STEM Learning in Afterschool Programs

By Lauren Heintz

In the United States, a growing gap exists between the increasing amount of science, technology, engineering and math (STEM) jobs available and the number of American students who have sufficient education and interest in these fields. The U.S. Department of Commerce projects that STEM jobs will grow by 17 percent from 2008 to 2018, compared to 9.8 percent growth for non-STEM jobs. However, the United States is ranked 27th among developed countries in the proportion of college students who earn the undergraduate degrees in science and engineering necessary to fill these jobs. To help address this gap, states are considering strategies to create opportunities for K-12 students to engage in STEM in ways that both increase their knowledge and engage their interest in pursuing STEM careers.

One strategy some states are using is to support high-quality, STEM-focused expanded learning opportunities (before-, after- and summer-school programs). STEM programming that occurs outside the traditional school day and year offers students more opportunities to engage in STEM subjects, usually through more hands-on and project-based learning. These expanded learning opportunities help to supplement what students learn in the traditional school day and allow more individualized learning time based on student interests.

A recent analysis by the Afterschool Alliance found that students who attend such high-quality STEM expanded learning programs have shown improved attitudes toward STEM fields and careers, increased STEM knowledge and skills, and a higher likelihood of graduating and pursuing STEM careers. These learning opportunities also have been shown to be effective in engaging students who are underrepresented in the STEM fields, particularly girls and minority students.

STEM afterschool programs also provide opportunities for partnerships among schools, families and communities. Programs can be provided through partnerships with various institutions, including schools, colleges and universities, museums, science centers, federal science agencies and businesses. These partnerships allow the leverage of community resources and experts to help provide students with STEM learning opportunities and pathways into STEM careers.

State Action

Legislation passed to support STEM expanded learning opportunities include the following.

- **California Assembly Resolution 34** (2012) urges development of summer camps, workshops and after-school programs to further the advancement and engagement of female students in STEM fields.
- **Oregon House Bill 2636** (2013) establishes the STEM Investment Council to, among other provisions, offer grants for extracurricular STEM activities.
Pennsylvania House Resolution 112 (2013) recognizes STEM Initiative Week to encourage STEM internships and workshops.

Texas Senate Bill 503 (2013) establishes the Expanded Learning Council to, among other provisions, study and make recommendations about expanded learning opportunities, including STEM programs.

Other states that have recently introduced legislation related to STEM expanded learning opportunities include Florida, Massachusetts, Michigan, New Jersey, New York, Tennessee, Virginia and Washington. Legislation ranges from STEM career pathways programs to student scholarships to establishing STEM summer learning centers.

Beyond legislation, states also can use coalitions or networks of schools and community partners to help support STEM expanded learning opportunities. Currently, 42 states have statewide afterschool networks that foster partnerships and policies to develop, support and sustain high-quality expanded learning opportunities across education, youth development, juvenile justice, child care, health and workforce development sectors. Some states, including Minnesota’s SciMathMN coalition, also use statewide education and business networks to support STEM education by aligning in-school and out-of-school STEM programming, coordinating state STEM resources and fostering STEM professional development across sectors.

**Federal Action**

Federal agencies such as the National Science Foundation, the National Oceanic and Atmospheric Administration, NASA and the U.S. Department of Defense invest heavily in STEM education programs by developing, implementing and evaluating STEM expanded learning opportunities. For example, NASA has supported its Summer of Innovation grant project since 2010 to encourage STEM education for underrepresented and underserved middle school students. This project builds the capacity of community- and school-based organizations that provide STEM expanded learning opportunities, supplying resources such as curriculum and support materials, and facilitating alignment of in-school and out-of-school STEM learning.

In 2014, the U.S. Department of Education announced that it will begin identifying and scaling up best practices to engage youth in STEM. This includes supporting the National Science Foundation’s Advancing Informal Science Learning program, which aims to better understand effective means and innovative models for engaging students in science outside school settings. In addition, the U.S. Department of Education plans to identify opportunities to leverage the 21st Century Community Learning Centers program (a federally funded, state-administered expanded learning grant program) to offer more students access to effective and engaging STEM activities outside the traditional school day.

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**Additional Resources**

STEM Education Coalition

Afterschool Alliance, STEM and Afterschool

U.S. Department of Education, STEM Education for Global Leadership