

STEM READY AMERICA

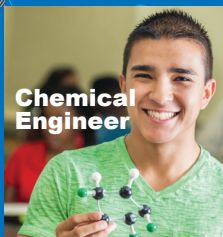
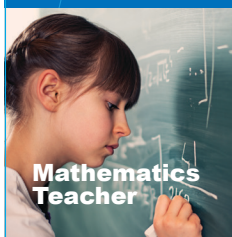
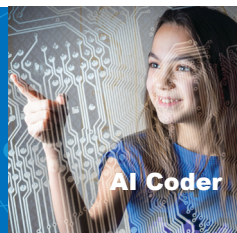
Inspiring and Preparing
Students for Success
With Afterschool and
Summer Learning

This collection of articles is excerpted from a new resource, *STEM Ready America: Inspiring and Preparing Students for Success with Afterschool and Summer Learning*. In this volume, Executive Editor Ron Ottinger and Contributing Editors Cary Sneider and Ian Hickox have collected expert perspectives on the state of the field of STEM learning—especially in afterschool and summer learning opportunities.

Collectively, these writings from more than 40 thought leaders highlight how young people are developing STEM knowledge and skills that will prepare them to be successful in school today and the workforce tomorrow.

The articles provide persuasive evidence and real-world examples to inform effective partnerships, policies, and actions to bring quality STEM learning to children and youth across the nation. This volume is focused in three key sections:

- **The Evidence for STEM**
- **Partnerships for STEM Learning**
- **Ensuring Access to Quality STEM Learning**



Developed by STEM Next with support from the Charles Stewart Mott Foundation, *STEM Ready America* builds on the award-winning 2013 publication *Expanding Minds and Opportunities: Leveraging the Power of Afterschool and Summer Learning for Student Success* edited by Terry K. Peterson, Ph.D., which made the definitive case for the power and effectiveness of afterschool programs and summer learning.

For more information about STEM Ready America and to download articles visit: www.stemreadyamerica.org.



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www.STEMReadyAmerica.org

Imagine Science: A Coalition of National Youth Organizations Bringing STEM to Scale

Jim Clark, Boys & Girls Clubs of America

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STEM Next | Charles Stewart Mott Foundation



Although more youth today are engaging in STEM learning in out-of-school-time (OST) than ever before, too few youth are choosing to pursue STEM in the long term. Moreover, most disadvantaged youth either do not have access to—or are not taking advantage of—OST STEM opportunities in their communities (Change the Equation, 2013, Afterschool Alliance, 2014). This is especially problematic given that STEM in OST is associated with powerful learning gains. Research shows it can boost critical thinking and problem-solving skills and activate youth interest in specific STEM pursuits and career pathways. Increases in STEM interest can, in turn, lead to increased knowledge and skills in specific STEM domains (Mass. Dept. of Higher Ed., 2011). Youth with well-developed individual interests in a STEM discipline have relatively higher levels of self-efficacy and are more able to sustain attention, set goals, and use diverse learning strategies (Renninger, 2010).

Communities nationwide must begin investing differently if we are to solve the problem of the narrowing STEM talent pipeline. Youth from historically disadvantaged demographic groups have less access than their peers do to STEM learning opportunities (Hill, Corbett, & St. Rose, 2010). They are youth of color, girls, and from low-income families, and they typically live in under-resourced rural and urban neighborhoods.

They are the same youth who are missing out on other enrichment opportunities such as the arts or organized athletics. They are the youth who stand to gain the most from STEM in OST and they are not getting it. This is an individual loss and a cost to regional employers and economies. For our purposes here we will refer to these youth as under-represented.

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Limited access to STEM learning in OST persists, despite the fact that almost all under-represented youth live within close proximity to schools, libraries, and parks. Community-based youth development organizations—already inhabiting the space and time among these assets—are uniquely positioned to engage under-represented youth in STEM. In fact, when they provide STEM learning in OST, youth development organizations can be the connective tissue schools and communities need to rapidly and effectively, and at scale, bridge STEM opportunity gaps.

As community-based organizations, youth development service providers typically have strong existing ties to neighborhood schools and a high degree of trust among families. Many already work directly in schools and partner closely with principals and teachers to support their educational goals for their students. They often also have strong ties to local school districts and municipal government officials who depend upon their organizations to provide a variety of enrichment and supportive services to families and schools. These services are commonly delivered through local initiatives and complicated portfolios of otherwise uncoordinated state and federal programs, such as the federal 21st Century Community Learning Centers program.

We know youth development organizations can play this role effectively because we have seen firsthand the power of positive youth development strategies integrated into quality STEM programming in each of our four organizations. Imagine Science is an initiative with the goal of providing under-represented youth with access to high-quality STEM programming. The way this is accomplished is through OST national-local partnerships. The initiative began in 2015. One of the guiding principles for Imagine Science is that quality OST programming aligned to evidence-based standards of positive youth development (PYD) can act as a catalyst for STEM engagement. A second guiding principle is a belief that we can serve the youth who stand to benefit the most by collaborating effectively together.

The Imagine Science Impact

Opportunity Youth Characteristics

Low-income	73%
Girls	56%
Youth of color	82%
Previous nonmembers	61%

7,556 youth served

► 4,044 (2015)

► 3,512 (2016)

Imagine Science represents an unprecedented partnership and a new way of doing business for its four governing organizations: Boys & Girls Clubs of America, Girls Inc., the National 4-H Council, and the YMCA of the USA. Staff from all four organizations partner closely, both at the national level and in each of the local Imagine Science pilot communities. The four organizations already collectively serve more than 18 million youth annually, at more than 100,000 locations nationwide. Each organization individually has committed to expanding the reach of hands-on STEM learning opportunities to under-represented youth nationwide, and collectively we have come together to share resources, expertise, and a mission of reaching the most under-represented youth through the Imagine Science initiative.

Quality OST programming aligned to evidence-based standards of positive youth development (PYD) can act as a catalyst for STEM engagement.

The Power of Four

Each of the four national organizations provides unique resources that work in conjunction to build the reach and programming for Imagine Science:

- ▶ **Boys & Girls Clubs of America (BGCA)** serves nearly 4 million young people each year at more than 4,200 clubs from public schools to public housing, on Native lands and on military installations around the world. There is a Boys and Girls Club in every congressional district in the country, providing a unique opportunity to engage with federal and local elected officials on key issues like STEM education. Every day, about 438,000 young people—59 percent of whom qualify for free or reduced-priced school lunches—enter a Boys & Girls Club, and BGCA has set a goal to engage 2 million youth in STEM annually by 2020.
- ▶ **Girls Inc.** contributes its expertise in reaching girls, especially low-income girls, through sustained engagement with STEM, as well as its dedication to a scientific, rigorous approach to measurement and evaluation. Girls Inc. engages more than 140,000 girls each year with opportunities that include STEM, and it has set a goal to increase its reach to 100,000 additional girls nationwide by 2020, all of whom will engage in STEM.
- ▶ **The National 4H Council (N4HC)**, the nation's oldest and largest STEM youth development organization, leverages its strengths in research-based STEM and Positive Youth Development (PYD) curricula and training, as well as its presence in every county in the nation, including 110 land-grant universities and cooperative extension systems. In 2015, 4-H programs across the country engaged 5 million youth participants in STEM projects. N4HC has set a goal to reach 10 million youth annually by 2025.
- ▶ **The YMCA of the USA (Y-USA)** leverages its physical presence. Over 70 percent of Americans live within 5 miles of a Y. The Y reaches 9 million youth in 10,000 communities. 58 percent of YMCAs are in communities where household incomes are below the national average. Since 2014, the Y-USA has integrated STEM activities into local affiliate programming in 48 states. Among the youth participants engaged in STEM, 66 percent are from under-represented groups. By 2017, the Y-USA has a goal to reach more than 200,000 youth with STEM.

Through Imagine Science, all four partners combine their resources, including hands on STEM curricula designed especially for OST, experienced training and technical assistance staff, and outcomes and data management, as well as fundraising expertise and tools.

The Barriers to Increasing Access

So, what is the benefit of partnering? Imagine Science partners leverage one another's existing assets and capabilities in newly combined ways to solve the *shared* complex problems that are preventing more under-represented youth from engaging in STEM.

Many community-based youth development organizations lack the resources to provide the access and reach of STEM learning opportunities to all the places and times where they are needed to engage under-represented youth. Partner affiliates routinely cite transportation issues and lack of dedicated funding as barriers, along with decreased or shifting public funding for OST in most communities over the past decade and limited funding of any kind for informal STEM learning in OST.

Compounding the access problems, youth-serving organizations also face challenges in building the capacity of their workforce to incorporate STEM learning into their OST programming. Staff turnover throughout the sector is high—because of the nature of the shifting funding landscape—while

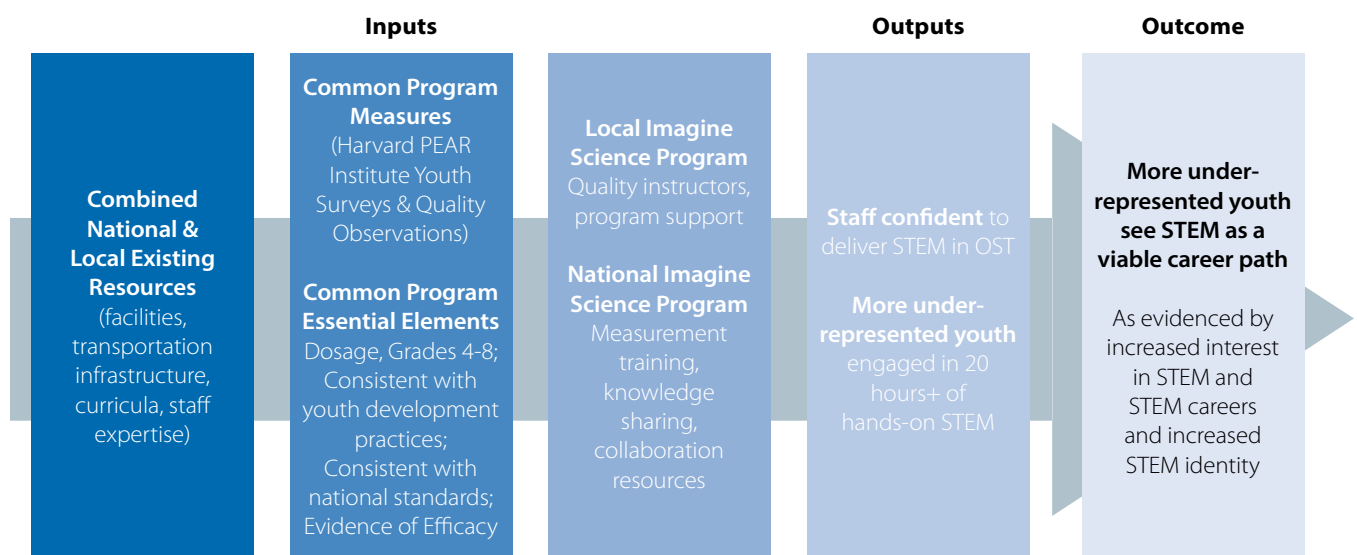
full-time program managers are stretched thin, trying to do more with less as a result. Despite strong interest to offer STEM in their programs, staff also report lack of confidence in their ability to conduct hands-on STEM learning activities and even lower confidence in their ability to engage under-represented youth in STEM learning.

Testing a New Way to Rapidly Increase Access

In February 2015, Imagine Science partners in three communities—Dallas, Texas; Omaha, Nebraska; and Orange County, California—agreed to jointly design and execute a proof-of-concept pilot to test their combined capabilities to identify and fill the STEM opportunity gaps in select neighborhoods.

Over two summers, Imagine Science served 7,556 students in its three pilot communities, 56 percent were girls, 82 percent were children of color, and 73 percent came from low-income families. More than half (61 percent) were youth who had not been participants in any programming of the four organizations, representative of a deeper reach into the community made possible, in part, by the local affiliates' commitment to finding and enrolling under-served youth.

Figure 1: Imagine Science Logic Model



Participating youth engaged in hands-on STEM activities integrated into an array of one-time or multiweek positive youth development programs in both school and community settings. The new local Imagine Science Community Partnerships shared transportation infrastructure, coordinated staffing, and leveraged existing community and school partnerships. They relied on a common program quality framework that identified the essential elements of quality STEM in OST programming organized by program design goals. The framework also used the same program observation measures and key performance indicators, as well as a shared data tracking system.

Imagine Science is designed to empower local partners to tailor their outreach efforts and programming to match local needs and capacities.

Imagine Science is designed to empower local partners to tailor their outreach efforts and programming to match local needs and capacities. In Omaha, for example, partners teamed up to automatically enroll rising 8th grade Imagine Science teens in the Early College Admissions Program at the University of Nebraska. This means that each of these youth will receive specifically targeted and sustained post-secondary enrollment supports—that would be unavailable to them through any other means—through to high school graduation.

The Orange County partners prioritized under-represented youth entering Imagine Science STEM programming in the Summer of 2016 to the top of their years-long waiting list for highly sought after fall afterschool programming funded through the state of California's After School Education & Safety program and federal 21st Century Community Learning Centers funds. In Dallas, youth in three middle schools in the low-income, under-resourced neighborhood of Pleasant Grove engaged in Imagine Science programming designed and planned in partnership with local school leadership and science teachers. Summer informal learning outcomes in the Dallas program were linked to year-round K–12 science curricula and standards. The goal of this programming is to transform the OST STEM learning experience from part-time summer instruction to a year-round hands-on experience, both during and beyond the school day and calendar, all under the shared moniker of Imagine Science. In all cases, Imagine Science community partners reported they gained access to resources and relationships more quickly than they believed they would have had they acted alone.

Outcomes Focus

The most significant surprise during the Imagine Science pilot was the latent demand for STEM learning opportunities. Each of the three communities targeted high-need areas where, before the pilot, we expected a low demand for STEM learning, especially where there were high numbers of youth previously not served in any way by the Imagine Science partner affiliates. We found the opposite to be the case. Where we anticipated 20–30 percent of Imagine Science participants to be previous nonmembers of our organizations, 61 percent of the youth reached in Imagine Science communities were previous nonmembers.

Beyond participation and demographic results, the Imagine Science partnership also worked with Gil Noam—Director of The PEAR Institute at Harvard University—and his team to evaluate the local program’s impact and to measure youths’ change in STEM interest. It may have been reasonable to anticipate that positive outcomes would be difficult to achieve with a population that, historically, has not been deeply involved with OST activities or STEM learning. However, youth STEM interest surveys conducted by Harvard/PEAR showed that this was not the case:

70.7 percent of youth reported greater levels of STEM interest at the end of the program compared to the beginning. There were also significant changes in reported STEM career interest over time, with 48.1 percent of students reporting greater levels of STEM career interest at the end of the program compared to the beginning.

Imagine Science offerings overall showed increases in STEM interest above national norms.¹ Surprisingly, while general interest in STEM was lower at the start of programming, Imagine Science youth by the end of programming had statistically significant higher levels of interest than the national average.

Contrary to national trends, there were significant gender differences in science outcomes that favored girls. Girls attending Imagine Science programs tended to rate science interest, science career interest, and perseverance items more positively than boys.

Contrary to national trends, older youth reported the highest levels of STEM engagement. Imagine Science middle school grade youth reported engaging in STEM activities and having greater STEM identity at statistically significant rates that are higher than national norms.

1. Youth surveys were designed by and independently analyzed by Harvard University/McClean Hospital PEAR Institute. PEAR maintains a national database of benchmarked youth STEM interest survey data that enabled the national comparisons to be made.

Five Success Factors

We attribute the successes of the local Imagine Science programming to five factors:

- ▶ **New and flexible investment:** Significant existing cross-organization infrastructure and assets were mobilized in each Imagine Science community, along with targeted, time-limited new investments nationally. The national investment was a galvanizing force as each community organized to rapidly get more youth engaged in summer STEM programming. Imagine Science communities are expected to sustain the local partnerships after the initial three-year investment.
- ▶ **Local control:** In the Imagine Science model, programmatic and financial decision making is locally controlled within high-level guidelines and standards of practice agreed upon at the national level of the partnership. Communities know their youth, and their challenges, best.
- ▶ **A focus on solving immediate barriers to access:** Each community chose a common geographic “Focus Zone,” then assessed their assets and unique capabilities for reaching more under-represented youth with jointly planned STEM programming at specific school, park, library, and community-based sites during a 12-week period of time.
- ▶ **Shared essential program elements:** The national Imagine Science partners agreed to six essential elements of quality STEM in OST (see Figure 1). They then created a framework that enabled them to use a common language and benefit from shared professional development.
- ▶ **Shared measures and improvement network:** One common set of mutually agreed-on metrics for program quality and youth STEM interest outcomes was used (PEAR youth assessment surveys and Dimensions of Success program quality rubric); communities shared their results within and across Imagine Science communities.

Imagine Science Next Steps

Our focus now at the national level is to modify guidelines for the local program delivery model of Imagine Science in order to prepare for optimal scaling nationwide. This will include, for example, paring down some of the costs to those that are the most essential and increasing flexibility for local Imagine Science affiliates to include the broadest age range and family participation possible. To complement scaling plans, we are using these insights to integrate Imagine Science fully with each national organization's individual STEM capacity building, outcomes management, and fundraising efforts.

Our vision for the future is to scale up access for OST STEM nationwide. Communities need organized and cost-effective delivery strategies that permeate the time and places between school and home, and between adolescence and adulthood. We recognize that Imagine Science and community-based youth development OST program providers represent just one piece of the puzzle to making OST STEM learning opportunities accessible to all youth. We also know that schools alone cannot effectively and rapidly reach under-represented youth with STEM learning opportunities—at very large-scale—in a sustainable way on; nor can community science centers, STEM employers, post-secondary institutions, or local government.

Collaborations of community-based youth organizations like Imagine Science—which can effectively apply the five success factors above—can help accelerate the interests of other collective action groups, like, for example, the STEM Funders Network STEM Learning Ecosystems Initiative sites. Similarly, Imagine Science communities are rich environments for quickly scaling up high-quality, evidence-based STEM curricula, such as those cataloged and highlighted by the national STEM business coalition, Change the Equation.

STEM OST programs have the potential to make extraordinary positive impacts on individual lives. What is needed now—if we are to widen the pipeline of STEM talent and significantly increase the rates of youth entering and exiting high school STEM-capable and STEM-interested—are diverse and extensive networks that can amplify the impacts of such programs nationwide. We know our communities have the main assets needed, but old ways of doing business must first be traded in for a new model.

Learn more at: <http://imaginesci.org>

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About the Authors



Jim Clark joined Boys & Girls Clubs of America (BGCA) as president and CEO in January 2012. He has guided the organization through the launch of an exciting new strategic direction, the Great Futures Impact Plan. His focus on outcome-driven programs is matched by his commitment to a comprehensive system for measuring Club impact, which, in turn, empowers Clubs to improve their services and do more for young people. Prior to joining BGCA, Clark spent eight years as president and CEO of the Boys & Girls Clubs of Greater Milwaukee. Clark also enjoyed success in the publishing industry, where he served in senior leadership roles in distribution, sales/marketing and customer service operations. A graduate of the University of Wisconsin, Clark received a Bachelor of Business Administration degree, with a major in finance and marketing.



Jennifer Sirangelo leads National 4-H Council in its mission to increase investment and participation in high-quality, 4-H positive youth development programs. Sirangelo, who joined Council in 2006 to grow support for the 4-H movement, is focused on supporting growth and leadership development for nearly six million young people through 4-H programs in science, agriculture, health and citizenship. She is currently leading the largest brand and alumni activation initiative in 4-H history, the *Grow True Leaders* Campaign. A Missouri native, she received a Bachelor of Arts degree in communications and political science from William Jewell College, a Master of Public Administration degree from Syracuse University and attended St. Peter's College at Oxford University. As an undergraduate, Sirangelo was recognized as a Harry S. Truman Scholar. She currently serves on the board of AgriCorps and Imagine Science.



Kevin Washington is President and CEO of YMCA of the USA (Y-USA), the national resource office for the Y. Washington assumed his post on Feb. 1, 2015, and is the 14th person and first African-American to lead the Y Movement in the U.S. He came to Y-USA from the YMCA of Greater Boston, where he served as President and CEO from 2010 to 2014. Prior to Boston, Washington served as President and CEO of the YMCA of Greater Hartford from 2000 to 2010. He also was Chief Operating Officer for the YMCA of Metropolitan Chicago from 1995 to 2000. He got his start in the Y as a Youth Program Director at the Philadelphia YMCA's Christian Street branch in 1978. A native of Philadelphia, Washington earned a bachelor's degree in history from Temple University.



Judy Vredenburg is President and CEO of Girls Inc., the organization that inspires all girls to be strong, smart, and bold through direct service and advocacy. As a network of local organizations, Girls Inc. provides out-of-school time programming to meet the needs of today's girls, in partnership with schools and at centers throughout the United States and Canada. Through its comprehensive approach to whole-girl development, Girls Inc. helps girls push past serious barriers, break the cycle of poverty, and become the next generation of leaders. Girls Inc. is on an accelerated path to double the number of girls served by 2020 and strengthen its public policy efforts to be the leading advocate for girls.



Jim Chesire is President of Bolster Mission Consulting. In 2014, the *Imagine Science* partnership engaged Bolster Mission and Jim has served as the project's consulting national director since. Prior to *Imagine Science*, Jim worked as a consulting strategist and project manager for several of the largest community youth development and human service providers in Chicago and Illinois. Before founding Bolster Mission, Jim was Project and Executive Director of the Chicago Out-of-School Time (OST) Project & Chicago Allies for Youth Success. Jim has a master's degree in Education & Human Development from Harvard University and undergraduate studies in educational psychology and the fine arts with Bradford-Merrimack College and the School of the Art Institute of Chicago.