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New Report: Afterschool Programs Make the Grade In Advancing STEM Learning

Analysis of Program Evaluations Underscores Role Afterschool Programs Can Play In Helping Close Gap in Science, Technology, Engineering and Math Skills for U.S. Students

WASHINGTON, D.C. –The nation’s urgent need for students to learn science, technology, engineering and math (STEM) skills can get a significant boost from afterschool programs, according to a new report, “STEM Learning in Afterschool: An Analysis of Impact and Outcomes.” The report was released today by the Afterschool Alliance at a congressional briefing where experts discussed the benefits of incorporating STEM subjects in afterschool settings. The briefing featured: Fernando Laguarda, Vice President for External Affairs and Policy Counselor, Time Warner Cable; Connie Chow, Ph.D., Executive Director, Science Club for Girls; Bronwyn Bevan, Ph.D., Director, Center for Informal Learning and Schools, Exploratorium; and Anita Krishnamurthi, Ph.D., Afterschool Alliance Director of STEM Policy, who led the report. Reforms in formal K-12 education are necessary, the report says, to fully address widely recognized shortcomings in STEM subjects – a gap that jeopardizes United States competitiveness with more STEM-savvy countries. But, it notes, children in the U.S. spend less than 20 percent of their waking hours in school, leaving untapped opportunities for supplemental STEM learning.

Utilizing evaluations from afterschool STEM programs throughout the United States, the report identifies trends and outcomes that demonstrate the significant and specific contributions afterschool programs are making to STEM education here. For example, a critical issue in STEM fields is that women and minorities are greatly underrepresented. However, with minority children participating in afterschool programs at a higher rate than the national average, and with girls participating in equal numbers to boys, these programs stand to reach the populations we need to bring into the STEM fields with high-quality enrichment opportunities that spark and maintain their interest. Several programs discussed in the report not only target these populations but have been successful in engaging them in STEM fields and careers.

“It’s crystal-clear that a more STEM-literate citizenry and workforce are crucial to the future competitiveness of the United States,” Afterschool Alliance Executive Director Jodi Grant said. “And it’s equally clear that a STEM-literate workforce will be even stronger when it is more diverse. What’s been less clear until now is how to get to where we need to be with STEM learning. This report lays out solid examples that demonstrate the invaluable role afterschool programs can play in moving the country forward. Afterschool programs give students the

chance to build robots, explore the stars, and learn how plants process sunlight and what makes airplanes and rockets fly. They have time to try, fail and try again. Much of that isn't possible during the regular school day."

The Afterschool Alliance's review of evaluations for the report found that high-quality STEM afterschool programs yielded STEM-specific benefits in three broad categories: improved attitudes toward STEM fields and careers; increased STEM knowledge and skills; and increased likelihood of graduation and pursuing a STEM career.

In the first category – improved attitudes toward STEM fields and careers – researchers have shown that an early interest in STEM subjects is a better indicator than grades of whether a student will pursue a STEM-related career. An early interest is also necessary to motivate students to develop the knowledge and skills required to pursue more rigorous math and science courses in high school.

The report summarizes evaluations of eight programs with strengths in this category:

- Communication, Science, Technology, Engineering and Math (CSTEM), which operates in six states and the Dominican Republic;
- For Inspiration and Recognition of Science and Technology (FIRST), which provides several leagues for student teams to participate in robotics competitions;
- Operation SMART, a national program offered by Girls Inc.;
- Science Club for Girls, based in Cambridge, Mass.;
- Student Science Enrichment Program, which supports innovative STEM efforts in North Carolina;
- TechBridge, a program for girls in Oakland, Calif.;
- Tech Corps, which offers programs in Ohio and Texas; and
- TechREACH, which offers afterschool clubs in Washington state.

For example, FIRST surveyed participants from 1999 to 2003 in New York and Detroit, finding that 80 percent of respondents reported increased understanding of the role science and technology play in everyday life. Eighty-six percent reported an increased interest in science and technology; 69 percent had an increased interest in STEM careers; 89 percent reported increased self-confidence; and 70 percent had an increased motivation to do well in school.

In the second category – increased STEM knowledge and skills – the report focuses on evaluations of nine programs that use the afterschool setting to cultivate skills such as problem-solving, critical thinking, communication and collaboration. These are crucial to the knowledge-based jobs of the present and future. The programs are:

- The 4-H Science Initiative, offered by 4-H clubs throughout the United States;
- The ACE Mentor Program, a national effort to partner high school students with mentors in architecture, construction and engineering;
- After-School MathPlus, a curriculum which is implemented in many afterschool programs nationally to highlight the importance of math skills for future career options;
- Build IT, which helps girls in Alameda County, Calif., explore the field of information technology;
- Design Team, a middle-school program in Saint Paul, Minn.;

- Project IT Girl, a three-year program for high school students in Austin, Tex.;
- The SHINE 21st Century After-School Program, which operates in rural Carbon and Schuylkill counties in Pennsylvania;
- The After-School Corporation, which launched a 2007 initiative to support STEM learning in afterschool programs; and
- The YMCA of Central Maryland, which used the Let's Go STEM curriculum at six sites.

Project IT Girl's evaluations, for example, showed that 82 percent of participants were more confident in gaining high-tech skills; and 79 percent gained a better understanding of STEM-related careers.

In the third category – increased likelihood of graduation and pursuing a STEM career – evaluations of STEM programs also show that participants are more likely to pursue higher education and study STEM fields. Tracking students long-term, the report notes, is a resource-intensive approach that only a few programs can afford. The report looks at evaluations of five programs: the aforementioned ACE Mentor Program, FIRST and Science Club for Girls, as well as Project Exploration, a Chicago effort that incorporates a strong mentor component, and Digital Wave, a Miami Science Museum program focused on climate change.

The ACE Mentor Program for example, which had 61 percent minority participation in 2008-2009, conducted a survey of 933 alumni in 2009. ACE students who were seniors in high school in 2009 graduated at a rate of 97 percent compared to the 73 percent national graduation rate as reported by the National Center for Education Statistics; and 66 percent of alumni from the ACE program are studying architecture, engineering, construction and the skilled trades, or are already working in one of these fields.

The report concludes that, although more outcome studies and impact data from STEM afterschool programs will help clarify these promising trends, existing data already show that the afterschool setting is playing a key role in supporting STEM learning. Future STEM education policy, the report says, should include afterschool as a key component of STEM education reform efforts.

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The Afterschool Alliance is a nonprofit public awareness and advocacy organization working to ensure that all children and youth have access to quality afterschool programs. More information is available at www.afterschoolalliance.org.