STEM READY AMERICA

Inspiring and Preparing Students for Success with Afterschool and Summer Learning

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Afterschool STEM programs help close America's skills gap

"STEM Ready America" event in Washington, D.C., highlights how afterschool programs can provide gains in critical workforce skills and interest in science careers

WASHINGTON, D.C. (March 1, 2017) – Students participating in afterschool programs that focus on science, technology, engineering, and math (STEM) reported increased interest in science careers and gains in important 21st century skills such as critical thinking and perseverance—skills in high demand in today's workforce.

The key findings emerge from the **Afterschool & STEM System Building Evaluation 2016,** an ambitious study supported by the Charles Stewart Mott Foundation and STEM Next, which will be released this month. The study looked at the impact of more than 160 afterschool programs, surveying nearly 1,600 youth in grades 4-12 across 11 states. It is the latest in a growing body of evidence demonstrating that afterschool programs help students succeed in school, work, and life. Highlights of the findings include that more than 70 percent of students across all states reported positive gains in areas of science interest, science identity, science career interest and career knowledge, and 21st century skills, including perseverance and critical thinking. Key findings include:

- 80 percent of students reported a positive gain in their science career knowledge
- 78 percent experienced a positive change in their self-reported interest in science
- 72 percent reported an increase in their perseverance and critical thinking skills
- 73 percent reported an increase in "STEM identity"—a personal belief that he/she can do well and succeed at science

Findings from the new study are included in ***STEM Ready America: Inspiring and Preparing Students for Success with Afterschool and Summer Learning,*** a compendium of articles from 40 leading experts featured on a new website (www.stemreadyamerica.org). The site provides success stories, research, and articles on STEM learning from policymakers, educators, and business, foundation, and youth development leaders.

"Afterschool programs have significant potential to help young people across America prepare for success in school today and jobs tomorrow," said Ron Ottinger, director of STEM Next and former executive director of the Noyce Foundation, which founded the program. "There's a powerful message here for employers nationwide concerned about the pipeline of qualified job candidates. Afterschool STEM programs are inspiring and equipping young people to pursue careers they never imagined before —and helping them gain skills needed for virtually every job in the future."

According to labor market data, STEM jobs are among the fastest-growing and highest-paying jobs in America. Millions of STEM jobs are projected to go unfilled due to the gap between the skills employers

need and the skills workers have. It's not only jobs directly in STEM occupations: by some estimates, nearly 80 percent of all new jobs created nationwide over the next decade will require STEM skills such as critical thinking, problem solving, creativity, perseverance, and experimentation.

"Afterschool works—for our kids, families, communities, and economy," said Gwynn Hughes, senior program officer for the Mott Foundation. "Quality STEM afterschool and summer programs are extremely cost-effective and can help position our country for future prosperity. We need to scale up these programs to ensure they're available for every child who's waiting to enroll."

More than 10 million young people participate in afterschool programs, but the demand is high. For every child in an afterschool program, there are two waiting to get in.

The new research findings and the new articles featured in *STEM Ready America* will be highlighted at an event on March 1, 2017, at the National Press Club in Washington. Leading experts from across the country will discuss the role of high-quality afterschool programs in helping students succeed, highlight promising programs, and focus on the urgent need to expand access for more students nationwide.

Brian Kelly, editor and chief content officer at *U.S. News & World Report*, will moderate the plenary panel. The keynote presentation will be delivered by Jim Gates, Jr., Ph.D, noted physicist and advocate for STEM learning, and co-author of the 2010 report to the President, *"Prepare and Inspire: K-12 Science, Technology, Engineering, and Math (STEM) Education for America's Future."* Leaders in STEM and afterschool programs, including the largest national youth-serving organizations, will attend.

The *Afterschool & STEM System Building Evaluation 2016* was conducted by The PEAR Institute: Partnerships in Education and Resilience at Harvard University and the Institute for Measurement, Methodology, Analysis & Policy at Texas Tech University. Researchers analyzed retrospective self-reports completed by students and surveys completed by program instructors to assess the impact of state system-building strategies and support on quality, quantity, and youth outcomes in STEM-focused afterschool programs. The evaluation was conducted in 11 states and involved nearly 1,600 students in grades 4-12 and 160 afterschool programs. More than half of the programs evaluated are funded by the federal 21st Century Community Learning Centers program.

About The Mott Foundation

The Mott Foundation, established in 1926 in Flint, Michigan, by an automotive pioneer, is a private philanthropy committed to supporting projects that promote a just, equitable and sustainable society. It supports nonprofit programs throughout the United States and, on a limited geographic basis, internationally. Grantmaking is focused in four programs: Civil Society, Education, Environment and Flint Area. In addition to Flint, offices are located in metropolitan Detroit, Johannesburg and London. With year-end assets of approximately $2.7 billion in 2016, the Foundation made 420 grants totaling more than $120 million. For more information, visit **www.mott.org**.

About STEM Next

STEM Next is a national field building leader in increasing opportunities in science, technology, engineering, and mathematics learning for youth across communities both in and out of school. STEM
STEM Next was funded by the Noyce Foundation, which for a quarter-century was dedicated to helping young people become curious, thoughtful, and engaged learners. The mission of STEM Next is to make STEM subjects fun and alive for all youth to solve the nation's and world's greatest challenges, with an emphasis on low-income youth and girls in underserved communities. For more information, visit **www.stemnext.org**.

Afterschool Learning
is a Powerful STEM Solution

The number of science, technology, engineering and mathematics (STEM) related jobs is increasing much faster than overall employment. To fill these jobs, we need to engage youth early to get them excited about STEM and help build the skills they will need for the future.

New research shows that STEM afterschool programs are an effective part of the solution.

With an innovative research design, a team from the PEAR Institute at Harvard University and McLean Hospital and IMMAP, Institute for Measurement Methodology Analysis & Policy at Texas Tech University surveyed nearly 600 youth and their program leaders in 160 programs across 1[illegible] states. They collected and analyzed data from observations of programs, student self-assessment and teacher factual data or questionnaires to create a fascinating new look into STEM in afterschool.

STEM Learning in Afterschool Works

78% of students said they had a more positive attitude about STEM because of their afterschool experience. INSPIRE

73% of students said they had a more positive STEM identity because of their afterschool experience. EDUCATE

80% of students said their STEM career knowledge increased because of their afterschool experience. EXPLORE

72% of students said their perseverance and critical thinking skills increased because of their afterschool experience. PREPARE

Youth Gain STEM Skills

"I like to figure out how things work."

More than 70% of students across all states reported positive gains in areas of STEM interest, STEM identity, STEM career interest and career knowledge, and 21st-century skills, including perseverance and critical thinking.

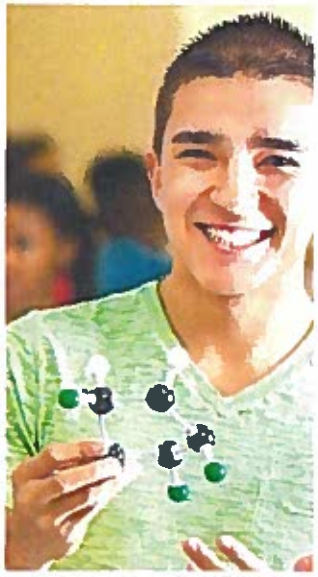
Focus on Quality Yields Positive Youth Outcomes

STEM afterschool programs with the highest quality ratings demonstrated the most positive student outcomes. The gains in STEM interest and skills underscores the return on investment from building capacity in programs and focusing on quality.

"I think of myself as a STEM person."

Source: The PEAR Institute, Partnerships in Education and Resilience, Harvard University and IMMAP, Institute for Measurement, Methodology, Analysis & Policy, Texas Tech University, 2015

More Details on What Youth Learn in Afterschool STEM



Increasing Interest in STEM

78% of students across all states experienced a positive change in their self-reported attitudes towards STEM interest following participation in their afterschool program.

These youth are excited about STEM and innovation, they like to make things, they are curious about mathematics, engineering and related subjects, and they like to figure out how things in the world work, such as how rain forms or airplanes fly.

Building a STEM Identity

73% of all students reported their STEM identity positively increased following afterschool program participation.

These youth find STEM easy to understand and that their friends and teachers believe they are a "STEM person" who does well at STEM.

Sparking Interest in STEM Careers

80% of the students across the 11 states reported a positive gain in their STEM career knowledge following program participation.

Additionally, students reported significant gains in STEM career interest and STEM activity participation, with more than 75% of students reporting positive change in these areas.

These youth know where to find information about STEM jobs and the steps to take to get hired; they know that the connections that what they learn in STEM now is important and useful to them and will help them get a job later. They visit websites about STEM and frequently participate in STEM clubs outside of school.

Building 21st-century Skills

72% of students across all states reported their perseverance and critical thinking skills positively increased following afterschool program participation.

64% of students across all states reported having higher quality relationships with adults and peers in their lives.

Results showed participation in a STEM-focused afterschool program made a positive impact across all 11 states on students' 21st-century skills, including perseverance, critical thinking and quality of relationships with adults and peers.

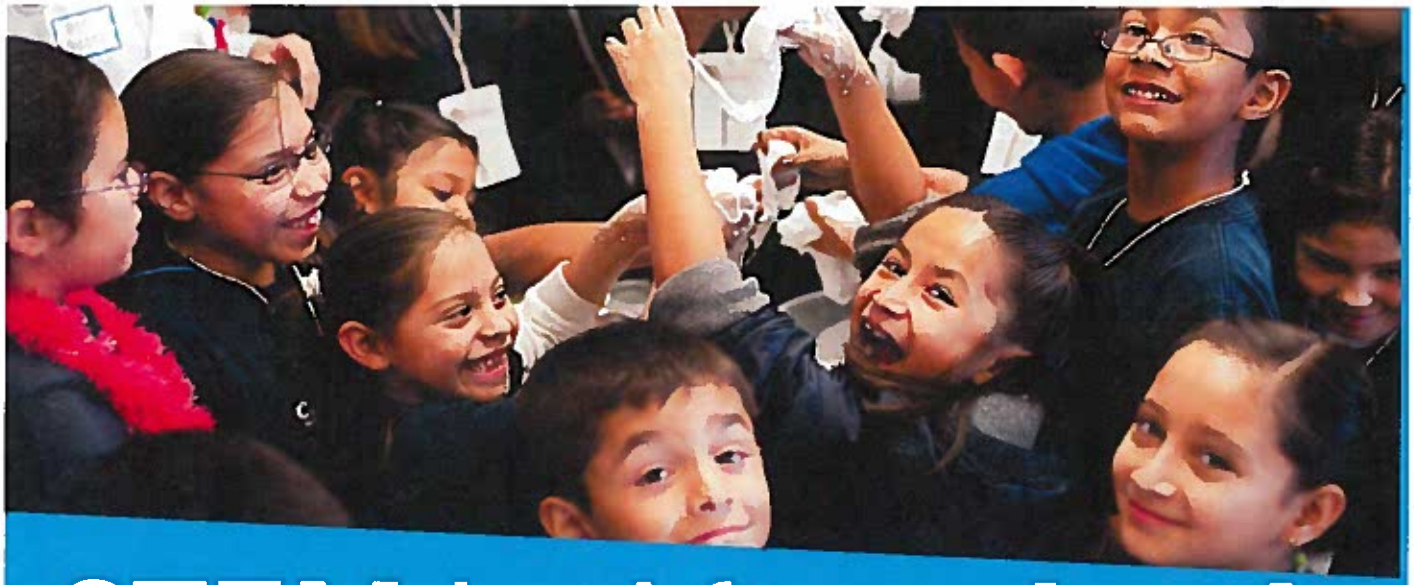
These youth like to think about different ways to solve problems, that they keep working to finish a task even if it takes longer than expected, that they discuss problems with adults they can trust, and that they get along well with peers.

Working across 11 states (FL, IA, IN, KS, MA, MD, MI, NE, OR, PA, and SC) the Afterschool & STEM System-Building Evaluation involved nearly 1,600 youth in 160 programs providing STEM learning opportunities.

www.STEMReadyAmerica.org

pear

TEXAS TECH UNIVERSITY
Institute *for* Measurement, Methodology, Analysis & Policy



STEM in Afterschool

Changing Perspectives. Shaping Lives.

The impact of afterschool programs on young people's aspirations and skills in science, technology, engineering and mathematics (STEM).

Highlights from "Examining the impact of afterschool STEM programs", a research paper by the Afterschool Alliance and the Program in Education, Afterschool & Resiliency at Harvard University. Commissioned by the Noyce Foundation.

After the school bell rings, young people are learning, exploring, making and questioning. Afterschool programs have long influenced students' personal development and supported their social and emotional growth. Today, the afterschool field has enthusiastically embraced STEM as an integral part of their educational offerings.

Afterschool programs that offer high-quality STEM learning experiences have a significant impact on participating youth—they cultivate students' interest in STEM and build STEM skills and proficiencies among diverse groups of young people.

What Students Say About STEM:

PHOTO CREDIT: SCIENCE CLUB

I like to do this.

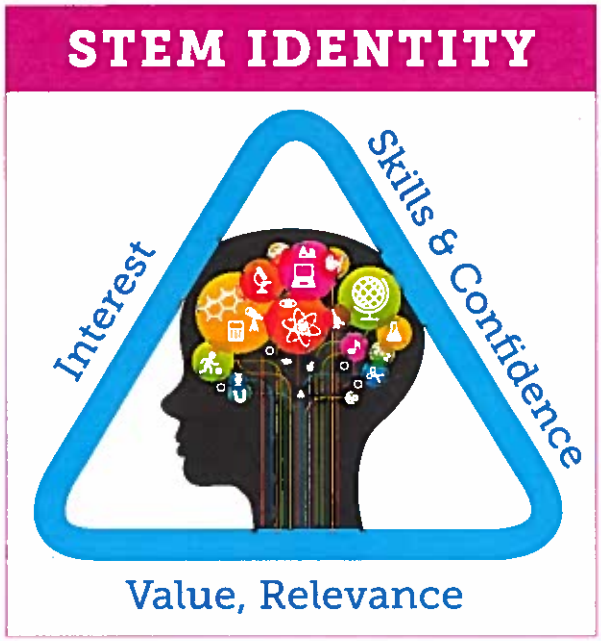
I can do this.

I want to do this.

This is important to me!

Afterschool Alliance | pear PROGRAM IN EDUCATION, AFTERSCHOOL & RESILIENCY | NOYCE FOUNDATION

Afterschool Makes STEM Stick



Lack of a STEM "identity" is often cited as one of the main reasons that young people don't pursue STEM fields. Research has found that even students who do well in STEM subjects do not aspire to STEM careers—often times students' idea of what scientists look like doesn't match who they are.

Afterschool programs play a major role in addressing this issue: they excite and sustain interest, build real skills, help youth connect STEM to their lives and communities, and introduce youth to a diverse array of professionals.

Interest and ability feed off each other.
Young people who become interested in STEM topics and professions are more willing to stick with it. As a result they develop skills that feed their interest and build confidence in their STEM abilities.

Dosage matters. More frequent participation in afterschool STEM programs is correlated with greater STEM interest and higher scores on assessments.

Role models and mentors help break down stereotypes about who pursues STEM, which is especially important for underrepresented populations. Afterschool programs are a prime space for youth to connect with and learn from STEM professionals.

Students at Techbridge in Oakland, CA, participate in weekly hands-on design projects and explore STEM careers through field trips to engineering and technology companies.

The Science Action Club in San Francisco, CA, helps middle school youth contribute to real science research through citizen science projects in their local communities.

In Project GUTS in Santa Fe, NM, middle school youth program computer simulations to solve real-world "what-if" scenarios, such as the spread of contagious disease and evacuation routes when a fire breaks out.

Impacts & Outcomes of Afterschool STEM Programs

Across programs and evaluations, we know it's true: in high quality afterschool programs, young people gain real STEM skills and learn that STEM is important and relevant to their lives.

PHOTO CREDIT: GIRL START

I **like** to do this.

- Afterschool STEM programs are **successful in engaging and retaining large numbers of students** from diverse populations.
- Young people in these programs **express curiosity and interest in STEM subjects**, in ways that extended that interest in school and out of school.

I **can** do this.

- Participants come to **understand the value of STEM** in contributing to society and solving global and local problems. They begin to see how STEM intimately connects to their everyday lives.
- Youth display an **increased awareness of career options**, as well as a nuanced understanding of those careers.

I **want** to do this!

- As they participate, young people **gain real skills** and the ability to productively engage in STEM processes of investigation.
- Youth learn essential **STEM-relevant life and career skills.**

Intensive afterschool STEM programs can also have a positive impact on academic performance such as better test scores, taking more science and math courses, and higher rates of high school graduation.

Learning Happens Everywhere

Young people draw on a variety of educational supports that not only include schools but also their families and peers, out-of-school time programs such as afterschool, and community resources such as science centers, libraries, universities and businesses.

PHOTO CREDIT: FUSE

Afterschool programs are a unique and critical component to a child's learning and must be included as an integral strategy in STEM education improvement efforts.

Dig Deeper!

The full paper details evaluation findings from 11 strong afterschool STEM programs, and gives an overview of recent research findings about the importance of afterschool and other out-of-school time experiences for STEM learning. The report can be dowloaded at: www.afterschoolalliance.org/STEMimpacts

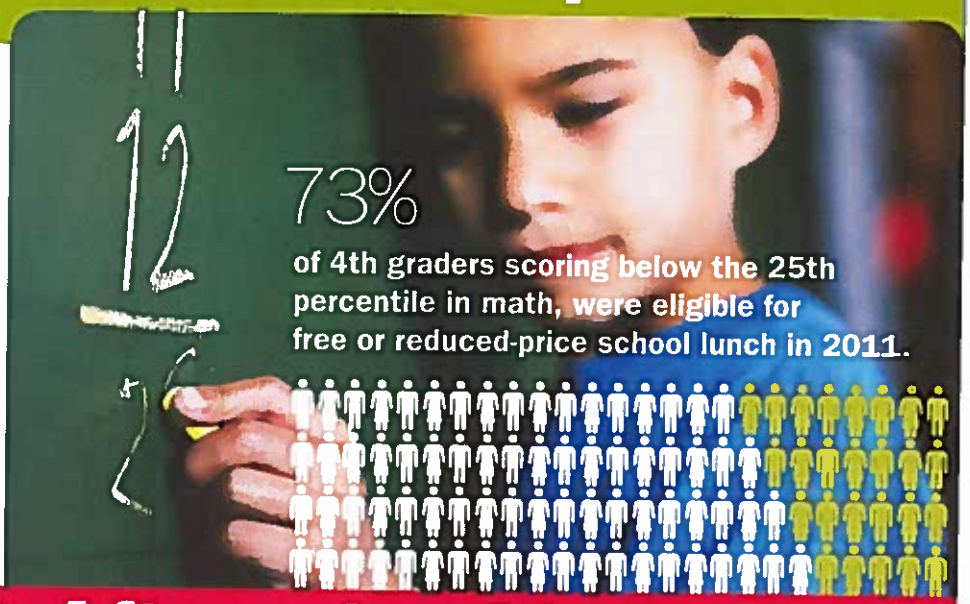
Afterschool Alliance | pear | NOYCE FOUNDATION

The **Achievement Gap** Is Real

"We can no longer afford to deny any child, let alone entire communities, the opportunity to learn, achieve and compete."

Congressman Chaka Fattah, Pennsylvania

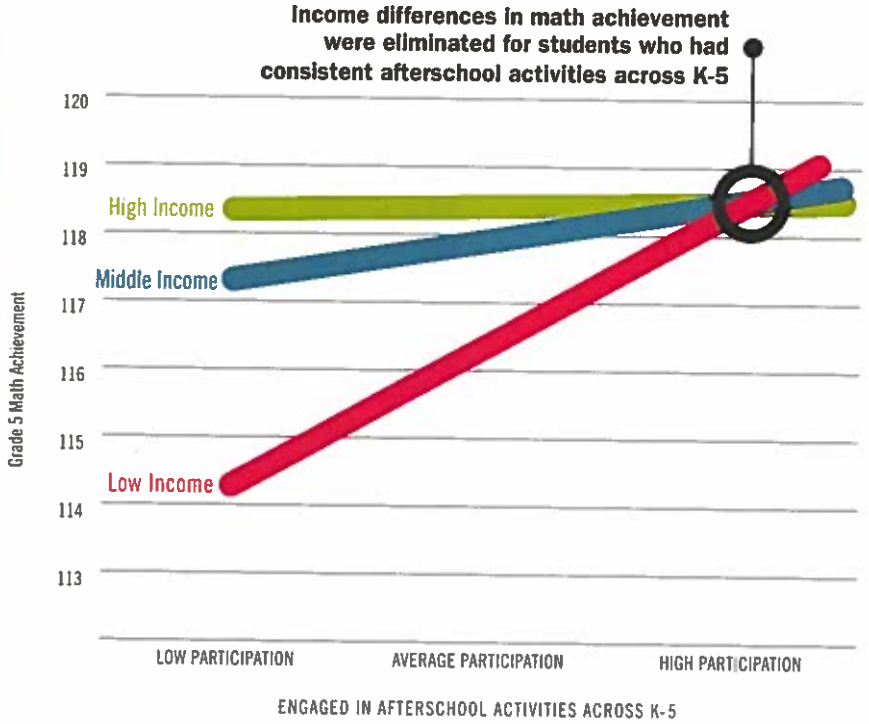
For Each and Every Child, Report to the Secretary of Education from the Equity and Excellence Commission, February 2013



NEW RESEARCH SHOWS

Afterschool Is a **Real Solution** Linked to **Closing the Gap**

Afterschool Participation Narrows the Math Achievement Gap[1]



1 Pierce, K. M., Auger, A. and Vandell, D. L. (April, 2013). *Narrowing the Achievement Gap. Consistency and Intensity of Structured Activities During Elementary School.* Unpublished paper presented at the Society for Research in Child Development Biennial Meeting, Seattle, WA.

New research demonstrates that more consistent time spent in afterschool activities during the elementary school years is linked to narrowing the gap in math achievement at grade 5.

What the data indicate:

- When afterschool participation is highly consistent, there is no gap in low-income and high-income children's math achievement at grade 5
- The more consistent the afterschool participation, the narrower the gap in math achievement
- The more rarely students participate in afterschool activities, the wider the achievement gap

Expanding Learning Through Afterschool: Three Key

1 More time spent expanding learning in afterschool = greater benefits for youth.[2]

Consistent participation in afterschool activities yields positive results.

- **Narrowed gap in math achievement**
- **Greater gains in academic and behavioral outcomes**
- **Reduced school absences**

More time spent in afterschool is associated with:

- Better work habits
- Improved academic performance
- Gains in self-efficacy
- Improved GPA
- Increased attendance, fewer school absences

Unstructured time with peers in the after school hours is associated with:

- Lower GPA
- More school absences
- Greater misconduct
- Reduction in work habits and self-efficacy

2. Auger, A., Pierce, K. M. and Vandell, D. L. (April, 2013). *Participation in Out-of-School Settings and Student Academic and Behavioral Outcomes.* Unpublished paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA.

Factors Linked to Positive Outcomes

2 When youth like their afterschool program, they show improvement in the classroom.[3]

When youth report positive afterschool experiences, teachers report gains in the classroom.

- Better work habits
- Stronger task persistence
- Pro-social behavior with peers

3 Youth appreciate and need support from afterschool staff.

When youth report on their afterschool experience, emotional support from adult staff is the most significant factor leading to their positive assessment.

3. Kataoka, Sabrina and Deborah L. Vandell. "Quality of Afterschool Activities and Relative Change in Adolescent Functioning Over Two Years." *Journal of Applied Developmental Science*. VOL 17, ISS 3 (2013): 1-12. Print.

Embrace Expanded Learning & Afterschool for the Future of Our Youth

Young people need—and deserve—more from their education. High-quality afterschool and summer learning programs powered by school-community partnerships offer young people a variety of hands-on, engaging learning activities that build on the school day. The Expanded Learning & Afterschool Project is a 50-state initiative harnessing the power of networks and leaders to help schools and communities leverage the time beyond school to accelerate student achievement. The initiative connects you with research, resources and best practices for building affordable and sustainable approaches to expanding learning in your community.

Only 8.4 million K-12 children participate in after school programs. 18.5 million would participate if a quality program were available in their community. (Afterschool Alliance, 2009)

Over 15 million school-age children are on their own after school. Among them, more than 1 million are in grades K-5. (Afterschool Alliance, 2009)

Join the growing community of people committed to ensuring that all children have access to afterschool and expanded learning opportunities they need to succeed.

Sign on as a supporter of the Expanded Learning & Afterschool Project and our principles

Stay informed about expanded learning events and opportunities

Sign up for our newsletter

For more information visit the Expanded Learning & Afterschool Project at www.ExpandingLearning.org

ABOUT THE RESEARCHER

Deborah Lowe Vandell is the founding dean of the School of Education at the University of California, Irvine. An internationally recognized scholar on the effects of early child care, K-12 education, afterschool programs and families on children's social, behavioral and academic functioning, Vandell has examined the effects of afterschool programs on academic and social outcomes. This work underscored the importance of out-of-school time as a factor in classroom success. In addition, Vandell developed an online assessment tool in use by the state of California to measure quality and student performance in afterschool and summer learning programs. Learn more about Vandell's research and how to put it to use at www.afterschooloutcomes.org