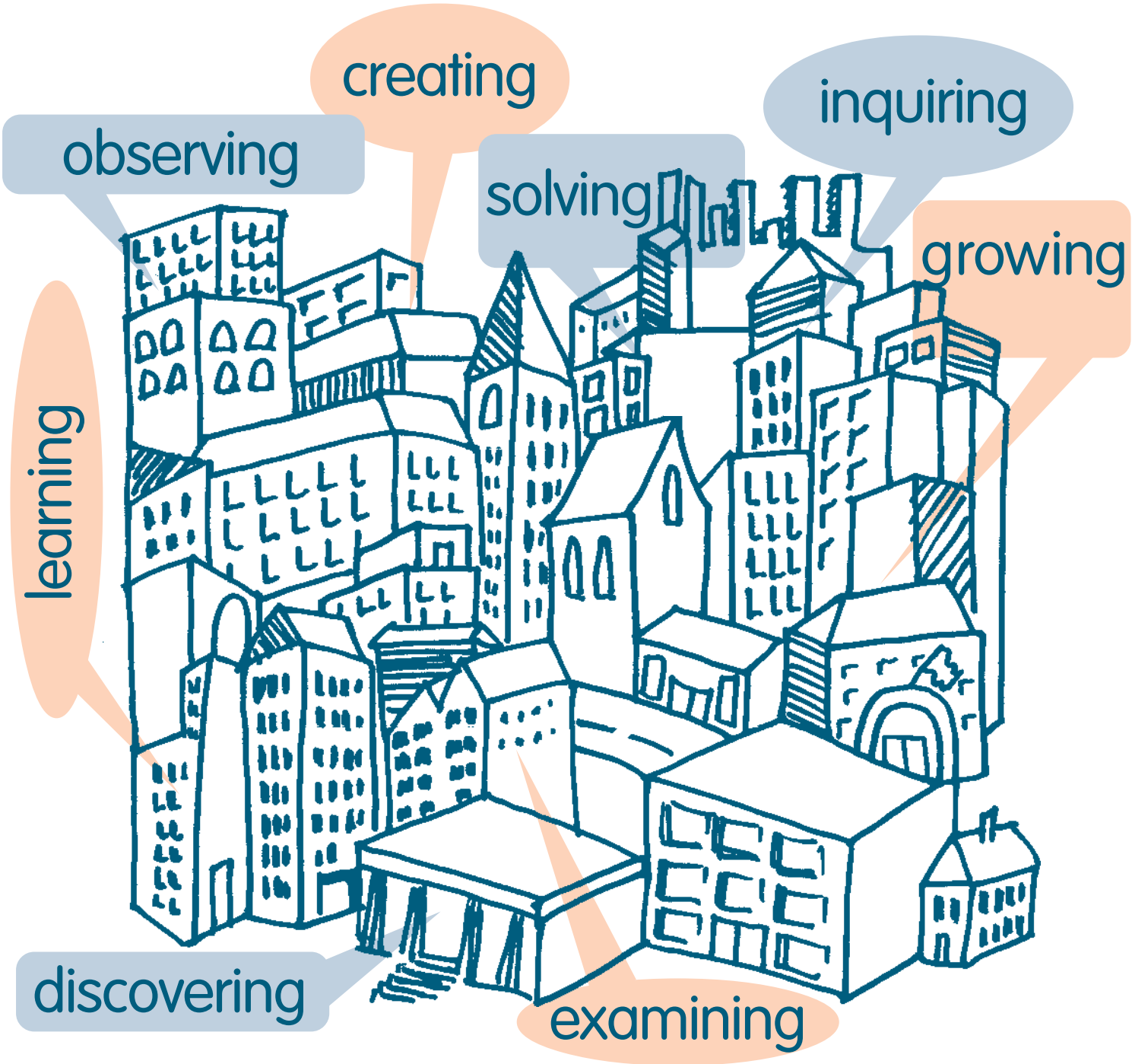
Science After School



National Conference on Science After School
Santa Fe, New Mexico January 28-30, 2004

Science After-School

The Coalition for Science After School was launched January 28, 2004 at the Santa Fe Institute, home to the world's leading researchers on the study of complexity. Against the dazzling backdrop of the New Mexican mesa, 40 educational leaders from diverse but overlapping domains—science, technology, engineering and mathematics education and after-school programs—met to grapple with three emerging, important trends in youth development and science learning in this country:

1. An explosion in the number of U.S. youth attending after-school programs, and increasing links between school and after-school curricula, funding, and accountability
2. An imminent, renewed national focus on K-12 science education with the advent of federally-mandated science testing
3. The extraordinary potential of after-school programs to enrich student learning through inquiry-based, hands-on science.

The conference, funded by the National Science Foundation (NSF), gathered leaders with a broad range of relevant knowledge, resources, and experiences to strategize ways to converge these trends in support of our nation's youth. The conference was convened by the leaders of three major science and mathematics R&D organizations—the Exploratorium in San Francisco, the Lawrence Hall of Science at UC Berkeley, and TERC in Cambridge, Massachusetts.

The Coalition quickly recognized a unique opportunity and unanimously supported immediate action, extending well beyond even the assembled participants. The degree of agreement was remarkable, given the diversity of perspectives present.

Key recommendations included:

- The development of an **infrastructure** to support coherent and sustained, rich and engaging science and mathematics in after-school settings—including materials/activities, staff development, and leadership development.
- The development of a **research agenda** and **research framework** that could connect to formal and informal education, examining science and mathematics learning and positive youth development and growth.
- The development of a **campaign** to educate, align, and cohere the STEM (science, technology, engineering and math) efforts of the after-school community with ongoing national K-12 science education improvement efforts and policies.
- The development of a plan for **sustainability** that relies on all of the above elements, but also includes the identification of long-term funding and networking strategies to support the infrastructure over time.

National Conference on Science After-School

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The Power of After-School Time

The power of after-school programs lies in their ability to create intellectually and emotionally stimulating environments for a wide range of youth. Over the past decade or more, after-school programs have become increasingly pivotal in reinforcing roles and responsibilities once wholly assumed by families, communities and schools. Significantly, supporting children's academic achievement in a high-stakes school environment is increasingly important to after-school leaders. In many cases, more time is spent on literacy and mathematics than ever before. An important principle at the Santa Fe conference was that while after-school programs need and want to support students more strongly in their academic work, they also need to maintain core values and design strategies that have traditionally made the after-school hours engaging, nurturing, and productive for youth—including those who do not thrive in formal school settings. That is, they did not want to *become* schools, but they did want to support schools, teachers, parents, and the children who were expected to succeed in schools.

This current push and pull between youth development and academic achievement—both the balance and the overlap—within the context of an underfunded system lacking key elements of a professional infrastructure could prove painful and distorting. Or it could offer new promise and opportunity. There is an opportunity for after-school programs to meet this dual agenda by aligning the academic content of some of their work with ways of learning that can engage students and help develop the traditional youth development areas relating to social skills and self-identity. This is an opportunity that is particularly well-suited to hands-on science and mathematics.

There is a tremendous synergy between the goals for youth development—access and equity, experience and self-esteem rooted in academic, intellectual, and emotional 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.

Another important principle was the recognition that there has already been substantial investments made in the development of both the after-school community and the science education infrastructure—curriculum, research and evaluation, staff development, etc. By bringing the after-school and the science education communities together, the Coalition seeks not only to build on known effective strategies and expertise, but to leverage the national investment and commitment to both areas of work.

The learning experiences of youth—ones that give them insight into the world and help support their progress toward productive citizenry—are the common ground and starting point for the Coalition for Science After School. For the Coalition, science is both a vehicle for personal exploration as well as a goal for learning and achievement.

Infusing Science into After-School Programs: Rationale

Rationale 1. There has been dramatic growth in the number of U.S. youth attending after-school programs, and increased links between schools and after-school programs.

After-school programs are expanding in terms of the numbers of students served and their importance in education and child development. Over 6.5 million children are in such programs, and the parents of another 15.3 million say their children would participate if programs were available (*America After 3 PM,* After School Alliance, 2004).

The growing popularity of after-school programs derives from the many needs they address. Families are increasingly dependent on after-school programs to supervise their children when the heads of households are at work. As a result, these programs are a critical link in the social fabric and safety net, particularly as many social institutions, especially the family and local community, are undergoing changes that often make them less able to support youth.

Furthermore, parents know that after-school providers help their children succeed by meeting their social, emotional, physical, and intellectual needs. Children who regularly attend after-school programs have higher grades and self-esteem than those who do not. (*A Decade of Results: The Impact of LA Best After-school Enrichment Initiative,* Huang D., et al, 2000). They demonstrate better peer relations and emotional adjustment, they spend less time watching television and they take better advantage of learning opportunities (*Building Quality and Supporting Expansion of After School Projects,* The After School Corporation, 2001).

After-school programs are increasingly seen as a key mechanism to help schools meet the more stringent accountability measures brought on by the No Child Left Behind Act. The U.S. Department of Education supports after-school programs with $1 billion of funding every year through the 21st Century Community Learning Centers Program. Many states now feature after-school programs in their plans for responding to the challenges created by the No Child Left Behind Act. Numerous foundations are investing millions of dollars in researching, supporting and operating after-school programs. This is especially true in urban areas, where after-school programs have an even more prominent role in helping students develop basic skills. They provide opportunities to inspire and engage students who are often underserved by even the best of mainstream education.

What are after-school programs?

After-school programs are diverse. They range from drop-in centers with daily activities, to school-based programs for specific academic content, to programs run by community-based organizations with a blend of personal growth and academic enrichment, to extended in-depth experiences at museums and cultural institutions. After-school can also stand for out-of-school, encompassing programs at all hours, on weekends and during the summer months. All share a commitment to providing youth with experiences to enrich learning and promote personal growth. While often linked with formal schooling, after-school programs offer greater freedom in designing learning experiences and a broader focus on whole child development.

Rationale 2. There is an imminent, renewed national focus on K-12 science education with the advent of federally-mandated science testing.

U.S. students in the early grades perform toward the top of the charts in international science tests, but by middle school their performance starts to drop. By the end of high school, U.S. students are among the lowest performing science students taking the tests (*Effective Schools in Science and Mathematics,* Third International Mathematics and Science Study, 2000). Credit for their early high scores is largely attributed to out-of-school science learning, such as visits to science museums and nature centers, and exposure to a wide range of media programs that are generally designed to engage and motivate children through their own curiosity (*Patterns of After-School Care in Middle Childhood,* Pettit, S., et al, 1997). The drop in interest and ability to do school science is reflected in the decreasing number of students pursuing science and engineering degrees in college, and developing qualifications to pursue careers in these fields.

Standards for education have been developed in science, as well as mathematics, technology, and engineering. These standards advocate solid content knowledge supported by inquiry, problem-solving and related thinking skills. While these goals are clearly defined and commonly agreed upon, schools often lack the capacity (staff, time, and resources) to provide rich curricula in these essential fields. It is particularly true that schools are less able to provide students with experiences doing science, engaging in scientific investigation, and constructing scientific arguments from evidence accrued through inquiry.

Schools are more equipped to support science learning as a body of facts and figures. However, this aspect of science is perhaps the least appealing to the majority of students and is one reason why science is stereotypically disliked by most students.

In most school systems, science education has received little to no attention for the past several years due to the intense focus on mathematics and reading literacy generated in part by mandated high-stakes annual testing in these subjects. Under *No Child Left Behind* legislation, districts across the country must begin to test students in science by the year 2006. The advent of these tests will require school systems to once again seriously address student science learning. But what kind of science?

Many states have adopted policies supporting the development of science content knowledge that includes learning science by doing science—i.e., through inquiry-based and/or hands-on science activities. Yet, because most standardized tests are likely to be pencil-and-paper tests, it is quite probable that few schools will be prepared or able to provide students with the in-depth, hands-on science experiences that research shows is essential to developing student interest in science, as well as developing lasting understanding of the nature of science and of science content. Schools will need support and expanded resources to provide their students with such experiences.

Science = STEM = Science, Technology, Engineering & Mathematics

The National Science Foundation uses the term "STEM" to refer to four related fields of education: science, technology, engineering and mathematics. While each field has its own structure, priorities and challenges, the four overlap in many ways. They share a focus on understanding the world around us, asking questions and finding answers, solving problems, and approaching topics with a clear, rational frame of mind. In this report, the shorthand terms "science" and "STEM" include all four fields of science, technology, engineering and mathematics.

Rationale 3. After-school programs offer excellent opportunities to enrich student learning in STEM through inquiry-based, hands-on experiences.

After-school programs have demonstrated their value for augmenting and amplifying traditional classroom instruction. For example, after-school programs have been an important part of efforts to improve reading literacy among youth. Similarly, they have helped in the development of mathematical skills and knowledge. Now, after-school programs and STEM education are well poised for a similar synergy. They can build on the best known practices in both fields to make a major contribution to enriching STEM education for our nation's K-12 students.

After-school settings are optimal for providing engaging, hands-on STEM experiences, enabling students to apply, reinforce, and extend skills and concepts taught in school. And they are particularly conducive to project-based activities where a wide variety of children can participate in the design, construction, investigation, sense-making, and communication of science projects. Projects can be designed to include important roles and learning opportunities for children of different age levels and academic abilities. Young children can help to design and construct, while older children can lead in hypothesizing, investigating and communicating results. Literacy skill development can be woven into the need to communicate the results of the experiments and investigations. Furthermore, the time for such experiences in after-school programs is more flexible than in formal education, and the agenda can change when questions lead to deeper inquiry.

There are numerous exemplary K-12 hands-on STEM activities (including innovative programs developed with NSF, NASA, the U.S. Department of Education, and other sources of funding) that could be repurposed for after-school communities and programs. With coordinated planning, after-school science programs could focus on key conceptual areas that tend to serve as building blocks for continuing science learning. After-school programs can help inspire students with engaging STEM experiences and develop scientific habits of mind that will last a lifetime.

A Wealth of STEM Activities for After-School

There are numerous ways to infuse STEM into an after-school program. Some approaches are one-time experiences, such as listening to a speaker or taking a field trip. Others build on children's natural curiosity about the world around them, such as watching plants grow or observing changes in the weather. Still others are on-going, such as nature studies, gardening and animal husbandry projects, science and computer clubs, and participating in national competitions. While STEM activities vary among programs, many have similar goals: to excite student interests and develop scientific habits of mind through hands-on, experiential learning.

Defining the Vision for STEM in After-School Programs

Building on a broad base of experience and expertise, conference participants developed a vision to strengthen STEM education in after-school programs on a large-scale, long-term basis.

In this vision, K-12 students in urban, suburban, and rural communities across the nation participate in after-school and summer programs with a rich variety of STEM learning experiences. In some programs, students might learn by experimenting, designing, and investigating. Using hands-on activities and field trips, they explore their communities and local environments. They collaborate to make observations, collect data, reach conclusions, and share their findings. They acquire key science concepts that augment and enhance what they learn in school, and develop skills in critical thinking, problem solving, research and cooperation.

Literacy skill development can be integrated into STEM learning, whether in traditional ways like reading science-related books, or when building 21st century skills. These can include determining what information is valid, and searching and vetting sources, as well as skills of scientific inquiry like determining what constitutes "evidence," making sense of images and observations, noticing and decoding patterns in nature, discussing and articulating observations, analyses and interpretations, and communicating ideas and findings.

STEM learning experiences can relate directly to students' community environments, whether investigating local ecologies, exploring engineering challenges, or focusing on the people and activities that make up the communities. After-school programs can get children and youth outside to connect to the science and nature around, and build physical skills, conceptual understandings, and appreciation of their own neighborhoods and surroundings. In short, through such after-school learning experiences, students extend and apply, in creative and engaging ways, the science, math, engineering and technology they learn in school.

With motivation, engagement, and retention being key issues for after-school programs, these science, mathematics, engineering and technology activities—which build on the interests and active engagement of young people—are designed to get learners wanting to return. The activities are physically active and intellectually engaging. They can stretch the imaginations as well as the academic and social skills of participating youth.

Seven Steps for Realizing the Vision

Conference participants developed a broad plan of action to make this vision real. These components, detailed below, require funding, resources and professionalism to ensure quality results. There was consensus that achieving this vision would require buy-in and action by all relevant stakeholders—federal and private funders, after-school program providers, materials developers, researchers, schools, communities and parents.

1. Establish Networks to Support Partnerships & Build Momentum

The Coalition seeks to build a national network of stakeholders and providers committed to STEM in after-school settings. Such a network needs to build on existing networks and local capacities to facilitate many aspects of the work before us: from disseminating knowledge, leveraging resources, and sharing successful practices to bolstering staff training, coordinating activities and development, and engaging parents and communities. An effective way of leveraging local investments to achieve national impact might be to organize a network using a hubs-and-spokes system around existing expertise or communities. Hubs could be regional, or they could focus on particular areas such as curriculum, staff development, or leadership training, bringing together many stakeholders with interest and expertise in a given domain.

The benefits of an effective national network will not be the standardization of services, but efficiencies and quality enhancement in a shorter time span, as well as the development of common ground to generate localized, customized programs. Importantly, a national network will help leverage existing materials and expertise.

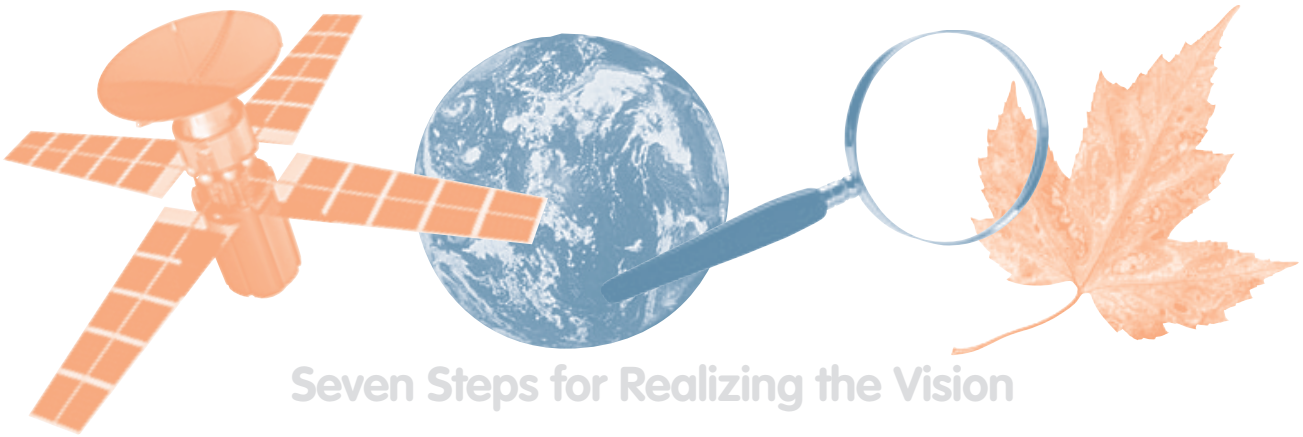
2. Develop a Reference System with Shared Language, Concepts, & Models

An important early step for infusing STEM into after-school programs nationwide will be to develop an intellectual framework of common concepts, models, and vocabulary that practitioners can share. An initial landscape study will yield a reference system, or taxonomy, that will be key to building STEM in the after-school field more effectively, focusing resources, evaluating innovation, researching effectiveness, and enhancing the delivery of programs.

A reference system will synthesize principles from both STEM and after-school that represent current thinking about effective practices, content and program delivery. A reference system will help providers and funders to identify gaps and unmet needs in the field, such as particular kinds of staff development, curricula materials, leadership and research. It will also offer a framework for analyses of actions and results that support research and evaluation.

3. Develop STEM Learning Activities Appropriate for After-School Programs

Through the landscape study and the development of a STEM-in-after-school reference system, the Coalition will identify key design principles and implementation strategies for STEM curriculum. These activities will provide the foundation for repurposing existing high-quality classroom science learning materials for use in after-school settings. The process will also lead to the identification of the need for new materials that build on current best practices while remaining practical and doable in after-school environments. STEM materials for after-school will need to be affordable, renewable, and multi-lingual, as well as customizable for local contexts and communities.



Rather than attempt to cover the hundreds of topics in standards-based curricula, the Coalition supports a focus on a dozen or so key K-12 science and math concepts related to important cognitive transition points critical to success in STEM learning. In this way, STEM in after-school can serve as a critical booster for academic success in science and math without repeating school curricula. These critical concepts will be mapped against the unique strengths of after-school settings to determine which ones are most appropriate and leverage the most learning.

It would be critically important for the materials to be targeted, both in content and design, in ways that make the most sense for after-school settings. These materials take into account what is most developmentally and cognitively appropriate, as well as what is most doable in after-school settings. This would include designing or selecting after-school STEM curricula for skills, content, attitudes, participation, and persistence. This work is part of the research as reference system, detailed below.

4. Promote Professionalism Through Institutional & Staff Development

Staff and leadership education will be central to effectively enhancing STEM into after-school programs. Currently, there is a great range of practice within after-school programs, ranging from master teachers, to paraprofessionals, to domain experts, to college students exploring careers in education. There is a need to establish and support standards, credentialing and compensation efforts to make the field more professional and capable.

To make real progress in professional development and realize cost benefits, the Coalition suggests focusing staff development on key science learning areas, and infusing this training into existing staff development structures rather than establishing new mechanisms. New curricula need to come with staff development built in, but this staff development may need to be reconceptualized in ways different from traditional K-12 curriculum approaches.

5. Engage Parents & Local Communities

Parental and community support will be vital to the long-term effectiveness of engaging youth in after-school science and math. Many after-school organizations have successfully involved local parents and communities in their programming, and building on and disseminating this expertise will be critical.

Engaging parents in both the purpose and the programs of science and mathematics in after-school was seen as a key need in any staff or leadership training done to bolster the field's professionalism. Initial work will include mapping relevant organizations and resources, reviewing existing efforts on parental/community engagement in both STEM and after-school, and outlining guidelines for linking parents and the local communities to after-school curricula and staff development plans.

6. Conduct Research into Effective Practices

Research that links to what we know about learning and points to how to capitalize on this knowledge will be critical to building and sustaining a national infrastructure for enhancing science and math education in after-school programs. Research will inform leaders and practitioners of what currently exists and will be the first step toward aggregating expertise and experiences in the field. Research also will make funders and decision-makers aware of needs and promising strategies for meeting them.

Three key research types and functions emerged as important for moving forward:

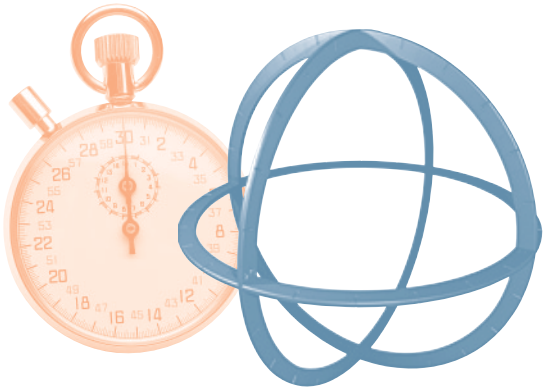
A. **Research as Survey: "What we know" —** Many participants, including funders and policymakers, argued for the need to: catalogue and assess what exists; assemble and connect existing research and evaluation projects; and convene experts in the field. There are many evaluation and research studies on informal learning and after-school practices. It is important to critically review them from the vantage point of STEM. What do we know about differences between generic programming with STEM components versus specialized programs built around STEM? What is the evidence for experiential and hands-on science learning? What models of math instruction and exploration in out-of-school settings show the most promising results? These are some examples of research that will need to be carefully analyzed prior to large-scale research and evaluation investments around STEM in after-school programs. The goal should not be to make choices for the field—what is a "good" or "bad" curriculum. Instead it is to catalogue existing resources for practitioners, policy-makers and funders by a set of criteria and to report on evaluation and research results whenever available.

B. **Research as Capacity Building —** Research has to become part of everyday planning in after-school programs. How many children are in programs? What kind of programs? What is the ratio among girls and boys, ages, regions, ethnic groups, and special education versus regular education? Many of these basic facts are not available to policy makers and practitioners. This lack makes much-needed finance studies complex. In addition, in-depth studies should research STEM content and programming in relationship to cognitive development of children and youth. Similarly, increasing sophistication in measurement development for this field is needed. Capacity building is about networking research institutions with the practice and policy fields, and developing a new generation of researchers and evaluators

C. **Research as Practice Check and Support for Innovation —** The Coalition produced a consensus that research and evaluation need to be integrated into practice initiatives. The efficacy of new curricula as well as teaching and learning methods needs to be rigorously assessed. Some publishers and research centers have begun to do this work, but far more is needed. New program designs need to be tested systematically before they go to scale. And large-scale, long-term evaluations are necessary for the action plans recommended in this report. Clearly, research has shown to be a productive innovation engine. What is far more difficult is establishing a culture in education and after-school circles whereby practices that do not show any evaluation results are discontinued. Given the importance that evidence-based practice in STEM can gain, it is essential to develop evaluation strategies that clearly reflect the intervention.

7. Strengthen & Diversify Funding

Funding will be necessary to build and sustain the field of science and math after school. Infrastructure and capacity-building are the highest priorities. These efforts will require support for networking between research institutions and after-school providers, as well as money to recruit, train and retain a new generation of practitioners and researchers. Funding will also be needed to drive materials development, professional development, longitudinal research, and existing and emerging networks. Building this infrastructure is the key step.



Five-Year Strategic Plan

Creating a national infrastructure that supports effective STEM learning activities in after-school programs will take broad-reaching, long-term action. The work described here will demand concerted efforts by a wide range of individuals and organizations. It also will require multiple sources of funding, including federal, state and local governments, foundations and businesses. The net gain, in terms of national capacity-building in science, technology, engineering and mathematics education, certainly warrants the investment.

Conference participants developed multi-faceted action plans in five domains:

- Infrastructure and networking
- Curriculum development
- Institutional and staff development
- Parent and community involvement
- Dissemination and outreach.

Linking elements from each of these domains, the conference recommends a three-phase plan over the next five years:

Years 1-2: Baseline Research and Infrastructure Development

To lay the strongest possible base, the field needs to research the current state-of-the-art, implement a landscape study to document the scope of existing STEM programs and services in after-school programs, define a common language and reference system, and mobilize existing networks to promote collaborations.

The following actions have already begun:

Establishment of a Steering Committee – The Coalition formed a steering committee, half of whom are from science learning organizations and half of whom are from after-school organizations, to support continued collaborations, activity, and networking among a wide range of after-school and science learning organizations. The committee is supporting initial fundraising efforts to achieve some of the goals outlined by conference participants, including the development of a reference system and convening a second conference. An overriding goal of the committee is to expand the Coalition and to develop communication mechanisms connecting the science education and after-school communities. Committee members are: Dennis Bartels, TERC; Mark Carter, National Alliance for After-school; Goéry Delacote, Exploratorium; Lucy Friedman, TASC; Jane Quinn, Children's Aid Society; and Elizabeth Stage, Lawrence Hall of Science.

Design & Implement a Landscape Study – The Coalition is seeking funds to conduct a landscape study to document, catalog, and identify current practices, programs and resources for science and math learning in after-school settings. Once funds are secured, an RFP will be issued to identify the

appropriate set of research, science and after-school partners to implement such a study.

Initial Policy and Advocacy Work – The steering committee sees one of its major tasks as investigating possible policy and advocacy avenues that the Coalition might undertake. Part of this advocacy relies on transparent and continuous communication within the Coalition so that the efforts and results of participants' work can be shared and promoted.

Organizational Level Efforts – All of the participants at the Santa Fe conference agreed to find ways to immediately incorporate or expand STEM programs into after-school settings. In many cases these new ideas involved collaborations or mutual interests identified at the conference.

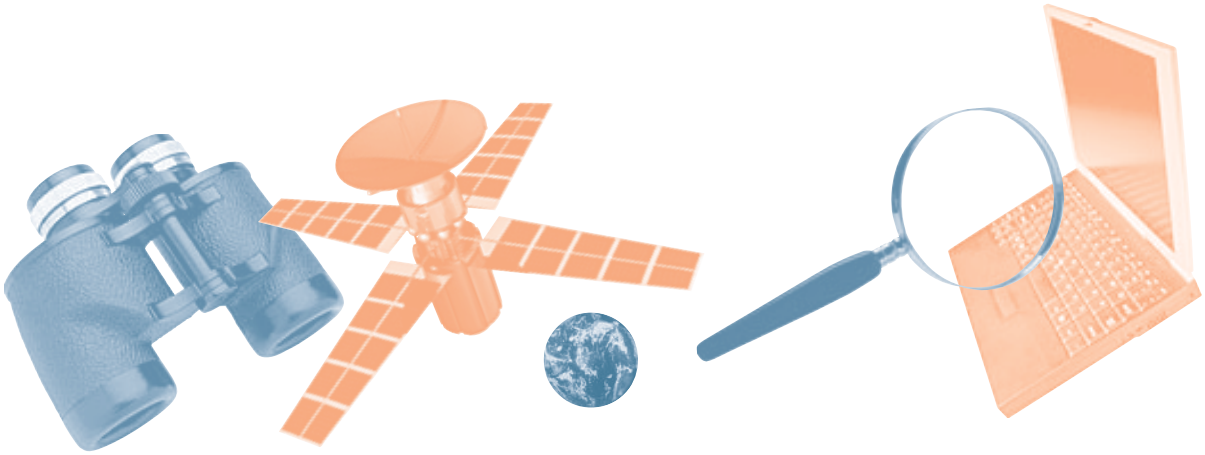
Planning for a Second Conference – A second conference is scheduled in Los Angeles for early 2005 to expand the network and build on the work begun in Santa Fe. The conference will again gather a broad range of perspectives and focus on three or four big-picture issues that undergird the potential and practices of infusing science into after-school settings. It also will further map the infrastructure needed to strengthen STEM in after-school and develop strategies to promote sustainability.

Years 2-3: Define and Disseminate Effective Practice Models

Based on results of the landscape study and development of the reference system documenting effective practices, the Coalition will seek to define critical elements of program design, curriculum, pedagogy, professional development, and parent involvement—all designed to achieve effective STEM education in after-school programs. As these models are developed, field-tested, evaluated, and refined, they will be disseminated nationally through existing networks as well as the emergent national network.

Years 3-5: Large-Scale Implementation

The Coalition will seek to initiate long-term, large-scale implementation efforts to promote STEM in after-school programs. Development of support and capacity-building will take place at all levels—federal, state, district and individual programs—with common directions and purpose, while allowing for individual variation that is the hallmark of after-school programs. Developing new models of targeted curriculum, staff development, leadership training, and research activities are among the activities the infrastructure will seek to implement and sustain.



Conclusion

The Santa Fe conference acted on a timely opportunity the convergence of a growing demand for quality after-school care, a mandate for improved K-12 science performance, and the particularly well-suited—match between inquiry-based science and after-school settings. The vitality and less-structured environment of after-school programs provide a natural setting for engaging, activity-based STEM experiences. With support and effective strategies, after-school programs can be instrumental in enhancing STEM education, enabling learners to improve their science, math, engineering and technology fluency. Through collaborative efforts that leverage the strengths and experiences of diverse institutions and people, the Coalition can establish a long-term and sustainable framework to support youth science and math learning. This vision is similar to the movement to improve reading literacy that is currently emerging in the after-school field nationally to meet an important developmental and societal need.

By leveraging existing resources — private and public organizations ranging from national to community levels — we can cost-effectively augment classroom education and dramatically improve science, math, engineering and technology learning among our nation's youth.

Participating Organizations

After-school Alliance, Flint, MI, Jennifer Reinhart, Associate Director.

American Museum of Natural History, New York, NY, Ellen Wahl, Director of Family and Youth Programs and Community Outreach.

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.

Boys and Girls Clubs, Atlanta, GA, Erica Saxby, Director of Education Programs.

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.

Department of Education, Washington, DC, Robert Stonehill, Director, State & Local Services Division.

Developmental Studies Center, Oakland, CA, Eric Schaps, President.

Education Development Center, Newton, MA, Bernie Zubrowski, Project Director.

Exploratorium, San Francisco, CA, Goéry Delacote, Executive Director; Bronwyn Bevan, Director, Center for Informal Learning and Schools; Darlene Librero, Director, High School Explainers Program.

Harvard Program on After-school Education & Research, Cambridge, MA, Gil Noam, Director.

Independent Consultant, San Francisco, CA, Diane Frankel

Key Curriculum Press, Emery, CA, Steve Rasmussen, President.

Lawrence Hall of Science, University of California, Berkeley, CA, Elizabeth Stage, Director; Jacquey Barber, Associate Director for Curriculum Research and Development; Bruce Stewart, Director of Student and Family Programs.

Learning Point Associates, Naperville, IL, Judy Caplan, Coordinator of School & Family Partnerships.

National Collaboration for Youth/National Assembly, Washington, DC, Pam Garza, Director, National Youth Development Network.

National Council on Community Education, Flint, MI, Pat Edwards, Assoc. Executive Director.

National 4H After-school Council, Washington, DC, Eddie Locklear, Director.

National Institute on Out of School Time, Center for Research on Women, Wellesley, MA, Joyce Shortt, Co-Director.

National School Age Care Alliance, Boston, MA, Mark Carter, Executive Director.

National Science Foundation, Elementary, Secondary, & Informal Education, Washington, DC, William Frascella, Director.

NASA, Informal Education Division, Washington, DC, Jim Stofan, Director.

St. Louis Science Center, St. Louis, MO, Diane Miller, Senior Director, Public and Community Programs.

Santa Fe Institute, Santa Fe, NM, Robert Eisenstein, President.

Southwest Education Development Laboratory, Houston, TX, Cathy Jordan, Program Director, National Partnership for Quality After School Learning.

TERC, Cambridge, MA, Dennis Bartels, President; Daniel Barstow, Director, Center for Science Teaching & Learning; Jan Mokros, Co-Director, Center for Educational Research, Chris Randall, Project Director.

The After School Corporation, New York, NY, Lucy N. Friedman, President.

U.S. Air Force After-School Network, San Antonio, TX, Linda Armstrong, Child Development/Training Specialist.

University of Arizona, Tucson, AZ, Marta Civil, Professor of Mathematics.

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

For additional copies of the report contact:

TERC
2067 Massachusetts Ave.
Cambridge, MA 02140
617-547-0430

e-mail: commmunications@terc.edu

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TERC

Lawrence Hall of Science
University of California, Berkeley