Engineering in Afterschool: Imagine the Possibilities

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Why afterschool?

LIFELONG AND LIFEWIDE LEARNING

16 WAKING HOURS

0-5 K  GR 1-12  UG GRAD  WORK  RETIREMENT

- 9.25%
- 18.5%
- 7.7%
- 5.1%

FORMAL LEARNING ENVIRONMENTS

INFORMAL LEARNING ENVIRONMENTS

Source: Life Center, University of Washington
“Ecosystem for Learning”

Learner

Social Supports
- Parents
- Friends
- Educators

Learning Environments
- School
- Afterschool & summer
- Home
- Science centers & others

Policy & Other
- Federal policy
- National standards
Defining Afterschool

1. A program that a child attends regularly
2. Provides a supervised, enriching environment
3. Usually offered in a school or a recreation / community center
4. Different from individual activities, such as sports, special lessons or hobby clubs

5. Youth development at the core.

As defined in America After 3 PM: A Household Survey on Afterschool In America, 2009
Afterschool 101

• 8.4 million children in afterschool programs
• 15 million unsupervised
• Demand outstrips availability

• Girls participate in equal numbers to boys
• African-American & Hispanic children participate in greater numbers
• Children in federally funded afterschool programs participate for average of 14.5 hours/week

• Benefits of afterschool well-known:
  o Improved attendance, class behavior & coursework
  o Helps working parents & worker productivity
• Huge support from voters
The Afterschool Field

Afterschool Providers
4-H; Boys & Girls Club; YMCA; Girls, Inc.; 21st CCLC; Science Centers & Museums

Philanthropic & Corporate Funders
C. S. Mott; Noyce; Bechtel; Time Warner Cable

Key Players

National Organizations
Afterschool Alliance; National Afterschool Association; National Summer Learning Association

State & Local Orgs
Statewide Afterschool Networks; City intermediaries
The Afterschool Alliance

1. Field-Building
   - 42 Statewide Afterschool Networks
   - Resources
     - Best practices
     - Models of high-quality programs
   - Strategic partnerships

2. Research
   - Translate research
   - Collect data

3. Policy, Advocacy & Communications
   - 21st CCLC (ESEA)
   - Families & children
   - FIRST Act (America COMPETES)
   - Perkins CTE Act

October 23, 2014
21st Century Community Learning Centers

- Only federal funding source exclusively for afterschool
- State funds based on Title I
- STEM initiative launched in 2011

1,660,945
Number of children and youth served

253,283
Number of adult family members served

45,619
Number of organizations partnering with afterschool programs

11,533
Number of school-based and community centers

9 in 10
Number of centers located in schools
State of STEM in Afterschool

- Providers enthusiastically embracing STEM
- Support systems growing rapidly
- Research into assessments and outcomes
- Focus on partnerships - STEM-rich institutions, schools, community-based organizations
Recent Resources on Engineering in Afterschool

Webinar:
- Engineering & Computing in Afterschool (March 2014)

Issue Brief:
- Computing and Engineering in Afterschool (December 2013)

Presentation:
- Computing in Afterschool (March 2014)
Quality After School Through The Eyes of a Classroom Teacher
Schools & Homes in Education

http://shineafterschool.com

Mission

1. To improve academic performance, student behavior & attendance
2. To increase STEM/CTE knowledge
3. To facilitate family involvement in student learning
SHINE Demographics

SHINE has served over 1,900 children in pre-K to 12th and family members in Carbon & Schuylkill Counties in 7 Public Schools, 4 Parochial Schools and CCTI covering 700 square miles in Northeast Pennsylvania

Pre-K to 5th Grade

• 100% of elementary students referred for academic reasons
• 88% from low income families
• 56% of elementary students have been in the program for 2—6 years
• 63% are Title I remedial Reading
• 45% are Title I remedial Math
• 27% have IEP’s

Middle School

• 99% of parents would refer the program to others
• 70% from low income families
• 99% of students were promoted to the next highest grade level
• 30% of the Career Academy students were previously enrolled in the SHINE K-5 program.
• 32% have IEP’s
Carbon County Child & Family Collaborative

Seamless Network of Educational & Social Programs Promoting School Readiness, College Ready Students, Parent Engagement, STEM and Training to Build the Foundation for a Skilled Workforce

Birth to 5 School Readiness
- Parents as Teachers (JTASD)
- Head start
- Home Visiting
- Early Intervention

LCCC SHINE Kindergarten
- Kindergarten & Home Visits
- Parent Engagement

LCCC Learn

Positive Action

LCCC LEARN

LCCC SHINE Kindergarten
- Kindergarten & Home Visits
- Parent Engagement

LCCC SHINE 1st to 3rd After School
- Victory Garden for Success (STEM)

LCCC SHINE 4th to 5th After School
- STEM High Priority Careers

LCCC SHINE 6th to 8th STEM Career Academy

LCCC Pre K - 6th Grade Summer Learning Experiences
- Home Visits
- Summer Camps

LCCC 9th-12th Grade CCTI Tutor/Mentor

Service Learning to expose students to teaching & high priority STEM & Community College

LCCC Education & STEM Interns
- Transition into 4 year State Universities
- Interns enroll into PASSHE through Articulation Agreements
- LCCC-Temple Engineering

LCCC High School Seniors
- Tutors/Mentors transition to SHINE intern

Hub for Professional Development
- SHINE Teachers, Interns, Local School Districts

Dental Van

Penn State Strengthening Families & Partners for Progress

Family Involvement
- 100% create Educational Plans and Workforce Goals

LCCC 6th to 8th<br>STEM Career Academy

LCCC 9th-12th Grade CCTI Tutor/Mentor

Service Learning to expose students to teaching & high priority STEM & Community College

Hub for Professional Development
- SHINE Teachers, Interns, Local School Districts
## Creating a SHINE Ecosystem

### Educational Partnerships
- Lehigh Carbon Community College
- Local School Districts
- Carbon Career and Technical Institute
- Pennsylvania State System of Higher Education

### Public
- Luzerne/Schuylkill WORKFORCE Investment Board, Inc.
- Department of Commerce and Economic Development
- Policy Makers
- Families

### Private
- Kovatch Corporation
- UGI Gas Company
- Local Businesses and Agencies
- NOYCE Foundation
How does SHINE create more effective classroom teachers and better prepared future educators?

Teacher Impact Survey

• 100% said that working in an after school program has improved student learning in their regular classrooms
• 81% agreed it had improved classroom management in their classrooms
• 93% agreed that they understood and utilize assessment data much more effectively

• 100% agreed in the important role families play in their child’s success
• 100% agreed they were better prepared to be a teacher in the 21st Century

“I have incorporated more science lessons that are interactive & engaging.”

“I have also gained more experience in addressing all learning styles, especially in the area of remediation.”
How does STEM relate to SHINE and the regular classroom?
Professional Development

- RtII Implementation
- STEM in the Gym
- Differentiated Learning Techniques
- Teaching Children in Poverty
- Science in the Classroom
- Framework of Youth Outcomes
Data-Driven Instruction

Benchmark Tests
State Standardized Assessments
Rigby’s
Quarterly Report Cards
Teacher/Parent Input
Instructional Plans

- Student strengths
- Student weaknesses
- Reading goals
- Math goals
- Social goals
Lesson Plans

Support meaningful STEM learning

Aligned with Common Core State Standards for reading, writing, math & science

Daily outline of STEM activities
Shenandoah SHINE Demographics

- 89% from low income families
- 41% have an IEP
- 63% are Title I Math
- 22% are Title I Reading
- 70% minorities
A Day at SHINE

• 30 minute homework
• 30 minute dinner
• 1 ½ hours STEM based projects

STEM Dollhouse
  o Tinkercad
  o Makerbot 3-D Printer
<table>
<thead>
<tr>
<th>NAME</th>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
<th>MATH GOALS</th>
<th>READING GOALS</th>
<th>SOCIAL SKILL GOALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joseph Needham</td>
<td>*Participates in discussions *Respectful to others *Willing to try new things *Uses manners</td>
<td>*Talkative at times during group activities *Needs to stay on task</td>
<td>IMPROVE: *Multiplication facts 0,1,2,5,10 *Memorizing one-digit addition and subtraction facts *Making sets of coins, making change, adding and subtracting coins *Understanding length and height *Finding the missing part, mental math</td>
<td>IMPROVE: *Reading fluency *Rigby by at least two levels *Spelling *Writing – complete sentences, sequence of events, writing focus, proofreading, story elements *Elements of writing – capitalization, punctuation, commas, contractions *Comprehension – main idea, cause/effect, draw conclusions, build prior knowledge, make predictions</td>
<td>*Use positive actions *Interact with other grade level peers <strong>LIFE SKILL:</strong> Decision making, problem solving</td>
</tr>
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Imagine the Possibilities!
Return On Investment
Trend Data 2007-2013

Pre-K to 5th Grade
- 80% improved in academic performance
- 92% had satisfactory or above grades in science
- 61% improved in classroom behavior
- 97% were promoted to the next grade level
- 97% understood what an engineer did
- 92% had exceptionally good or satisfactory school attendance

Middle School
- 97% were excited about STEM activities
- 85% enjoyed using CAD
- 77% became familiar with careers requiring engineering & electronics

Middle School Parents:
- 84% improved in their teamwork & problem solving skills
- 86% improved in technology
- 68% improved their attitude toward school
SHINE Recent Highlights

- Recognized by US Dept. of Ed for work in Career & Technology Education
  - 1 out of 15 programs selected to be published in a 2014 Lessons Learned document
- SHINE is consistently recognized by the Afterschool Alliance as an exemplary model for afterschool STEM
- Partnership with Kovatch Mobile Equipment Corporation
  - 50 middle school Career Academy students became engineers for a day on their field trip to the company
  - Middle school students will outfit a 24-foot trailer that Carbon & Schuylkill DUI Task Forces will utilize during DUI Checkpoints.
"I think the students had a very exciting experience in D.C.," Brayford said. "They were able to see all of the different avenues that STEM has to offer. They were able to see first hand how much our STEM curriculum encompasses and were also very fortunate to experience what it is like to brainstorm, create and present their own projects to their peers at the convention."
Cultivating Ecosystems

Basic building blocks:

1. K-12 school system that values collaboration
2. Robust afterschool program / intermediary
3. STEM expert institution

How Cross-Sector Collaborations are Advancing STEM Learning (2014)
Ecosystems Everywhere!

Emerging STEM Learning Ecosystems Profiled in this Report

1. AFTERZONE SUMMER SCHOLARS
   Providence, RI

2. BOSTON SUMMER LEARNING PROJECT
   Boston, MA

3. CALIFORNIA ACADEMY OF SCIENCES, SCIENCE ACTION CLUBS
   San Francisco, CA

4. CENTER FOR THE ADVANCEMENT OF SCIENCE EDUCATION, MUSEUM OF SCIENCE AND INDUSTRY
   Chicago, IL

5. CHICAGO PRE-COLLEGE SCIENCE AND ENGINEERING PROGRAM
   Chicago, IL

6. DETROIT AREA PRE-COLLEGE SCIENCE AND ENGINEERING PROGRAM
   Detroit, MI

7. EXPANDED LEARNING NETWORK OF THE SOUTHERN TIER
   Corning, NY

8. GIRLSTART
   Central Texas

9. INDIANA AFTERSCHOOL STEM INITIATIVE
   Indiana

10. NEW YORK CITY STEM EDUCATORS ACADEMY
    New York, NY

11. ORANGE COUNTY STEM INITIATIVE
    Orange County, CA

12. SHINE (SCHOOLS AND HOMES IN EDUCATION) AFTERSCHOOL PROGRAM
    Carbon and Schuylkill counties, PA

13. SMILE (SCIENCE AND MATH INVESTIGATIVE LEARNING EXPERIENCES)
    Oregon

14. SYNERGIES
    Portland, Oregon

15. URBAN ADVANTAGE
    New York, NY

From [How Cross-Sector Collaborations are Advancing STEM Learning](#) (2014)
Statewide Afterschool Networks
www.statewideafterschoolnetworks.net

- Established in 2002 by C. S. Mott Foundation
- Intentional & meaningful bridges between leaders of schools, communities and families to support student learning
- 42 networks strong & growing
  - Alabama and Alaska most recently added
- Partnership with Noyce Foundation for STEM

Connect with your state network!
Noyce & Mott Foundations: Afterschool & STEM Collaboration

Afterschool & STEM System Building w/ Noyce (CA, FL, IA, IN, KS, MA, MD, MI, MO, NE, NY, OK, OR, PA, RI, NE, WA)

Those finalizing STEM system proposals (AZ, MN, NC, SC)

Focused on STEM, no Noyce support (NJ, WY)

Planning, no system building yet (KY, OH)
Questions & Discussion
• Models that Bring Teachers & Afterschool Together

1. Learning Community or Community of Practice (CoP)
   • ARMS at the University of Wisconsin-Madison

2. Co-planning, co-teaching
   • STEM Educators Academy from TASC & the New York Hall of Science

3. Preservice teachers as facilitators
   • Girlstart & UTeach
Getting Involved in Afterschool STEM

Where to start?

• Build on afterschool infrastructure
• Plug into existing networks

Afterschool STEM Best Practices:

• Quality OST STEM activities & curriculum
• Instructors trained in OST pedagogy
• Partnerships with STEM-rich institutions
• Using professional mentors to connect to careers
Thanks for attending!

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