

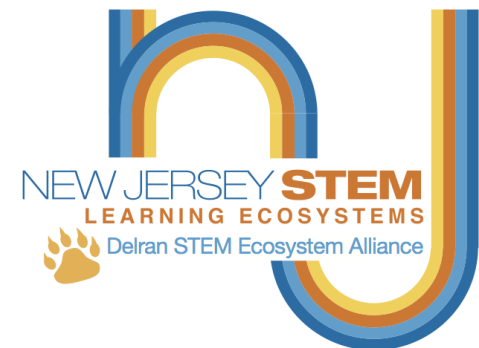
# Delran STEM Ecosystem Alliance

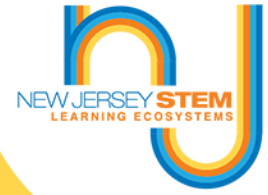
Delran Township Schools  
Board of Education  
50 Hartford Road, Delran, NJ 08075

**January 3<sup>rd</sup>, 2017**



[www.njstemecosystems.org](http://www.njstemecosystems.org)





# Design Studio Meeting 1

The Design Studio (known as the Design Team) worked together to:

Craft a shared articulated vision for the work in the form of:

- Aspiration Statement
- Design Principles (The Non-Negotiables)
- Design Features

## DESIGN PRINCIPLES

- ▶ All members of the ecosystem have a responsibility for funding to support a high functioning ecosystem. (9)
- ▶ The ecosystem must include diverse members of the community. (4)
- ▶ All students should have access to high-quality STEM opportunities. (7)
- Trial and error is celebrated because it breeds creative thinking. (5)  
DESIGN PROCESS incl. ITERATION & INNOV.
- Learning opportunities are FUN and real world. (3) I  
STEM EVERYWHERE

Members of the DSEA are responsible for providing access to mentors, role models, and social experiences that will foster ownership of learning. (8)

The DSEA cultivates STEM as a mindset of learning for success in 21<sup>st</sup> century living. (10)

All Members have equal agency. (2)

\* Develops socially responsible learners capable of solving problems for a lifetime. (7)



- EFFECTIVE STEM ed. in & out of schools impacts families of learners (10)
- Access for ALL learners (2)
- Provide tools/PD necessary for educators. (5)
- Work to increase family/parent partnership
- Promote active thinking/problem solving where failures are viewed as a step toward success. (1)
- Commitment for true partnership + collaboration among all entities (school, businesses, higher ed, families, etc., etc., etc.!) (2)

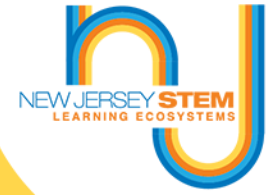
- Business, out of school organizations and higher ed. are part of the good stuff happening during and after school. (3)

HIGH QUALITY STEM EDUCATION INCLUDES THE ARTS. OUTCOME BASED LEARNING IS IMPORTANT. (4)

Value Alignment Among K/12, HE, Employers → STEM for ALL family PARTNERSHIP. (5)



# THE 21<sup>ST</sup> CENTURY VISION FOR STEM...FOR ALL CHILDREN



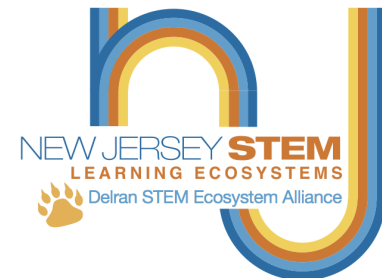
**STEM IS INCLUSIVE OF THE ARTS**

**STEM IS INCLUSIVE OF DESIGN THINKING AND DESIGN LITERACY**

**STEM IS INCLUSIVE OF COMPUTATIONAL THINKING AND LITERACY**

**STEM IS ALIGNED WITH WORKFORCE**

**STEM IS ALIGNED WITH ECONOMIC DEVELOPMENT**



STEM

Funders Network

# STEM Funders Network Membership History



S. D. BECHTEL, JR. FOUNDATION  
STEPHEN BECHTEL FUND



Kern FAMILY FOUNDATION



GORDON AND BETTY MOORE FOUNDATION



NOYCE FOUNDATION



SIMONS FOUNDATION



the Lemelson foundation  
improving lives through invention



The Pinkerton Foundation





# Global Societal Challenge

- Level 1

- Climate Change
- Water Scarcity
- Energy Security
- Cyber Security

• **Unfortunately, little to no connection between education and real world**

- Losses
- Fisheries Depletion
- Deforestation
- Infectious Disease

- Level 2

- Poverty
- Education
- The Digital Divide
- Urbanization
- Security
- Migration
- E-Commerce rules
- Biotechnology rules
- Maritime Safety and Pollution

**Eliminate our way of life**

**Disruptive to our way of life**

# Unprecedented Global Competitors



Singapore 1965



Shanghai - 1987

Are we educating students to truly compete globally?



Singapore 2015



Shanghai 2015



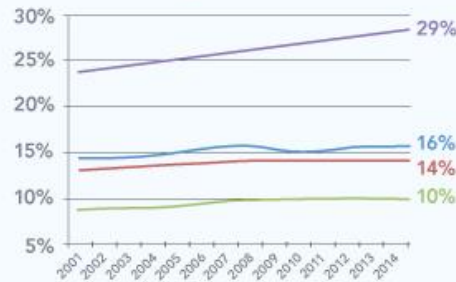
# Equity Challenge...

## Women have seen no improvement in STEM since 2001

Women remain as scarce as ever in engineering, computing, and advanced manufacturing.

Women as a percentage of the:	2001	2014
Engineering Workforce	13%	12%
Computing Workforce	27%	26%
Advanced Manufacturing Workforce	10%	10%

## African Americans and Latinos have lost ground in STEM

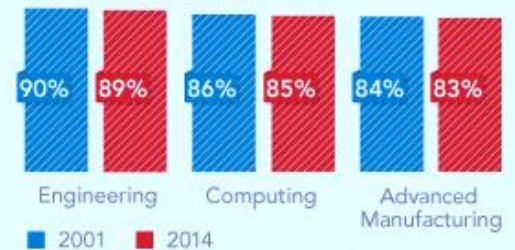


### African American/Latino Percentage of:

- the U.S. working-age population
- the advanced manufacturing workforce
- the computing workforce
- the engineering workforce

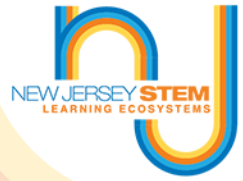
## Whites and Asians still dominate the STEM workforce

Between 2001 and 2014, whites and Asians declined from 74 to 69 percent of the working-age population. Yet their dominance in critical STEM occupations continues unabated.



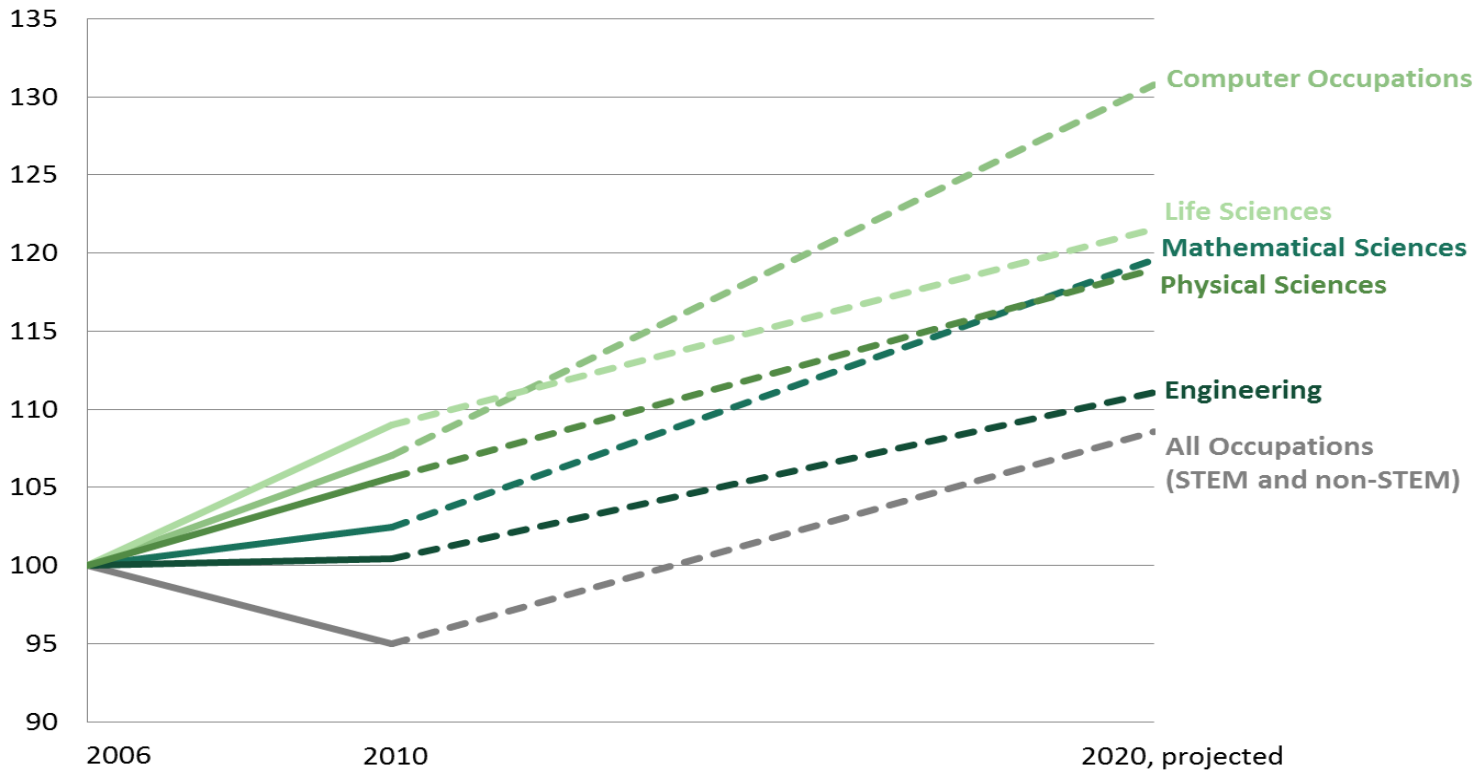


# Employment Challenge...



## Figure 1: Sustained Growth is Projected for STEM Occupations

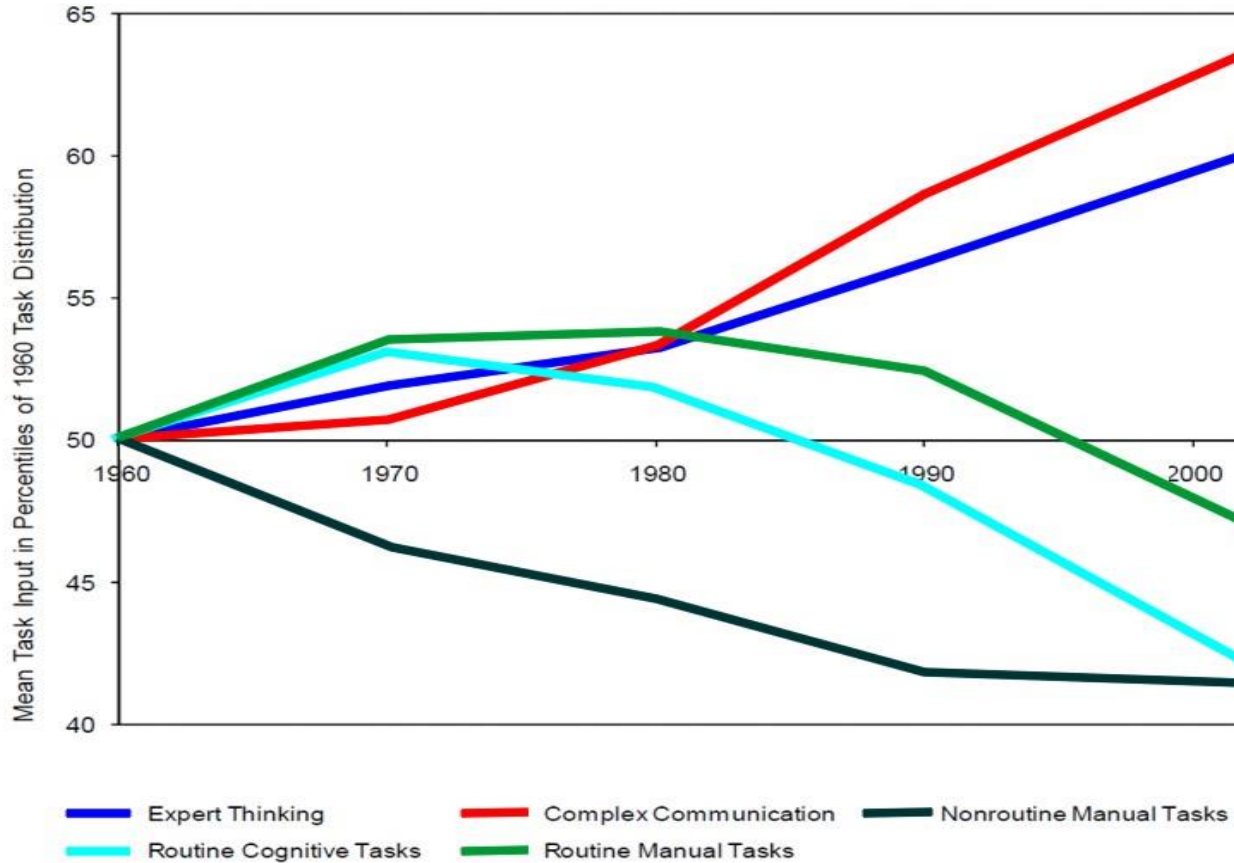
Employment as a Percentage of 2006 Employment, by Occupation



Source: Chairman's staff of the Joint Economic Committee based on data from the Bureau of Labor Statistics. The BLS does not project employment for individual years from 2010-20. For the purposes of this chart, Life Sciences excludes Medical Sciences.

# Skills Gap Challenge...

Trends in Routine and Nonroutine Task Input  
in U.S. Occupations: 1960 to 2002



Source: Autor, Levy and Murnane (2003) updated to 2002 by David Autor.

# Opportunity...



**2.5**  
**TIMES**  
**FASTER**

Middle skill jobs that require technology grew **2.5 times faster** between 2003 and 2013 than middle skills jobs that don't.

{CHANGE THE EQUATION} **STEM**tistics

Almost all of the  
**{ 30 FASTEST-GROWING }**  
occupations in the next decade will require at least some background in STEM.

{CHANGE THE EQUATION} **STEM**tistics  
WORKFORCE



## The demand for STEM talent is growing

Between 2014 and 2024, growth in computing, advanced manufacturing, and engineering will meet or greatly exceed growth in non-STEM jobs.

Source: Change the Equation, "The Diversity Dilemma," 2015

{CHANGE THE EQUATION}



ADVANCED MANUFACTURING

+12%  
ENGINEERING



# Impact...

**\$2.5 TRILLION**



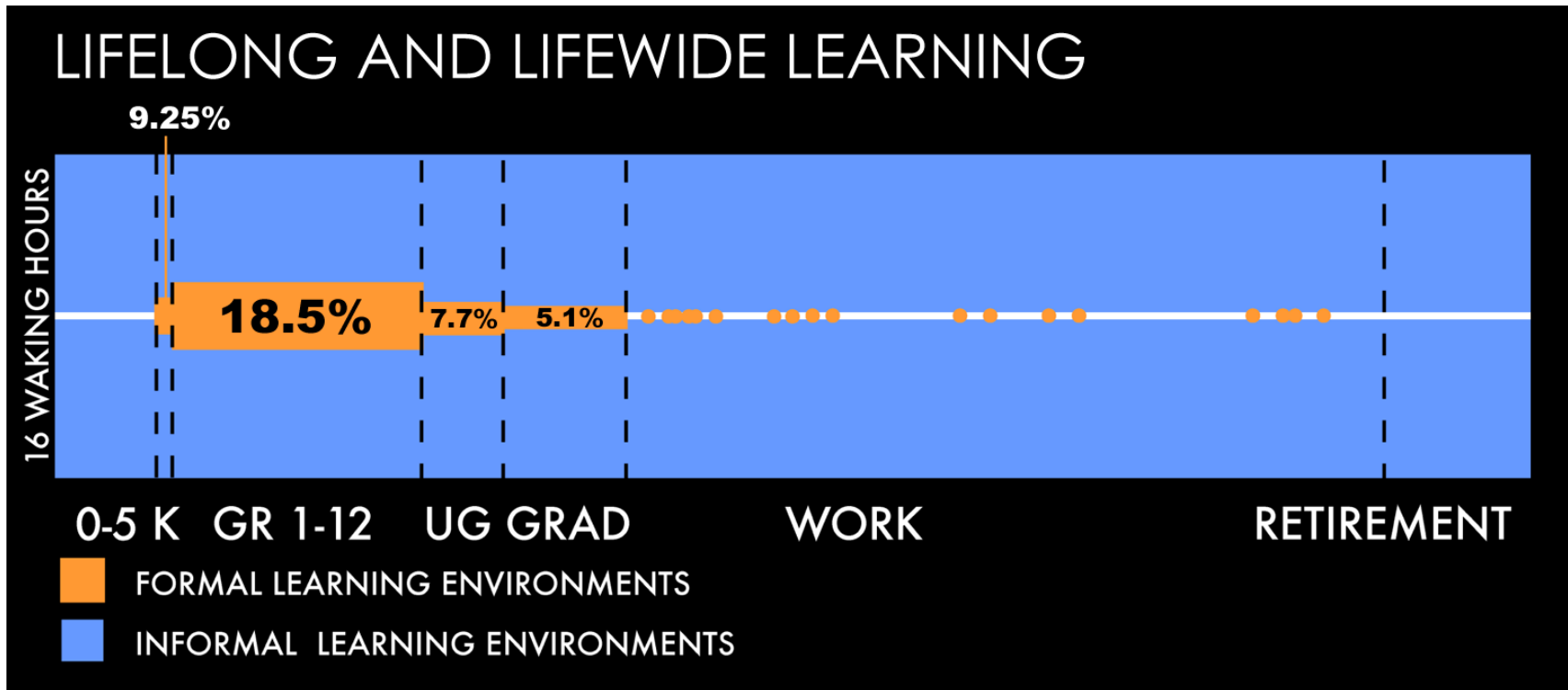
The U.S. would gain an extra *\$2.5 trillion* in Gross Domestic Product between now and 2050 if its students scored at the international average on math and science tests.

{ CHANGE THE  
EQUATION }

**STEM**tistics



# Underlying Premise... When Does Learning Occur?



# STEM Learning Ecosystems



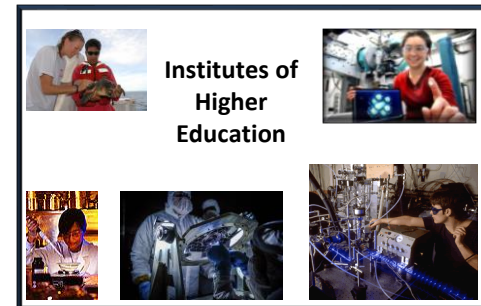
**STEM-Rich Institutions**

This collage features three images: a person interacting with a large digital display showing marine life, a group of people gathered around a table in a museum-like setting, and a large mammoth skeleton on display in a museum.



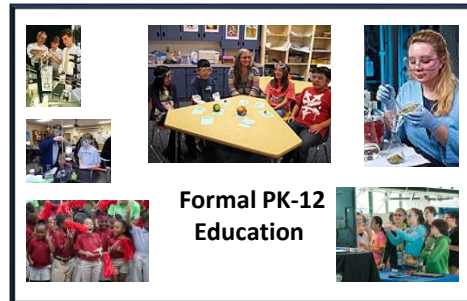
**Business Community**

This collage includes five images: a person working at a computer workstation, two people in a meeting, a woman in a lab coat with a pet, a large industrial ship, and a person in a control room.



**Institutes of Higher Education**

This collage features four images: a man and a child with a small robot, a woman in a red shirt working with a laptop, a person in a lab coat, and a person working with complex electronic equipment.



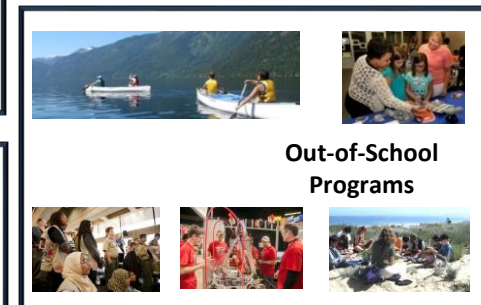
**Formal PK-12 Education**

This collage shows five images: a group of children in a classroom, a group of students around a table, a girl in a lab coat, a group of children in red shirts, and a group of students in a classroom.



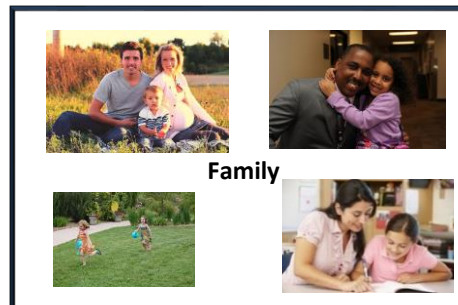
**Learner Centric**

This collage contains three images: a group of people looking at a screen, a group of five people standing together outdoors, and a child pointing at a colorful alphabet chart.



**Out-of-School Programs**

This collage features four images: two people in a small boat on a lake, a group of people sitting around a table, a group of people in a classroom, and a group of people sitting on a rocky shore.



**Family**

This collage includes four images: a family of four sitting outdoors, a man and a woman embracing, a child running on a grassy field, and a woman and a child working together at a desk.

# The Focus: STEM Ecosystem Elements

## Key Partners

1. PreK-12 school system receptive to external partnerships
2. High-quality out-of-school time/youth development system and programs
3. STEM-expert museums, science centers, professional associations, and businesses
4. Institutions of higher education
5. Private sector STEM-focused businesses
6. Parent and community-based organizations

## Critical Attributes

1. **Anchored by a passionate leader(s) with a collaborative vision and practice**
2. Attentive to the enlightened self-interest of all partners
3. Philanthropic and public sector support and in-kind resources

## Focus Areas

1. Building the capacity of educators in all sectors.
2. Equipping educators with tools and structures to enable sustained collaboration.
3. Linking in- and out-of-school STEM learning.
4. Creating learning progressions that connect and deepen STEM experiences over time.
5. Focusing instruction on inquiry, project-based learning and real-world connections to increase relevance.
6. Engaging families and communities.
7. Exposing young people to potential STEM careers.

# The Evolution of a STEM Learning Ecosystem

## Networking

- Coalesce like-minded partners
- Exchange funding information
- Share grant-making information
- Identifying resources

## Cooperation

- Share vision and goals
- Discuss common strategies and objectives
- Begin to build trust among partners
- Provide opportunities for program support and professional development

## Coordination

- Increase number of effective STEM programs
- Provide more opportunities for program support and PD
- Begin to think about network infrastructure
- Commit to some common goals and objectives

## Collaboration

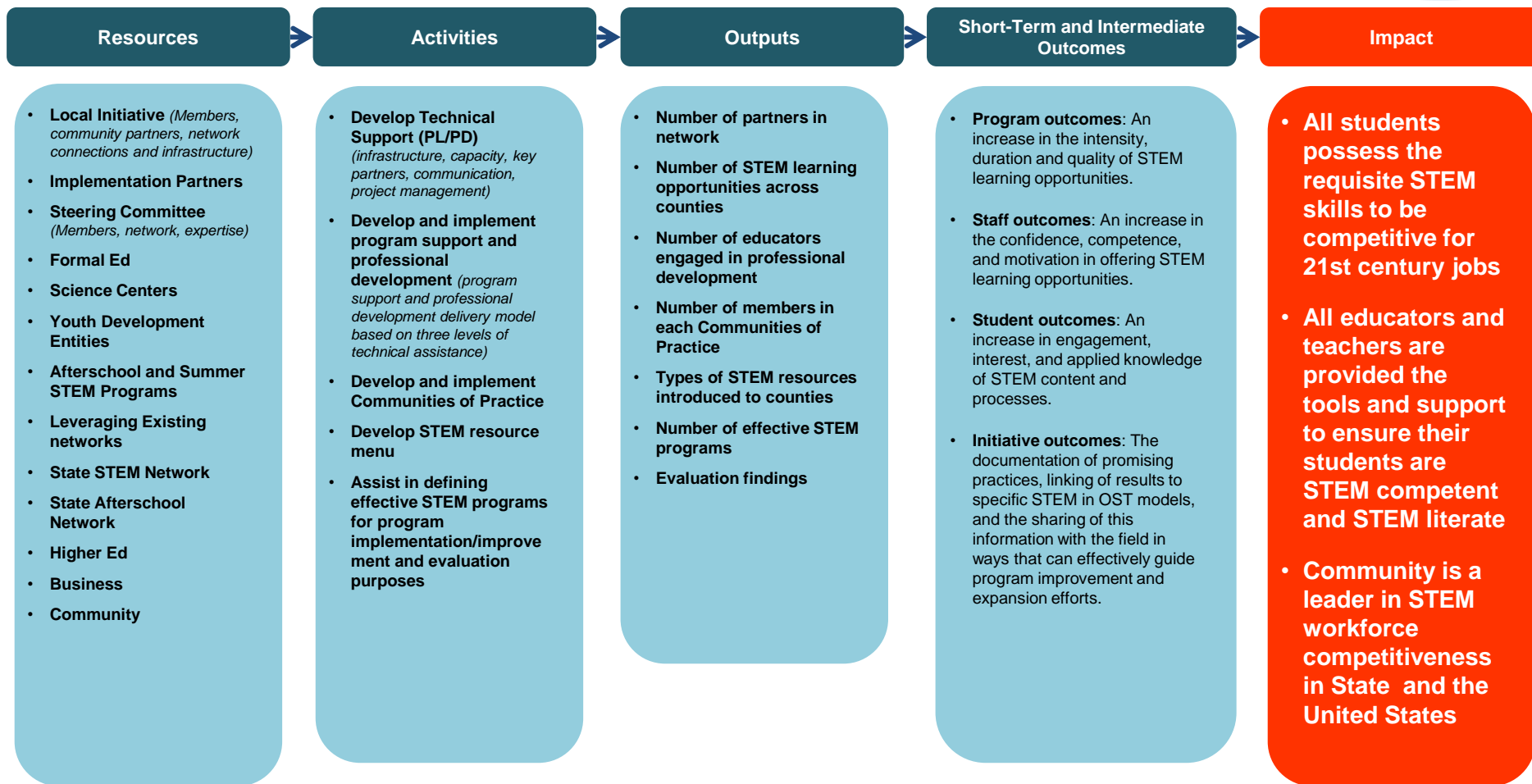
- Develop network infrastructure
- Shared funding
- Shared goals and objectives
- Increase number of effective STEM programs
- Provide more opportunities for program support and PD
- Begin linkages between in & out of school learning platforms

## Synergy

- Agreed upon goals and objectives
- Respect for all enlightened self-interests
- Established and sustainable network infrastructure
- Funding done with conscious impact on others and the system itself
- Communities of Practice operate independently
- Established linkages between in & out of school



# Conceptual Ecosystem Logic Model



# Cohorts 1 & 2 Communities





# STEM Learning Ecosystems

National SLE Community of Practice,  
COP

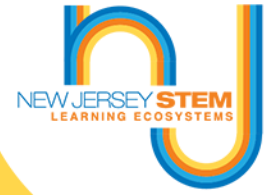
[www.stemlearningecosystems.org](http://www.stemlearningecosystems.org)

# Delran STEM Ecosystem Alliance

## Vision for the Future

1. Pointing girls and historically underrepresented students toward Role Models in STEM that they associate themselves with;
2. Seeking out and successfully engaging young people to participate in high-quality, diverse and interconnected STEM learning experiences;
3. Actively engage young people in STEM, as detailed in the Next Generation Science Standards and other similar state standards for science education;
4. Providing teachers with the tools they need;
5. Showing students that STEM is about trial and error;
6. Underscoring that STEM careers lead to socially good and meaningful careers; and
7. Prioritizing mentoring moments from Day 1

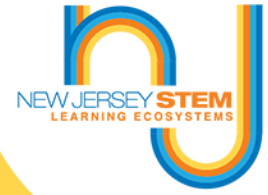




# Delran STEM Ecosystem Alliance Design Principles

“The Non-Negotiables”

# Delran STEM Ecosystem Alliance Survey



The Delran STEM Ecosystem Alliance aspires to give ALL the youth of Delran the framework and tools - through cross-curricular learning - to become independent thinkers and problem solvers who are well-prepared to advance the community through STEM.

To inspire STEM passion, in our Delran community, to develop skills to solve problems for a life time.

STEM The Ecosystem contributes to the development of and opportunities to educate and encourage the next generation of pioneers to sustain and enhance the local and global community.

The STEM Ecosystem contributes to developing socially-responsible, informationally literate, lifelong learners who are able to identify and strategically pursue personal and career goals.

# Delran STEM Ecosystem Alliance Survey



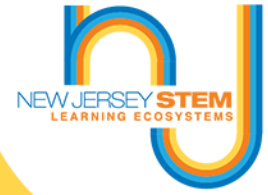
Developed to capture general attitudes, awareness and assets of STEM in Delran

Questions designed to generate conversation and discourse, not as a statistically valid analysis of the state of STEM in the region

Survey designed to capture updated landscape information around STEM programming, services and supports

# Delran STEM Survey...

## High Level Findings



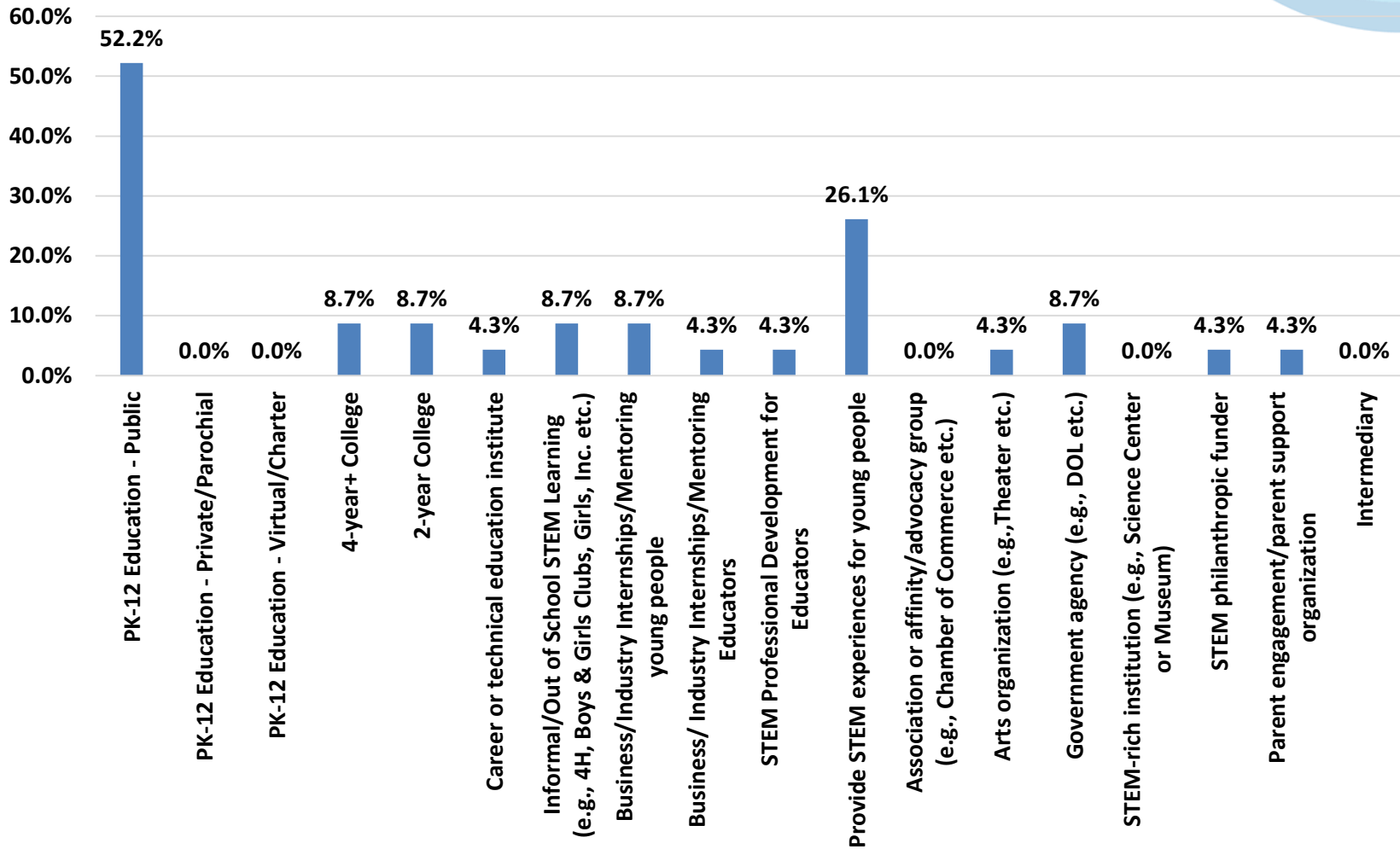
Total of 23 responses were collected

**Educator Heavy** - **52.2%** of the responses were from the formal PK-12 sector

**Experience and Commitment** - **25%** have been STEM advocates for 10+ years

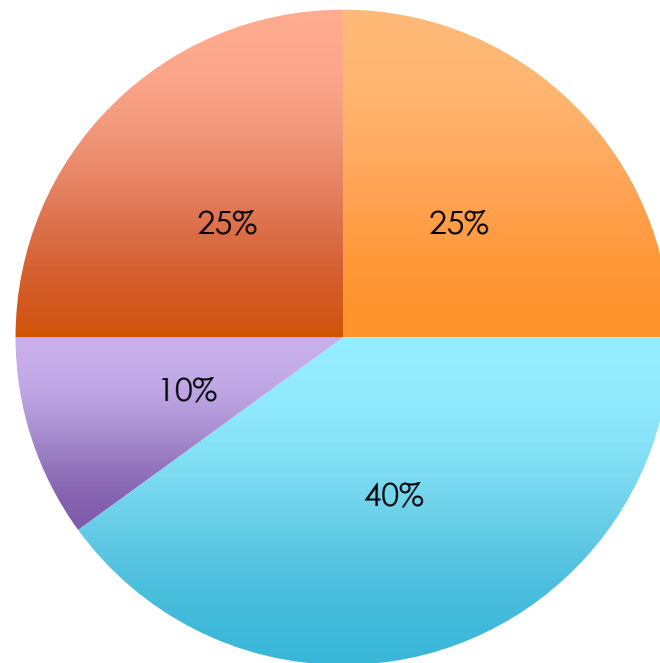
**Types of STEM Advocacy** – **42.9%** believe that they research and continuously improve STEM programs and an additional **42.9%** facilitate and support community engagement around STEM learning for all young people well

# What best describes your organization's role as a STEM supporter? (Please select all that apply.)



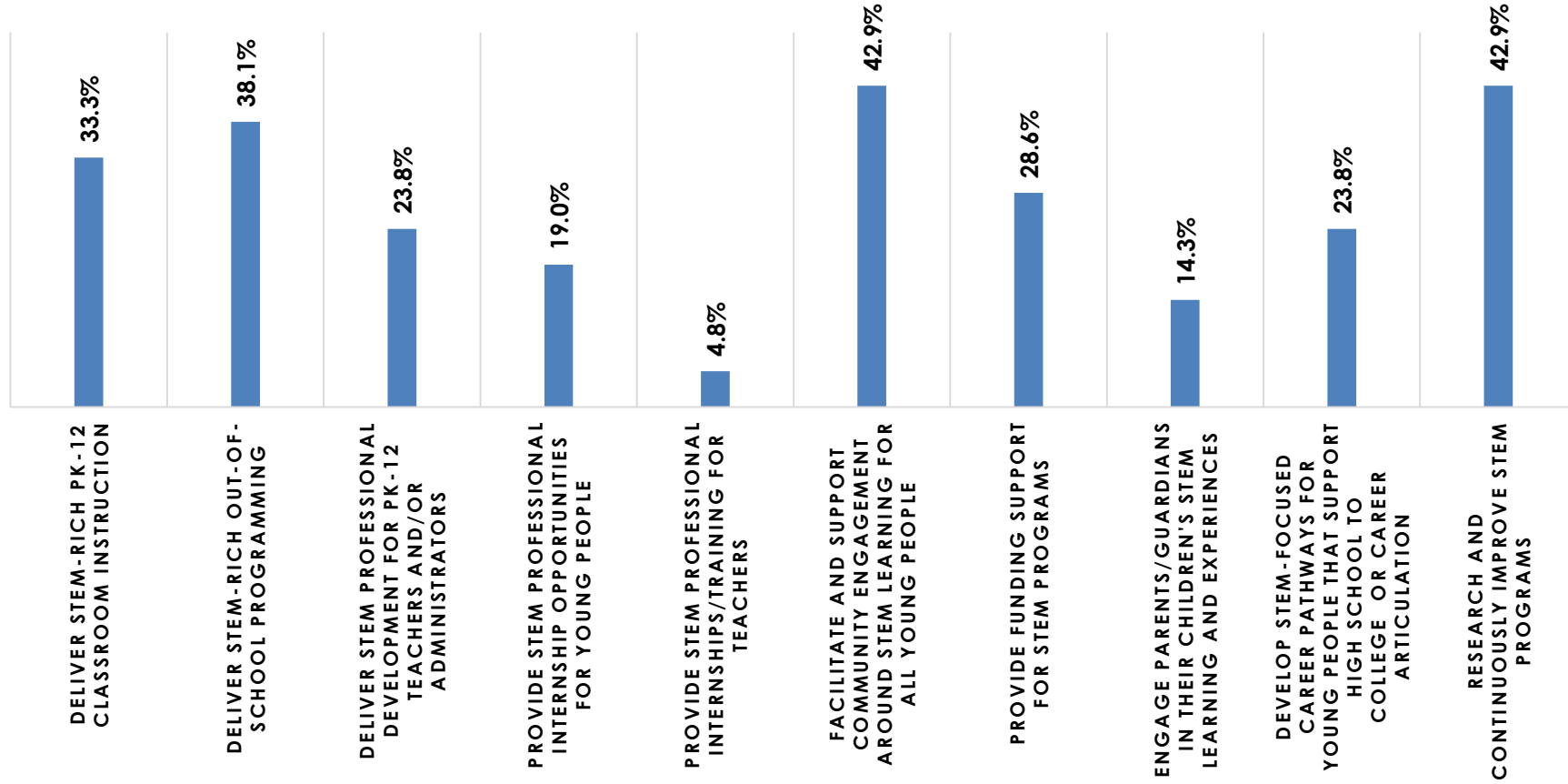


# How many years has your organization been a STEM advocate?



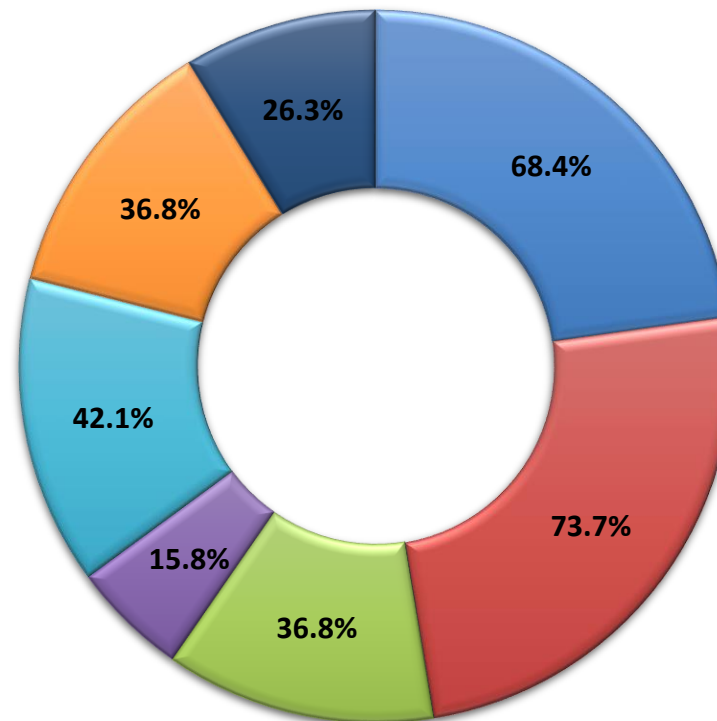
■ Less than 1 year ■ 1-3 ■ 4-9 ■ 10+

## AS A STEM ADVOCATE, WHAT DOES YOUR ORGANIZATION DO REALLY WELL? (PLEASE SELECT ALL THAT APPLY.)



## Help us understand your attitudes and awareness of STEM learning and teaching in the community. (Please select all that apply.)

- School districts visibly support a commitment to STEM education.
- Our community is developing a positive, college or career bound culture focused on STEM.
- Our community is developing a STEM focused work-ready culture.
- Our community of out of school organizations is committed to STEM learning (e.g., 4H, Boys & Girls Clubs, Girls, Inc. etc.)
- Our community is focused on aligning in and out of school learning.
- Our community is committed to long-term funding to sustain our STEM Learning Ecosystem.
- Our community engages families in shared vision/decision-making.



# Delran STEM Survey...

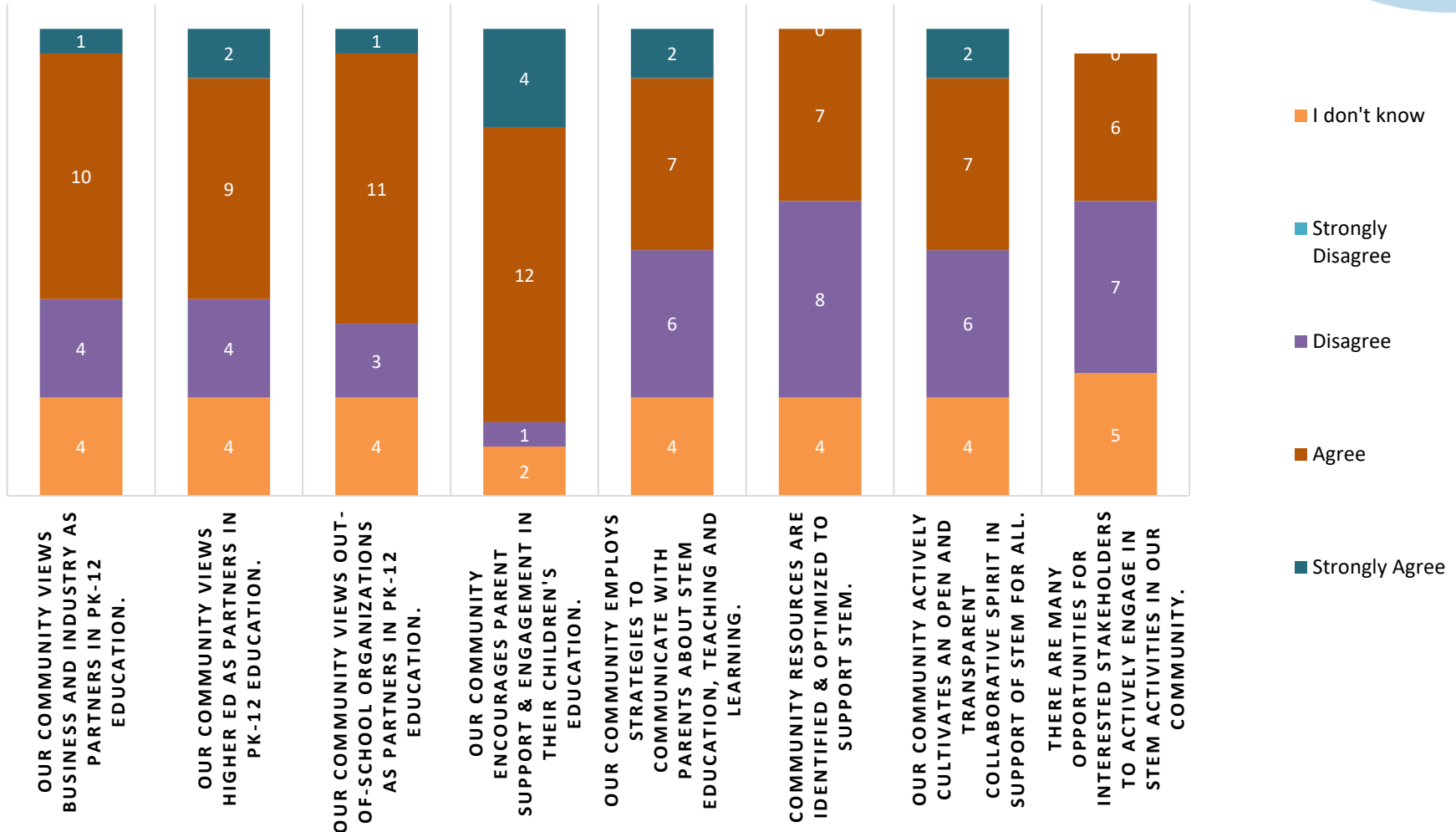
## High Level Findings



**Development of 21<sup>st</sup> Century Skills - 52%** of respondents believe youth are developing competencies in 21<sup>st</sup> century skills in school (**48%** believe this is happening in out of school time)

**Student mentoring is valued - 50%** of respondents said that business and industry do a good job mentoring students, and **88%** said they welcome even more from business and industry, including more mentoring and provision of family STEM experiences. Additionally almost **87%** of respondents welcome more mentoring and academic coaching from higher education partners

# IN YOUR OPINION, HOW DOES THE COMMUNITY APPROACH/VIEW AND ENGAGE IN PARTNERSHIPS AND CROSS-SECTOR COLLABORATIONS TO SUPPORT STEM TEACHING AND LEARNING?





# Delran STEM Survey...

## High Level Findings

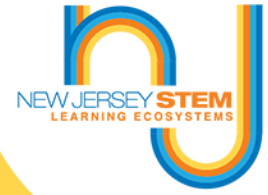


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# STEM Pathways Network...

## Vision and Mission



*The Delran STEM Ecosystem Alliance provides an integrative, interactive system with a shared vision for developing and growing a sustainable and collaborative STEM community that is characterized by proactive and passionate thinking while providing all Delran learners equitable access to high-quality STEM learning and work opportunities.*

Delran Asset Survey Link – Please use the link to complete the survey:  
<https://www.surveymonkey.com/r/DelranSTEMEcosystemAlliance>



# Delran STEM Ecosystem Alliance Vision

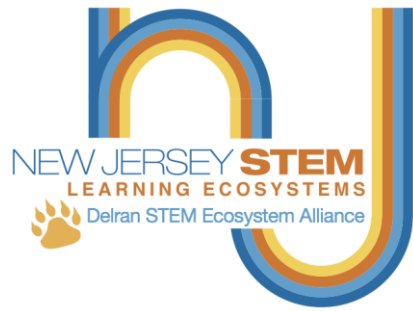


## ***SPN Vision***

New Jersey attracts, cultivates and retains a 21st century workforce that is engaged and supported through statewide alignment of public and private STEM educational resources, ensuring the state remains globally competitive in STEM industries and continues its rich history of innovation.

## ***SPN Mission***

The **NJ SPN**, a public-private strategic alliance, defines and guides a statewide STEM vision for pre-K-to-workforce formal and informal learning opportunities that strengthen academic skills and inspire students; facilitates research and recommendations on STEM talent pipeline needs and barriers to success; and exposes students to the many educational pathways, experiences, and professionals that can prepare them for STEM degree programs and careers in New Jersey.



# Thank you!

Please Visit  
[www.njstemecosystems.org](http://www.njstemecosystems.org)



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