

APPENDIX

Testimony before the Joint Legislative Hearing of the NJ Assembly Education Committee & NJ Assembly Science, Innovation, and Technology Committee March 21, 2109

A "Flash Talk" on STEM Ecosystems: A Public/Private Partnership to Support Underrepresented Populations

Dr. Brian Brotschul Superintendent, Delran Township Schools (Burlington County) bbrotschul@delranschools.org @Delran_Super	Kim Case, Esq. Manager, NJ STEM Pathways Network Executive Director, Research & Development Council of NJ kcase@rdnj.org @KimCase11; @NJSTEMPathways
Erica DeMichele Co-Lead, Delran STEM Ecosystem Alliance K-12 Supervisor of Science, Technology, Sustainability and Co-Coordinator of STEM Initiatives, Delran Township Schools edemichele@delranschools.org @DemicheleErica; @DelranSTEM	Mary Jo Hutchinson Co-Lead, Delran STEM Ecosystem Alliance K-12 Supervisor of Mathematics, Business, Robotics, and Co-Coordinator of STEM Initiatives, Delran Township Schools mhutchinson@delranschools.org @maryjohutch; @DelranMath; @DelranSTEM

A Flash Talk on the Delran STEM Ecosystem Alliance Benefiting Delran Schools- Brian Brotschul

Delran's students and families are benefiting from the development of private and public partnership. Access to STEM career pathways, as called out in our District's Goals, are supported by the NJ STEM Pathways Network in an extraordinary vision for the sake of our future. Delran Schools serve over 3,000 students, K-12. We have undergone a Renaissance in the area of STEM education, with full support from community, municipal government and local legislature. Students are the direct beneficiaries.

Why SFRA Matters- Brian Brotschul

The new State funding directly impacts the classroom. Through challenging curriculum in all content areas and increased STEM programming, we are reducing summer skill loss and absenteeism. Our campaign promotes partnerships that support 21st Century hard and soft skills.

STEM Career Data- Mary Jo Hutchinson

Data shows that underrepresented populations are not making headway in STEM careers. Women have made no gains and minorities have actually lost ground. Compared to 2001, these groups are not keeping pace with job potentials.

Delran STEM Ecosystem- Erica DeMichele

In 2016, Delran STEM Ecosystem Alliance became 1 of 4 NJ ecosystems. In 2017, we were accepted into the national community of STEM Learning Ecosystems, as 1 of 68 internationally recognized groups focusing on networking and partnerships to create a strong STEM workforce.

The Power of the Ecosystem- Mary Jo Hutchinson

A collaboration of K-12, higher education, business/industry, and community partners working together, our mantra is "STEM for ALL", with a focus on underrepresented populations. The goal is developing skills in future innovators and creators who will contribute to the economy of New Jersey.

Cradle-to-Career Pathway- Erica DeMichele

The Cradle-to-Career pathway is the visual representation for STEM readiness. A 2017 report from Microsoft indicates that girls lose interest in STEM subjects by age 15. We must spark STEM interest and identities before high school. Once there, dual-credit and certifications with RCBC prepare students for college OR career.

Delran Innovation & Fabrication Lab- Mary Jo Hutchinson

Delran STEM's current capital project is the creation of a Fab Lab. This space will promote real-world problem solving using digital tools like CNC routers, laser cutters, and 3D printers. Students will develop, design, and create, honing skills that will translate into career readiness.

Women in STEM- Erica DeMichele

Annual programs like Lockheed Martin's Women In Engineering Day and Teentech Workshops encourage young women, to develop a culture of STEM. With female leaders like ourselves, young girls see themselves as STEMinists too.

Economically Disadvantaged- Mary Jo Hutchinson

Delran STEM has leveraged grant funding to provide high-quality experiences for students who could not afford them before. With scholarships of up to 75% off the cost of tuition on free or reduced lunch, longer hours and free busing, we have removed barriers to participation.

Special Education Inclusion- Erica DeMichele

For students with disabilities, a special education integrationist makes modifications to STEAM Camp programs. Teacher grants have fulfilled teacher requests for reading materials at differentiated levels, allowing access to the same science content as their peers.

Overcoming Language Barriers- Mary Jo Hutchinson

Special ELL family engagement nights, complete with translated materials, in-person translators, and ethnic foods resulted in high attendance and enthusiastic responses from families. This implores us to continue to pursuing a STEM for ALL mission.

Using Parent Feedback- Erica DeMichele

Listening to parents, and using data and evaluations from families allow us to move STEM programming forward. We continually survey families on STEM dispositions and attitudes, and analyze the results to measure our impact and improve future STEM programming.

Supporting Families at Home- Mary Jo Hutchinson

A strong home-school partnership is highly beneficial to a child's education. Sharing resources and research with families increases their capacity to build STEM interest and proficiency in their children, and to support and extend the STEM experiences their children have at school.

Supporting Teachers- Erica DeMichele

Lockheed Martin is one of our most supportive STEM champions, including \$8,400 of grants which were awarded to our teachers this year. These grants support innovative teacher-designed STEM classroom projects that have impacted 550 students this school year alone.

Robotics- Mary Jo Hutchinson

Delran Schools is proud of a comprehensive K-12 Robotics program, which increases complexity as our students progress from simple LEGO robots K-2, all the way up to designing, building, and programming robots for regional high school VEX Robotics competitions.

Sustainability and Community- Erica DeMichele

Our community partner, Sustainable Delran and our four bronze level certified schools won the prestigious Collaboration Award at the NJSBA Conference in 2017. As a result we have been asked by Kean University to present in China this May, offering expertise on integrating STEM learning for students there.

NJ STEM Pathways Network- Kim Case

New Jersey is in a unique position in workforce development and education. Through the establishment of STEM ecosystems, like the one in Delran, you can feel the passion and experience that can continue through your support and endorsement.

White House STEM Report- Kim Case

In December 2018, the Committee on STEM Education and the National Science and Technology Council listed the development of STEM Ecosystems as 1 of 8 essential goals to building a strong foundation in STEM. As part of the STEM Ecosystem network, our relationships with the national movement are gaining momentum.

Championing STEM Work- Kim Case

We hope that the answers we provide to your questions today are just the start of our continued collaboration, for the sake of New Jersey's students and families who want highly skilled citizens and a workforce prepared for the future.

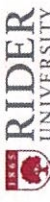
Delran STEM Ecosystem Alliance is Born



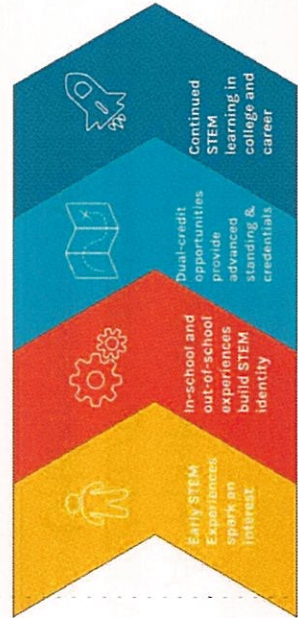
TIES
Uniting Partners. Transforming Learning.



THE POWER OF THE ECOSYSTEM



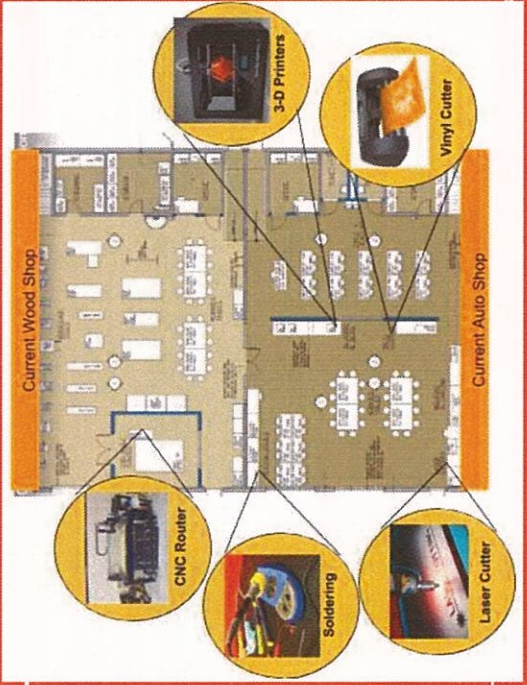
DELTRAN'S CRADLE TO CAREER STEM PATHWAY



Delran Students and Rowan College at Burlington County: Articulated Pathways



OPENING FALL 2019



Women in STEM



Economically Disadvantaged



DELAN TOWNSHIP SCHOOLS
 10000 Delan Rd.
 Delan, MI 48821
 Telephone: (516) 461-6810
 Fax: (516) 461-6812



Dr. Brian Bressanelli
 Superintendent
Dr. Anna Bellia-Vercillo
 Director of Student Services
Mrs. Christine Battanone
 Director of Curriculum and
 Instruction
Mr. Derek Mond
 Business Administrator
 March 5, 2012

Dear Tree and Reduced Lunch English Families,

[illegible]

Cost Per Week of STEAM Camp or STEAM Academy	\$400	Free Lunch (only cost per child)
Cost Per Week of STEAM Camp or STEAM Academy		

Reprints.
 Andrea Delgadillo & Mary Jo Williamson
 Owens Township Schools
 10000 Owens Road
 Owens, MI 48867
 Tel: 517/466-1400
 Fax: 517/466-1400
 Email: delgadillo@owens.k12.mi.us
 Web: www.owens.k12.mi.us

Science is fun for everyone at Delran camp



Special Education Inclusion



Science is fun for everyone at
Delran camp



Burlington County Times



Leveled texts allow struggling readers to access science content.

Overcoming Language Barriers

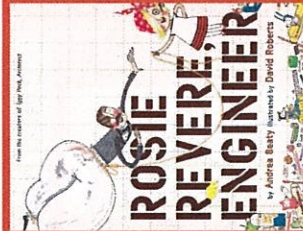


En sevdiğin meyveyi inşa et ve bir arkadaşın tahmin etmesini isteyiniz.

(Build your favorite fruit and see if a friend can guess it.)

Construa sua fruta favorita e veja se um amigo consegue adivinhar que fruta é.

(Build your favorite fruit and see if a friend can guess it).

Translated to Turkish,
Portuguese and Spanish

Using Parent Feedback to Drive STEM Programming

#NJSTEMMonth

Delran STEM Family Engagement Night Post Survey 2019

Please click on the number of times you attended the event to see how many other families attended the event. Thank you!

*Required

Child #1's Grade Level *

Child #2's Grade Level *

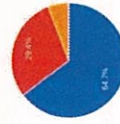
Child #3's Grade Level *

Child #4's Grade Level *

Child #5's Grade Level *

The STEM activities tonight provided materials and/or activities that were engaging and purposeful.

177 responses



Strategy games
Science
Robotics
Engineering

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Supporting Families at Home



What is Bedtime Math?

- Fun, **free app** – for iOS or Android
- A wacky new math problem each day
 - Three levels** of challenge (ages 3-9)
 - Answers provided
 - No log-ins, no scores
- Just **5 minutes a day** makes a difference for your kids



Math at Home Helps Kids at School

587 first graders



Reading app

Math app

- Bedtime Math users gained **3 months of math skills** within one school year
- Kids of "math-anxious parents" gained **half a school year**



Laura Overdeck
Bedtime Math Foundation

"What started out as a fun mathematics activity for my children has now grown into a nationwide movement to make math cool and to get kids fired up about numbers."

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Supporting Teachers



Robotics



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Sustainability and Community



2nd Grade students at Delmar's Middlebridge Elementary School act as field biologists, using their rain garden to explore ecosystems dynamics.



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New Jersey STEM Month



Kim Case
New Jersey STEM Pathways Network Manager &
Executive Director of The Research and Development Council of New Jersey

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CHARTING A COURSE FOR SUCCESS: AMERICA'S STRATEGY FOR STEM EDUCATION



A Report by the
COMMITTEE ON STEM EDUCATION
of the
NATIONAL SCIENCE & TECHNOLOGY COUNCIL

GOALS FOR AMERICAN STEM EDUCATION		Build Strong Foundations for STEM Literacy											
		Increase Diversity, Equity, and Inclusion in STEM											
		Prepare the STEM Workforce for the Future											
Pathways	Objectives	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055
Develop and Retain Diverse STEM Workforce	Expand STEM Occupations	•	•	•	•	•	•	•	•	•	•	•	•
	Increase Work-Based Learning and Training	•	•	•	•	•	•	•	•	•	•	•	•
	Employer Partnerships	•	•	•	•	•	•	•	•	•	•	•	•
	Expand Successful Practices from Across the Learning Landscape	•	•	•	•	•	•	•	•	•	•	•	•
Engage Students where Disciplines Converge	Science, Technology, and Engineering Education	•	•	•	•	•	•	•	•	•	•	•	•
	Make Mathematics a Magnet	•	•	•	•	•	•	•	•	•	•	•	•
	Encourage Interdisciplinary Learning	•	•	•	•	•	•	•	•	•	•	•	•
	Expand Science, Technology, and Cyber Skills Literacy	•	•	•	•	•	•	•	•	•	•	•	•
Build Computational Literacy	Make Computational Thinking Integral	•	•	•	•	•	•	•	•	•	•	•	•
	Expand Digital Proficiency Element of All Education	•	•	•	•	•	•	•	•	•	•	•	•
	Expand Digital Proficiency Element of All Education	•	•	•	•	•	•	•	•	•	•	•	•
	Expand Digital Proficiency Element of All Education	•	•	•	•	•	•	•	•	•	•	•	•

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NJ STEM Pathways Network

Our Mission

The NJ STEM Pathways Network defines and guides a statewide STEM vision for grade to career formal and informal learning opportunities that strengthen academic skills and engage 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.

Our Values



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The **New Jersey STEM Pathways Network (NJSPN)** is a strategic public-private alliance defining and guiding a **STEM** vision for cradle to career pathways in New Jersey.

STEM



SCIENCE • TECHNOLOGY • ENGINEERING • MATH

WHAT WE DO

Using data to drive all objectives and achieve our mission, the NJSPN:

- 1 Aligns resources to scale and replicate promising practices.
- 2 Identifies learning opportunities by convening **New Jersey's STEM** experts.
- 3 Promotes **STEM** career pathways by training state leaders and creating deeper public awareness of opportunities available in the 21st century workforce.

New Jersey: OUR OPPORTUNITY

New Jersey students have not made statistically-significant gains in 4th or 8th grade science since 2009.¹

Out of 100 **STEM** occupations, **93%** of them had wages above the national average. **STEM** workers earn about **26% more** than their non-STEM counterparts.²

Students expressing interest in **STEM** show higher levels of **college readiness**.³

Between 2017 and 2027, the number of **STEM** jobs will grow **9%** in New Jersey—with positions in computing, engineering and advanced manufacturing leading the way.⁴

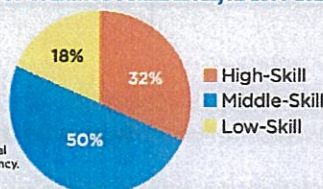
There are **1.4 open jobs in STEM** for every unemployed person in New Jersey.⁵

Demand for Middle-Skill Jobs Will Remain Strong

Between 2014-2024, 50 percent of job openings will be middle-skill.

Source: NSC analysis of long-term occupational projections from state/labor employment agency.

JOB OPENING BY SKILL LEVEL, NJ 2014-2024

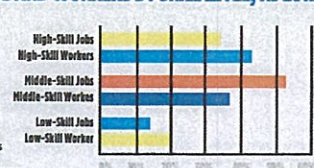


Middle-Skill Gap

Middle-skill jobs account for 53 percent of NJ's labor market, but only 37 percent of the state's workers are trained in the middle-skill level.

Source: NSC analysis of Bureau of Labor Statistics Occupational Employment Statistics by State, May 2015, and American Community Survey Data 2015.

JOBS AND WORKERS BY SKILL LEVEL, NJ 2015



"middle skilled" - jobs that require more training than a high-school diploma, yet less than a four-year college degree.

1: US Department of Education, 2015. 2: ACT, 2017. 3: Economic Modeling Specialists International, 2017. 4: National Skills Coalition, 2018. 5: Change the Evaluation, 2017.

Join us by visiting: www.njstempathways.org and by following @njstempathways and #NJSTEM

NJ STEM Ecosystems

Replicating the National **STEM** Learning Ecosystems model, the NJSPN has fostered the creation of four **STEM** Learning Ecosystems to advance collaboration across educators, business, government and community-based organizations in order to form more integrated cradle-to-career pipelines.

Representing six New Jersey counties, the Ecosystems are opportunities to address unique regional challenges, while also providing a space to pilot, scale and replicate work that expands a statewide vision of **STEM**.

Delran **STEM** Ecosystem Alliance BURLINGTON COUNTY

An integrated, interactive **STEM** community that provides all learners access to high-quality **STEM** learning and work opportunities.

- Building a digital fabrication lab to prepare students for the 21st century economy
- Development of county-level **STEAM** camps for grades 3-12
- Expansion of Robotics programming in grades 2-8
- Computer Science exposure for K-8 students
- Sustainable energy and agricultural programs to engage students

Liberty **STEM** Alliance HUDSON COUNTY

- County wide Hack-a-Thon to advance Computer Science
- Workforce development events, with Latinas in **STEM**
- Professional Development for in-and-out of school educators

A renowned community dedicated to enriching **STEM** opportunities in Hudson County by incorporating all voices, creating pathways, and serving as an information hub.

South Jersey **STEM** & Innovation Partnership CAMDEN, CUMBERLAND AND SALEM COUNTIES

A diverse community of educational institutions, subject matter experts and industry leaders developing the region's talent pipeline.

- **STEM** Advisory Board to give employers a voice in building talent to fill their regional needs prepare for future innovations
- Hack-a-Thons (HackSJSIP) in Camden and Salem Counties to promote Computer Science
- Increase digital literacy of students and educators Talent Pipeline development (Engineering, Cybersecurity, Mechatronics)

Newark **STEAM** Coalition NEWARK, ESSEX COUNTY

- Alignment of in-and-out-of school learning opportunities to integrate preparation for 21st century economy
- Workforce development initiatives, including connections between youth and employers

A resource-rich ecosystem that prepares PreK-16 students to participate in a 21st Century workforce by closing opportunity gaps to ensure prosperity for the entire community.

NJ STEM MONTH

An annual event in March, **NJ STEM Month** is a celebration of the Garden State's incredible accomplishments in science, technology, engineering, math and innovation.

ALL organizations in the state are called to showcase and celebrate excellent work in **STEM** for **NJ STEM Month** by hosting/attending events and engaging on social media.



- Become a member
- Participate in **NJ STEM** Month
- Make a donation

To make a donation please make checks payable to the Research & Development Council of New Jersey; ATTN: New Jersey STEM Pathways Network

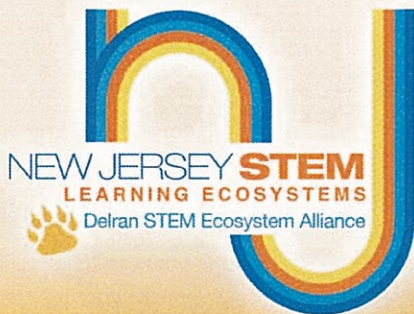
Visit njstempathways.org/stemmonth for more information.

CONTACT: KIM CASE, Executive Director, Research & Development Council of NJ and Manager of the New Jersey STEM Pathways Network kcase@rdnj.org

The New Jersey STEM Pathways Network, a strategic public-private alliance, was established in 2014 by the New Jersey Office of the Secretary of Higher Education to define and guide a STEM vision for cradle to career pathways in New Jersey. The NJSPN is chaired by Laura Overdeck, Chair of the Overdeck Family Foundation and Founder of Bedtime Math and is managed by the Research & Development Council of New Jersey.

The NJSPN aims to attract, cultivate and retain a 21st century workforce in New Jersey, ensuring the state remains a top global competitor in STEM industry and continues its rich history of innovation.

Join us by visiting: www.njstempathways.org and by following @njstempathways and #NJSTEM



Delran STEM Ecosystem Alliance works together to create an interconnected, intentionally designed pipeline of experiences to produce better outcomes for our learners.

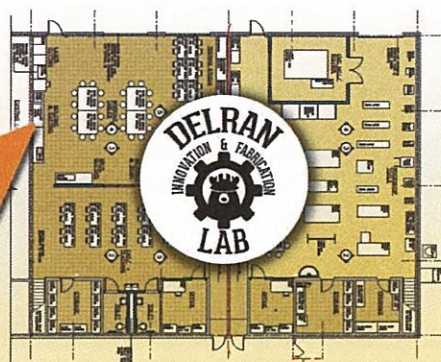
- STEM for ALL
- Pipeline from K-12 school to workforce
- Certifications in less time to workforce
- Well developed citizens for Burlington County and the state of New Jersey

Strategic thinking for the future...

the jobs that are yet to be created.



Delran High School's defunct auto shop was storage for almost a decade. Sponsorships will transform it into a state-of-the-art Innovation & Fabrication Lab.



What is a **DIGITAL FABRICATION LAB?**

- ☒ A state of the art Digital Fabrication Laboratory for use by...
 - K-12 Delran students
 - Rowan College at Burlington County
 - Community organizations
- ☒ Potential for sustainable funding

What is **STEM/STEAM?**

Why does it matter?

The creation of this lab will train students for the jobs of the future.

STEM

Science
Technology
Engineering
Math

STEAM

Art integrated into **STEM**

1/2 OF ALL **STEM JOBS**

don't require a four-year degree and pay an average of \$53K, which is 10% higher than non-STEM jobs with similar educational requirements

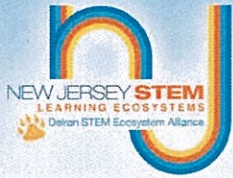
Almost all of the **30 FASTESTS-GROWING** occupations in the next decade will require at least some background in **STEM**.

To find out how to get involved

CONTACT:

ERICA DeMICHELE or MARY JO HUTCHINSON

stem@delranschools.org • delranschools.org/s_t_e_m • @DelranSTEM



DELRAN'S CRADLE TO CAREER STEM PATHWAY

Early STEM
experiences
spark an
interest

In-school
and
out-of-school
experiences
build STEM
identity

Dual-credit
opportunities
provide
advanced
standing &
credentials

Continued
STEM
learning in
college and
career

IMAGINE
the Possibilities
of this Path:

DELRAN HIGH SCHOOL STUDENTS EARN 9 COLLEGE CREDITS IN:

- Engineering/Drafting
- Production Design 1
- Production Design 2

DELRAN HIGH SCHOOL GRADS ATTEND RCBC FOR THE 3+1 PROGRAM IN ONE OF THE FOLLOWING PROGRAMS:

Engineering, MET or EET

THESE STUDENTS GRADUATE FROM ROWAN UNIVERSITY WITH A FOUR YEAR DEGREE:

- In less than four years
- By paying only 3 years of associate degree tuition
- Classes with Lockheed Engineers and Internships
- Lockheed Martin or other **STEM** career opportunities



PHASE PLAN

PHASE 4
Staffing
and
Sustainability

PHASE 1
Pole Barn
and
Engineer
Plans

PHASE 2
Space
Upgrades

PHASE 3
Machinery,
Installation
and
Training

How can you get involved?

Help Fund Phase 3:

- Materials
- Professional Development

Create new grant
opportunities for us
to collaborate

Sponsorship will include:

- Highlights by media
- Plaque naming your organization

DELRAN INNOVATION & FABRICATION LAB SPONSORSHIP LEVELS



Edison's
Light Bulb
\$5,000

Supports: Personal
Protection & Safety
Equipment and Other Lab
Station Materials
for 2,200 students



Edison's
Phonograph
\$10,000

Supports: Professional
Development/Training for 50
teachers and Desktop CNC
Routers to support 3,100
students per year



Edison's
Movie Camera
\$25,000

Supports: CNC Routing
Stations and Electric
Stations to support 3,100
students per year



Edison's
Electric Car
\$50,000

Supports: Laser
Cutter Stations and Lab
Computer Technology
to support 3,100
students per year

To sponsor a donation or
a grant proposal

CONTACT:

ERICA DeMICHELE or MARY JO HUTCHINSON
stem@delranschools.org • delranschools.org/s_t_e_m • @DelranSTEM

NEVER TOO YOUNG TO Start STEM!

Have you ever spent time **COUNTING THE STARS** with your child? Or answered a child's question when they asked **WHY THE SKY IS BLUE** or the **GRASS IS GREEN?** Or tried to predict with a child what bathtub toys might **SINK OR FLOAT?** These are examples of **STEM** (science, technology, engineering, and math) you can do with your child every day. Children are just like scientists as their natural curiosity leads them to explore and see the world around them. Like scientists, children are interested in how things work, move, and change and will ask questions about what they see.



Talk, sing, read, play and write or draw with your child from birth to engage them in learning basic STEM concepts



As your child observes how something works, encourage them to predict what will happen next, "Blow a bubble and ask your child what will happen to it if your child pops it"



Encourage your child to describe, compare and sort objects by color, shape, size, height and weight, "Talk with them about how bubbles are different sizes or moving fast or slow"



Encourage your child to look for patterns and sequences in everyday objects and activities

Are you interested in finding out where more STEM activities for your child are being held around the state? Check out the calendar of NJ STEM Month events on the NJ STEM Pathways Network (NJSPN) website: www.njstempathways.org/events/2019-03/

Join the conversation on social media by following: [@NJSTEMPathways](https://twitter.com/NJSTEMPathways), [@RDCouncilNJ](https://twitter.com/RDCouncilNJ) and [#NJSTEMMonth](https://twitter.com/NJSTEMMonth)



NEVER TOO YOUNG TO Start STEM!

NJ Stem Month - An Annual event in March, NJ Stem Month is a celebration co-hosted by the New Jersey STEM Pathways Network (NJSPN) and Research & Development Council of New Jersey (R&D Council of NJ). NJ STEM Month highlights the Garden State's incredible accomplishments in science, technology, engineering, math and innovation.



EVENT	HOST	DATE	TIME	CITY	COST
Leap into Science Balance Workshop	Ocean City Library	March 1	10:30-11:15am	Ocean City	FREE
Delran STEM Family Engagement Night	Delran STEM Ecosystem Alliance	March 4 & 18	6-7:15pm	Delran	FREE
Code Block	Eduscape	March 12	9am-12pm	Montvale	\$129
Jr. Baykeeper Open House	NY/NJ Baykeeper HQ	March 20	5-7pm	Matawan	FREE
Bricks 4 Kids Makers Day Building Fun	Brick City 4 Kids	March 22	6:30-8:30pm	Newark	\$10 or \$25 for family of 3
Family Maker Night	Denville Public Library	March 22	5-7:30pm	Denville	FREE
Amateur Radio Booth	New Providence Memorial Library	March 23	1-4pm	New Providence	FREE
2019 Scratch Programming Challenge	WeMake 4H	All of March			FREE

Anyone can participate in NJ STEM Month by hosting or attending an event and by engaging on social media. A full calendar of NJ STEM Month events can be found on the NJSPN website: www.njstempathways.org/events/2019-03/

Join the conversation on social media by following: @NJSTEMPathways, @RDCouncilNJ and #NJSTEMMonth

2019

STEAM UP SUMMER CAMP

EARLY
BIRD
DEADLINE:
April 30th

Monday - Thursday

9AM to 3PM

Special Rates

for Students on FREE
or reduced lunch pricing

Busing available for
Delran students!



Weekly Themed Engineering Projects, as well as Circuitry, Coding and Robotics Challenges.

WEEK	2nd Graders going into 3rd Grade	3rd Graders going into 4th Grade	4th Graders going into 5th Grade	5th Graders going into 6th Grade
Week 1 7/8 to 7/11	MATERIALS ENGINEER Solid as a Rock: Replicating an Artifact	AGRICULTURAL ENGINEER The Best of Bugs: Designing Hand Pollinators	ENVIRONMENTAL ENGINEER Water, Water Everywhere: Designing Water Filters	OPTICAL ENGINEER Lighten Up: Designing Lighting Systems
Week 2 7/15 to 7/18	INDUSTRIAL ENGINEER Marvelous Machines: Making Work Easier	BIOENGINEER Just Passing Through: Designing Model Membranes	GEOTECHNICAL ENGINEER A Stick in the Mud: Evaluating a Landscape	TRANSPORTATION ENGINEER The Attraction is Obvious: Designing Maglev Systems
Week 3 7/22 to 7/25	ELECTRICAL ENGINEER An Alarming Idea: Designing Alarm Circuits	BIOMEDICAL ENGINEER No Bones About It: Designing a Knee Brace	MECHANICAL ENGINEER Catching the Wind: Designing Windmills	ACOUSTICAL ENGINEER Sounds Like Fun: Seeing Animal Sounds
Week 4 7/29 to 8/1	CIVIL ENGINEER To Get to the Other Side: Designing Bridges	ENVIRONMENTAL ENGINEER A Slick Solution: Cleaning an Oil Spill	AEROSPACE ENGINEER A Long Way Down: Designing Parachutes	CHEMICAL ENGINEER A Work in Progress: Improving a Playdough Process

\$225 per week; see registration form for more information on discounts and payment plans.

ALL STUDENTS REGISTERED BY APRIL 30th WILL BE ENTERED INTO A DRAWING TO WIN ONE FREE WEEK OF STEAM CAMP!

For more information, email: steamcamp@delranschools.org or visit www.delranschools.org and hover over "Parents" tab, then click on "STEAM Summer Camp."

2019

STEAM



ACADEMY

Grades 7-12

Early Bird Deadline:
April 30th

Payment Plan Available

**Multiple Week and Multiple
Child Discounts**
(See registration form)

*Partial Scholarships
Available for Students
with Financial Need*

New this year!

- A hands-on STEAM experience including engineering activities, culinary arts applications, and field trip experiences.
- Monday - Thursday 9am - 3pm
- Bus transportation available for Delran students!
- DHS Students who volunteer as counselors for two or more weeks of STEAM Camp may attend one week of STEAM Academy Week free of charge (all volunteers must be entering grades 9-12 at Delran High School, and must apply and be accepted into the STEAM Camp volunteer program).

**Sustainability, Horticulture,
and Culinary Arts
Farm-to-Fork Experience**

**CAMP Monday, 7/29 to
DATES Thursday, 8/1**



STEAM Camp & STEAM Academy are made possible through grant funding from PSE&G, Schneider Electric, The Delran Education Foundation, and The Overdeck Foundation.

\$225 per week; see registration form for more information on discounts and payment plans.

ALL STUDENTS REGISTERED BY APRIL 30th WILL BE ENTERED INTO A DRAWING TO WIN ONE FREE WEEK OF STEAM CAMP!

For more information, email: steamcamp@delranschools.org or visit www.delranschools.org and hover over "Parents" tab, then click on "STEAM Summer Camp."

The Third Annual

DELRAN STEM FAIR

May 20, 2019 • Delran High School • 5:30-7:00 pm



Delran Student Presentations Include:

- Delran School Student Groups
 - Robotics Teams from Millbridge, DIS, DMS, and DHS
 - Green Teams from Millbridge, DIS, DMS, DHS & Delran Municipal Green Team
 - DMS & DHS Science Fair Winners
 - Rocketry Club
 - Computer Science / Coding Student Projects and Activities
- STEAM Camp & STEAM Academy Registration

Participating Partners Include:

- Inside Out Design Studios, LLC- Sustainable Landscape Architecture, learn to rain garden
- Mobile vans for STEM learning- Escape the Room, Palmyra Nature Cove and Gaming
- Schneider Electric - Energy Savings Improvement Plan and Energy Challenge, solar panel ideas

Clothing and Household Goods Donation Drive:

- Green Drop Truck will collect Clothing, shoes, blankets, bedding, knick-knacks, kitchenware, toys, small appliances, electronics, sporting goods
- Tax deductible contributions benefit the Military Order of the Purple Heart

Unused Prescription Drug Drop Off:

- Delran Township Police Department will collect ALL unused prescription drugs for proper disposal

Food and Fun Sales Include:

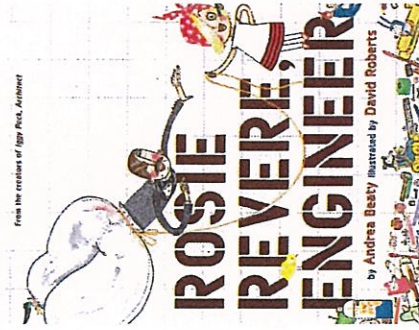
- Kona Water Ice and Chic-Fil-A
- School Store Bear Wear
- Greenhouse tours, including plants for sale

Come out to participate in interactive displays and STEM activities!



DELRAN STEM FAMILY ENGAGEMENT NIGHTS

K-5 families are invited to participate in an evening of family fun! You will learn about growth mindset in STEM, hear the story Rosie Revere, Engineer, and complete building challenges with LEGOs. Parents will learn the best ways to interact with their children to promote STEM thinking, and will learn about resources and upcoming STEM opportunities for their children. Several lucky families will win a copy of Rosie Revere to take home with them!



Monday, March 4 from 6:00-7:15 pm
Monday, March 18 from 6:00-7:15 pm
Delran High School Media Center

Online registration is required and space is limited!

Click the link in your email, or visit www.delranschools.org/s_t_e_m to register!

(Email blast sent to K-5 parents on 2/7/19)





An annual event in March, **NJ STEM Month** is a celebration co-hosted by the New Jersey STEM Pathways Network (NJSPN) and Research & Development Council of New Jersey (R&D Council of NJ). **NJ STEM Month** highlights the Garden State's incredible accomplishments in science, technology, engineering, math and innovation.

Anyone can participate in **NJ STEM Month** by hosting or attending an event and by engaging on social media. A full calendar of **NJ STEM Month** events can be found on the NJSPN website: www.njstempathways.org.

You can join the conversation on Social Media by following: @NJSTEMPathways, @RDCouncilNJ and #NJSTEMMonth

Why We Celebrate **STEM** in New Jersey

1

New Jersey has the most scientists and engineers per square mile in the universe!¹

2

NJ consistently ranks in the **top 5** in innovation by Bloomberg U.S. Innovation Index.²

3

New Jersey is home to **9-time Nobel Prize** powerhouse Nokia Bell Labs.³

4

MEDICINE CHEST OF THE WORLD:

More than 300 biotechnology companies and 20 pharmaceutical/medical technology firms call New Jersey home.⁴

5

New Jersey is ranked **#12 in the nation** for the number of current STEM or STEM-related jobs.⁵

1: New Jersey, 2012. 2: Bloomberg Innovation Index. 3: Nokia Bell Labs, 2018. 4: BioNJ, 2018. 5: Change the Equation, 2016.

With the support of Governor Murphy's administration and Assemblyman Andrew Zwicker's office, NJ STEM Week expanded to include the entire month of March in 2018. March is now **NJ STEM Month** as designated by the New Jersey State Legislature and gubernatorial proclamation.



ENCOURAGING MORE STUDENTS TO EXPLORE **STEM CAREERS**

By celebrating **NJ STEM Month** we pave the way for students to pursue **STEM** careers by generating excitement and awareness!

In 2015 there were **8.6M jobs in STEM** and 7 out of 10 of those jobs were computer related.¹

Of the more than **6 million** New Jersey high school students only **1.6 million** are interested in pursuing a **STEM** career.²

STEM workers earn **26% more** than their non-STEM counterparts.³

In New Jersey, there are **1.4 open STEM jobs** for every unemployed person.⁴

1: U.S. Bureau of Labor Statistics, 2017. 2: US Innovation and Change the Equation. 3: Pew Research Center, 2018. 4: JerseyCAN, 2017.

SUPPORT STEM MONTH TODAY!

Become a **NJ STEM Month** Sponsor at any of our giving levels. By sponsoring this month long celebration you are:

- Giving New Jersey schools, students and families access to hands-on, **STEM** learning experiences through distribution of mini grants.
- Providing training for educators and students entering the workforce.
- Supporting regional events to bring deeper public awareness and a greater understanding of **STEM** career pathways.
- Elevating New Jersey's status as a global leader in **STEM** and innovation.



Last NJ STEM Month

8,100	LEARNERS IMPACTED
101	UNIQUE STEM MONTH EVENTS
54	PARTICIPATING ORGANIZATIONS
13	NJ COUNTIES IMPACTED
210	UNIQUE ENTRIES STEM Month 2018 Social Media Sweepstakes
+32K	SOCIAL MEDIA IMPRESSIONS
420K	READERS Multiple publications featuring NJ STEM Month
24	STATE LEGISLATIVE REPRESENTATIVES Active Engagement

SPONSORSHIP LEVELS AND BENEFITS	Edison's Light Bulb \$100,000	Edison's Phonograph \$25,000	Edison's Movie Camera \$10,000	Edison's Electric Car \$5,000
Serve as NJ STEM Month's presenting sponsor.	●			
Co-branded signage for all booths at the NJ STEM Month Celebration at New Jersey Statehouse in Trenton.	●			
All NJ STEM Month Marketing will be co-branded, including print, digital, social media presence and event "SWAG."	●			
"Invitation only" breakfast roundtable to discuss STEM in NJ with prominent state leaders.	KEYNOTE SPEAKER	PRESENTER	ATTENDEE	
Webinar to conclude NJ STEM Month reaching more than 70 statewide organizations.	HOST	SPEAKER	ACKNOWLEDGMENT	
NJ STEM Month Celebration at New Jersey Statehouse in Trenton and NJSPN Quarterly Meeting.	KEYNOTE SPEAKER	SPEAKER	ATTENDEE	ATTENDEE
Signage recognition at the NJ STEM Month Celebration at New Jersey Statehouse in Trenton.	●	●	●	●
Receive prominent brand recognition on NJ STEM Month Marketing, including print, digital, social media.	●	●	●	●
Seat on NJ STEM Month host committee.	●	●	●	●
Receive framed gubernatorial proclamation celebrating NJ STEM Month.	●	●	●	●
Opportunity to attend events, site visits and other convenings hosted throughout the state.	●	●	●	●

CONTACT:

KIM CASE

Executive Director, Research & Development Council of NJ and Manager of the New Jersey STEM Pathways Network

kcase@rdnj.org

Cumberland County STEM Event

The American Association of University Women of Cumberland County (AAUW-CC) strives to close the gender gap in STEM industries by being intentional about providing exposure and support to minorities and girls. Our goal is to inspire, motivate and create a network that will assist in dismissing stereotypes and demonstrate that women can and do thrive in STEM careers.¹

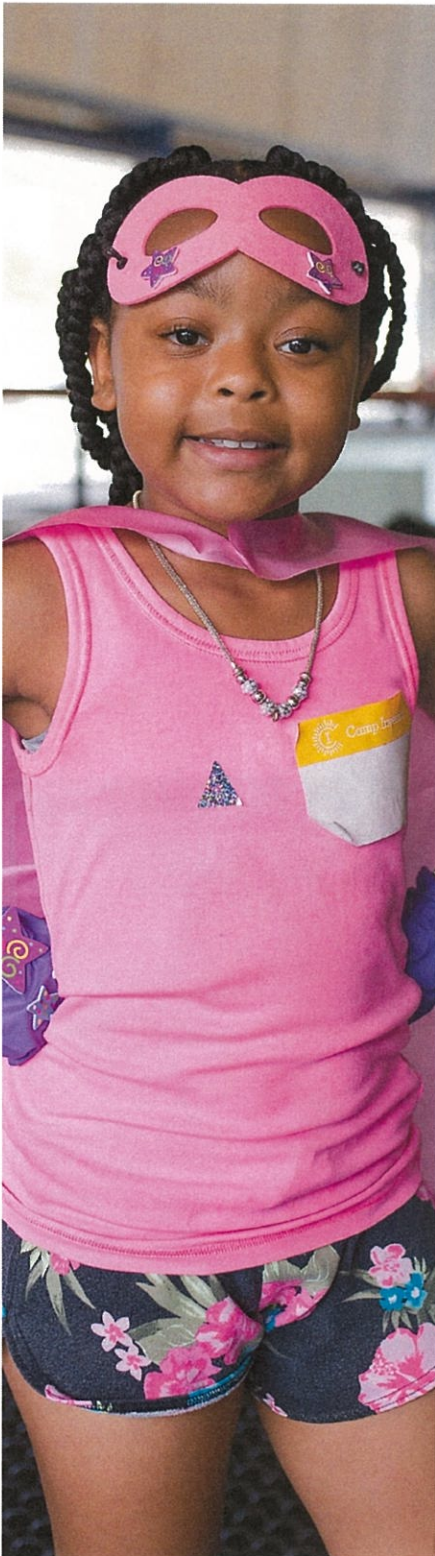
The "Why So Few" report conducted by the AAUW and other studies show that there is a considerable decrease in the interest in STEM fields by the time this underrepresented population reaches high school. This decrease in interest often include critical self evaluations, lack of confidence, socio development, cognitive issues with abstract ideas in math and lack of female role models and mentors.

To tackle such debilitating issues, the AAUW-CC will be strategic in its efforts by:

1. Partnering with schools and other local organizations to complete this mission.
2. Solicit female industry professionals to connect with female youth.
3. Advocate, create, implement and offer STEM programs such as Tween Tech to the girls of Cumberland County.

On March 15, 2019, the AAUW-CC hosted Tween Tech. A one day STEM event in which 200 girls from middle schools across Cumberland County descended upon the community college to participate in 16 STEM based workshops.

¹ How Exposure To Innovation Closes the Gender Gap In STEM Fields



HOW EXPOSURE TO INNOVATION MATTERS WITH CLOSING THE GENDER GAP IN STEM FIELDS

Women have been historically underrepresented in science, technology, engineering and mathematics (STEM) fields, and in 2015, they comprised a mere 24 percent of the STEM workforce.¹ Despite showing similar interest in STEM compared to their male peers in elementary school, when young girls grow up, a majority pursue careers in non-STEM fields. Combined, women earn less than 20 percent of computer science, engineering and physics undergraduate degrees nationwide.² What are the reasons for this significant drop in STEM interest by the time girls enter high school?

It was this same question researchers at Microsoft asked themselves in 2017, when the company teamed up with psychology professor Martin Bauer of the London School of Economics to discover at what age girls began to lose interest in STEM subjects, and the underlying reasons for the decline.

In order to encourage young women's innovative development and grow their much-needed presence in STEM industries, it is essential to provide exposure and support for them in early education. Educators and mentors must actively work toward dispelling gender stereotypes and demonstrate that women can and do thrive in STEM careers.



The study found that by age 15 only 42 percent of those surveyed said they would consider a career in STEM and listed reasons including negative gender stereotyping and a lack of female role models in STEM careers for their decision.³

1. Noonan, R. (2017, November 13). Women in STEM: 2017 update. Retrieved from <https://www.commerce.gov/news/fact-sheets/2017/women-stem-2017-update>

2. Cheryan, S., Ziegler, S. A., Montoya, A. K., & Jiang, L. (2017). Why are some STEM fields more gender balanced than others? *Psychological Bulletin*, 143(1), 1.

3. Trotman, A. (2017, March 1). Why don't European girls like science or technology? Retrieved from <https://news.microsoft.com/europe/features/dont-european-girls-like-science-technology/>



THE INNOVATION GENDER GAP AND ITS ROOTS

The innovation gender gap is not only harming the economic prospects of women, but it's also negatively impacting STEM fields in need of diverse ideas and solutions. Though gender bias has received much of its national exposure in the form of unequal payment practices – on average, full-time working women are paid 80 cents for every dollar paid to a man doing the same job – this imbalance can have even more serious consequences when it comes to health and medicine.⁴ For example, heart disease, the leading cause of death in the United States, has historically been misdiagnosed in women because symptoms differ between the sexes. Despite the fact that women have both a higher lifetime risk of a stroke and are less likely to survive their first heart attack than men, women continue to receive lower-quality medical care compared to their male counterparts. The reason for this inequality has to do with a lack of female physicians and representation during clinical trials.⁵

The best way to eliminate both gender bias and the lack of female representation in the STEM workforce is to address the reasons why interest in the math and sciences dwindles as girls grow older. Significant among these is the absence of female role models in STEM fields. According to the 2017 Microsoft study of the 11,500 women between ages 11 and 30, one of the key reasons why girls chose not to follow a career in STEM was because they lacked a female role model.⁶ Being introduced to mentors at a young age has been shown to improve performance and a sense of belonging in STEM – factors that improve both recruitment and retention rates for women in the field.⁷ This technique is especially effective when the role models are similar to the child in interests, attitude and behavior.⁸ However, given the relatively limited number of women in STEM fields (as compared to their male counterparts), it can sometimes be difficult to find an adequate number of mentors to inspire and influence the vocational decisions of school-aged girls.

GENDER ROLES AND STEREOTYPES IN STEM

In addition to a scarcity of female STEM role models, another major deterrent arises from fears of stereotyping and discrimination in engineering and computer science. According to Bauer, conformity to social expectations, gender stereotypes and gender roles are factors that negatively impact the decision to pursue innovative career opportunities.⁹ Further research conducted by Sapna Cheryan, a psychology professor from the University of Washington, has shown that the prevalence of “masculine culture” in many STEM workplaces has contributed to a lower sense of belonging among women and has caused women to avoid situations in which they feel like an outsider.¹⁰ Stereotypes that assume women are naturally poor performers in math and science act as invisible barriers, and according to Cheryan, these “assumptions about the STEM fields signal to women that they might not belong or feel accepted in these career fields.”¹¹

Research has shown that gender-related stereotypes begin to develop in children at around four years of age.¹² These presumptions are especially harmful to young girls who very early on in their education begin to question their aptitude in math and science. Though there exists a national push to close the innovation gender gap by introducing high school STEM programming to young women in this age group, it simply begins too late. Instead, educators and mentors must start providing girls with playful introductions to the world of technology and engineering beginning in early childhood.



4. The National Women's Law Center. (n.d.). Equal pay & the wage gap. Retrieved from <https://nwlc.org/issue/equal-pay-and-the-wage-gap/>

5. American Heart Association. (n.d.). Path to parity. Retrieved from <https://www.gatedforwomen.org/fight-heart-disease-women-gated-for-women-official-site/path-to-parity-2/>

6. Trotman (2017, March 1)

7. Drury, B. J., Say, J. O., & Cheryan, S. (2011). When do female role models benefit women? The importance of differentiating recruitment from retention in STEM. *Psychological Inquiry*, 22, 265. DOI: 10.1080/1047840X.2011.620935

8. Ibid

9. Trotman (2017, March 1)

10. Cheryan, Ziegler, Montoya, & Jiang (2017)

11. Gallucci, M. (2016, October 15). "Masculine culture" of STEM fields is partly to blame for gender gap. Study Retrieved from <https://mashable.com/2016/10/15/stem-gender-gap-masculine-culture/#YEHffvXxYmg>

12. Martin, C. L., & Rulle, D. N. (2010, January 10). Patterns of gender development. *Annual Review of Psychology*, 61(1), 353-381. DOI: Retrieved from <https://doi.org/10.1146/annurev.psych.023008.100511>



INTRODUCING ROLE MODELS AND EARLY EDUCATION PROGRAMMING TO SPARK INNOVATION

In order to integrate early STEM education programming that will properly engage young girls, there are certain practices that must be emphasized. One of the most effective involves the introduction of relevant role models and mentors. Research from [the Equality of Opportunity Project](#) found that exposing girls to female inventors at a young age has the potential to reduce the gender gap in technical-related STEM fields by half.¹³ **Introducing young girls to successful women within an educational setting cultivates a tangible bond between STEM role models and a young girl's growing opinions about how she would fit into such fields.**

This strategy has been reinforced by research conducted at Tulane University, which found that exposing young girls to female role models in STEM not only buffered the effects of negative stereotyping, but also led to increased performance and interest in STEM fields overall.¹⁴ Because the women in the study were able to connect to a figure who embodied sought-after outcomes, attitudes

toward STEM as a potential career path began to shift, and levels of perceived belonging and acceptance increased.¹⁵

Educators and parents should take advantage of classroom and out-of-school environments that promote STEM as a viable career path. Not only do these jobs earn on average 29 percent more than their non-STEM counterparts, but the industry is growing significantly; and STEM occupations are estimated to grow by 8.9 percent from 2014 to 2024 – a higher rate than comparative job sectors.¹⁶ Gender stereotypes and fear of not being accepted should in no way discourage girls from avoiding this fulfilling, stable and lucrative career path. By introducing female STEM role models at an early age, research has shown that this exposure can have powerful, long-term impacts. By starting with developmentally appropriate programs and role-modeling, parents and teachers can inspire females to be future leaders in innovation and eliminate STEM stereotypes once and for all.

FEARLESS FEMALES INSPIRING STEM EDUCATION



Radia Perlman, National Inventors Hall of Fame® (NIHF) Inductee and inventor of robust network routing and bridging, didn't let the typical stereotype of girls in STEM deter her from following her dreams. A great piece of advice from Perlman to young female innovators is that "the more of a difference you can make, the more valuable you are!"



Frances Ligler, NIHF Inductee and inventor of portable optical biosensors, was inducted in 2017 for her work with sensors. She is also the primary influence behind the Camp Invention® 2019 activity DIY Orbot™. In this module, campers experiment and design courses for their very own sensor-based robot and learn how Frances built her own path to success!



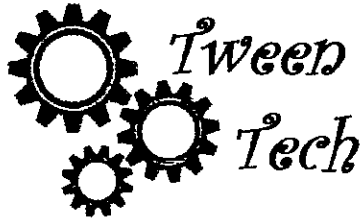
Carolyn Bertozzi, NIHF Inductee and inventor of bioorthogonal chemistry, isn't afraid to push boundaries. At Camp Invention, young girls are exposed to the tools and encouragement they need to recognize and build confidence! Bertozzi's advice for young innovators is to not let rejection get in the way of discovery. "If you can't do it because somebody said so, let's go talk to that person and ask them why does it have to be that way," Bertozzi said.

13. Bell, A., Chetty, R., Jaravel, X., Petkova, N., & Van Reenen, J. (2017). Who becomes an inventor in America? The importance of exposure to innovation. DOI: 10.3386/w24062

14. Streamer, L., Park, L., & Young, A. (2014, September). Motivating women in STEM: The impact of gender roles and role models. Tulane University. DOI: Retrieved from <https://digital.library.tulane.edu/islandora/object/tulane%3A27745>

15. Ibid.

16. Economics & Statistics Administration. (2017, March 30). STEM jobs: 2017 update. Retrieved from <http://www.bls.gov/reports/stem-jobs-2017-update>



MY PERCEPTIONS OF SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS

Please mark the box to the right that best indicates how much you agree or disagree with the statement.

POST-SURVEY

THIS IS YOUR POST-WORKSHOP SURVEY: PLEASE FILL THIS OUT AT THE END OF THE ENTIRE DAY.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I like science.	☐	☐	☒	☐	☐
I am interested in a career in science.	☐	☐	☐	☒	☐
I am confident I can learn science.	☐	☐	☒	☐	☐
Women can succeed in scientific jobs.	☐	☒	☐	☐	☐
Girls are as good as boys at science.	☒	☐	☐	☐	☐
I like technology.	☐	☐	☐	☒	☐
I am interested in a career in technology.	☐	☐	☐	☒	☐
Women can succeed in technology.	☐	☒	☐	☐	☐
Girls are as good as boys at technology.	☒	☐	☐	☐	☐
I am confident that I can learn technology.	☐	☐	☒	☐	☐
I am interested in learning about engineers.	☐	☒	☐	☐	☐
I like engineering.	☐	☒	☐	☐	☐
Women can succeed as engineers.	☒	☐	☐	☐	☐
I am confident that I can become an engineer.	☐	☐	☒	☐	☐
I am interested in a career in engineering.	☐	☐	☒	☐	☐
I like mathematics.	☐	☒	☐	☐	☐
Girls are as good as boys in mathematics.	☒	☐	☐	☐	☐
I want to develop my mathematical skills.	☐	☒	☐	☐	☐
High school math classes will help no matter what I decide to study.	☐	☒	☐	☐	☐
I am confident that I can learn mathematics.	☐	☐	☒	☐	☐
I plan to attend college.	☐	☐	☒	☐	☐
I'm thinking of having a career in science, technology, engineering or math.	☐	☐	☒	☐	☐
I am interested in being nominated for the Summer Tech Trek Camp July 21-27, 2019.	☐	☐	☒	☐	☐

My favorite part of today (please write in below)

I got to know more about what happens in a crime scene.

For future events, I suggest that you (please write in below: ways to improve, better workshop ideas...)



MY PERCEPTIONS OF SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS

Please mark the box to the right that best indicates how much you agree or disagree with the statement.

PRE-SURVEY

THIS IS YOUR PRE-WORKSHOP SURVEY: PLEASE COMPLETE AS SOON AS YOU FINISH YOUR STEM CARDS

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I like science.	☐	☐	☒	☐	☐
I am interested in a career in science.	☐	☐	☐	☒	☐
I am confident I can learn science.	☐	☐	☒	☐	☐
Women can succeed in scientific jobs.	☒	☐	☐	☐	☐
Girls are as good as boys at science.	☒	☐	☐	☐	☐
I like technology.	☐	☐	☒	☐	☐
I am interested in a career in technology.	☐	☐	☒	☐	☐
Women can succeed in technology.	☒	☐	☐	☐	☐
Girls are as good as boys at technology.	☒	☐	☐	☐	☐
I am confident that I can learn technology.	☐	☐	☒	☐	☐
I am interested in learning about engineers.	☐	☒	☐	☐	☐
I like engineering.	☐	☐	☒	☐	☐
Women can succeed as engineers.	☒	☐	☐	☐	☐
I am confident that I can become an engineer.	☐	☐	☒	☐	☐
I am interested in a career in engineering.	☐	☐	☒	☐	☐
I like mathematics.	☐	☒	☐	☐	☐
Girls are as good as boys in mathematics.	☒	☐	☐	☐	☐
I want to develop my mathematical skills.	☐	☐	☒	☐	☐
High school math classes will help no matter what I decide to study.	☐	☐	☒	☐	☐
I am confident that I can learn mathematics.	☐	☒	☐	☐	☐
I plan to attend college.	☐	☐	☒	☐	☐
I'm thinking of having a career in science, technology, engineering or math.	☐	☐	☒	☐	☐

My greatest hope for today is (please write in the space below):

That I will figure
out what I want to
do. for what career
I might want

Our Success Stories

Connecting City Kids to Nature

Like many children growing up in Trenton, Jaaziah Bethea had limited opportunity to freely explore the wonders of nature. But today, thanks to a grant from Bristol-Myers Squibb, he's sharing the magic of the outdoors with other kids from our state's capital.

An attendee of the Stony Brook-Millstone Watershed Association's Summer Nature & Environmental Day Camp in his youth, Jaaziah, now 18, is a camp counselor at the Watershed Association through its Trenton Link Camp Scholarship Program.

"When my advisor in the New Jersey MentorPower Program told me about this opportunity, I knew it was the perfect place for me," said Jaaziah, a graduate of Trenton Central High School West who plans to attend the University of Pittsburgh in the fall. "Camp at the Watershed was so much fun - even if rain moved my overnight camp-out inside. As a counselor, I love working with the younger kids, some who've never had a yard or stream to play in."

In addition, the Trenton Link Camp Scholarship Program offers a Bristol-Myers Squibb Internship to a young adult from Trenton. This camp counselor position is a vital link between our program and the scholarship campers - the first person they see on the bus in the morning and the last contact they have at the end of the day. It also provides an important mentoring experience with the camp participants.

"At a time when TV and video games are quickly replacing time spent outdoors, it's vital to reconnect our children with the natural world," said James R. Waltman, executive director of the Watershed Association. "Thanks to the generous support of Bristol-Myers Squibb, our camp program can continue to inspire the next generation to appreciate and protect our local environment."

For six weeks each summer, the Watershed Association's Summer Nature & Environmental Day Camp uses the 860-acre Watershed Reserve's fields, forests, pond and stream to embrace and explore the wonders of nature. For each grade-specific camp session, professional staff guides campers through educational activities, such as stream explorations, tracking adventures, insect safaris, nature crafts and journaling. Older students enjoy canoeing, backpacking, camping and night hikes.

The Trenton Link Camp Scholarship Program is part of the Watershed Association's larger "Trenton Link: Connecting Urban Children to Nature" initiative, which provides educational programming to less advantaged schools and individuals by waving program fees and providing transportation from Trenton to the Watershed Reserve.

Funded by Bristol-Myers Squibb's Community of Learners Program, the Watershed Association's Trenton Link Camp Scholarship Program provides Trenton youth whose families cannot pay camp fees or transportation to and from the 860-acre Watershed Reserve in Pennington with the chance to attend one week of the Watershed Association's Summer Nature & Environmental Day Camp for free.

Our Success Stories

Summer College Program Offers Uncommon Learning Experience for Undergrads

If asked how he spent his summer vacation, Devon Cocuzza would have to throw around words like polymorphism and co-crystals, the kind of scientific terms that most people don't encounter every day (if ever).

Polymorphism refers to a substance's ability to exist in different forms, and it must be controlled in pharmaceuticals to help keep active ingredients at their most stable and soluble form. This is necessary to ensure that the ingredients in their safest and most effective state.

Cocuzza spent weeks experimenting with ways to control polymorphism in pyrazinecarboxamide (PCA), an antibacterial agent used to treat tuberculosis. He wasn't working in an industry or government research lab, however. Instead, Cocuzza, a junior at The College of New Jersey (TCNJ), was conducting the research as part of the MUSE program, an intensive academic experience offered every summer at the college in Ewing, New Jersey. Cocuzza was one of five Chemistry and Biology students whose participation was funded by a grant from Bristol-Myers Squibb.

MUSE – which stands for Mentored Undergraduate Summer Experience – began in 2004 with a small number of students from the School of Science. In subsequent years, the program expanded to include TCNJ's six other academic schools: Arts and Communication; Business; Culture and Society; Education; Engineering; and Nursing, Health and Exercise Science.

During the most recent summer, 87 students and 44 faculty members participated, representing 20 different programs and all seven academic schools, says Dr. Janet Morrison, an associate professor in the Department of Biology and director of the MUSE Program.

TCNJ undergrads who participate in the program spend eight weeks living in the same dormitory while they conduct research or engage in other creative activities in mentored collaboration with faculty members.

The housing arrangements and a series of group activities – recreational, social and academic – are intended to build a sense of community among the students and faculty from diverse schools.

Morrison said the program reflects a larger institutional commitment to promote student-faculty collaboration and find meaningful research opportunities for undergraduates – something an undergraduate-focused college like TCNJ is well-equipped to do.

Undergraduates at larger research universities who participate in research projects will often find themselves working on basic tasks while collaborating with graduate students, Morrison says, while at TCNJ, the students work in close collaboration with their faculty mentors. They are encouraged to bring their own ideas to each project and are given opportunities to help design studies, interpret data and co-author reports, Morrison says.

Available on www.BMS.com ([here](#))

In the sciences, MUSE project ideas stem from the faculty members' current research pursuits and are designed to produce new knowledge and advance the progress of science, she says.

For Cocuzza, the research mostly involved developing and testing co-crystals as a method of controlling polymorphism in PCA. (Co-crystals are crystals that contain two different molecules, often joined by hydrogen bonds.)

It was a new experience on many levels. Cocuzza had not worked on an original research project before and was not familiar with chemical engineering, the research interest of his faculty mentor, Dr. Heba Abourahma.

Cocuzza says that he and other students mentored by Dr. Abourahma met with her daily during the summer to discuss their progress, results and what steps should be taken next. He relied on her heavily at first, he says, but, as he grew more familiar with the work, he was able to be more independent and exercise his own critical thinking and problem-solving skills.

With the summer program over, Cocuzza has continued working on the project with Dr. Abourahma during the current academic year. He expects to keep working on the research until he graduates.

"She always gave us enough liberty to be working by ourselves but also was a resource when we had questions and needed direction," Cocuzza says. "I am learning now that we were kind of spoiled in the summer because Dr. Abourahma could work exclusively with us, as opposed to during the academic year, when she becomes very busy preparing for classes."

For more information on the MUSE Program, visit <http://fscollab.pages.tcnj.edu/muse/>

Bristol-Myers Squibb and 4-H present...



2018-2019 Series of Six

Science Saturday Programs for Trenton area youth in 4th - 7th grades

9:30 am – Noon

Mercer County 4-H Office

(930 Spruce Street, Next to Trenton Farmers Market)

October 20, November 17, December 8

January 12, February 9, March 9

Contact Erika Kaufman, 4-H, at ekaufman@mercercounty.org or 609-989-6830 for more info. Enrollment forms available at <http://mercercounty.njaes.rutgers.edu> and from your school or afterschool program. Return to the 4-H office by October 5 (**email Erika; mail to 930 Spruce St., Trenton, NJ 08648; or fax to 609-396-9573**). Youth must attend all six sessions. Refreshments provided. No registration fee.



Cooperating Agencies: Rutgers, The State University of New Jersey, U.S. Department of Agriculture, and County Boards of Chosen Freeholders. Rutgers Cooperative Extension, a unit of the Rutgers New Jersey Agricultural Experiment Station, is an equal opportunity program provider and employer.

Our Success Stories

Centers for Science Teaching and Learning Help School Districts Implement Next Generation Science Standards (NGSS)

As a company committed to discovering and delivering innovative medicines that help patients prevail over serious diseases, Bristol-Myers Squibb recognizes how important science literacy is in today's increasingly complex society. Whether you work in a laboratory, a community hospital or a high-tech manufacturing facility, or you simply want to make informed choices about your family's health care, a basic understanding of science is essential.

Our commitment to scientific excellence extends well beyond the walls of our laboratories. We support – and our employees participate in – many initiatives to enhance science education and promote student interest in science careers.

We focus on hands-on, inquiry-based learning that enables students of all ages to effectively integrate and apply what they learn, become independent and critical thinkers, and more deeply explore their interests. This is accomplished in two ways. First, we help educators discover new ways to bring science to life and inspire K-12 learners. Second, we help educators provide meaningful opportunities for students from elementary school to college apply their learning about topics such as biology, chemistry, genetics, robotics, engineering, alternative energy and environmental science.

The Bristol-Myers Squibb Centers for Science Teaching and Learning at Rider and Montclair State Universities in New Jersey and at Quinnipiac University in Connecticut are our signature investments in science and technology education.

These centers, which work with public school districts and private schools in their respective geographies, are changing how in-service and pre-service K-12 educators learn to teach science and mathematics. In addition to emphasizing the use of the scientific method as a tool for inquiry and exploration, the centers help teachers develop deep content knowledge, understand how scientific concepts at various grade levels fit into a larger context for students as they progress from elementary school to high school, and employ instructional technology to improve learning outcomes.

“To function in our rapidly changing world it is essential that high school graduates leave prepared to enter the workforce or pursue post-secondary education competent in fundamental scientific content as well as scientific reasoning and habits of mind,” says Kathleen M. Browne, Ph.D., assistant provost and former director of the SELECT program at Rider University.

An area of special emphasis for the centers for the 2013-14 academic year is helping teachers and administrators prepare for the anticipated adoption and implementation of the Next Generation Science Standards (NGSS). These standards, designed by educators from 26 states in a process led by the National Academy of Sciences, the American Association for the Advancement of Science, the National Science Teachers Association and Achieve LLC, will help students in grades K-12 better prepare to pursue advanced studies and careers in science, technology, engineering and mathematics (STEM).

Available on www.BMS.com ([here](#))

The Bristol-Myers Squibb Centers for Science Teaching and Learning in New Jersey have been working with the New Jersey Department of Education to help educators and administrators in the state's 600-plus school districts prepare for the anticipated adoption of the new standards.

At Rider University, the SELECT program has been working with teams of K-12 administrators and teachers from 13 school districts to help them identify – and successfully close – gaps between their existing science curricula and the new standards.

"The Next Generation Science Standards are designed to help students more effectively build knowledge of disciplinary core ideas, cross-cutting concepts, and science and engineering practices coherently through the grades," says Cathlene Leary-Elderkin, new director of the Rider SELECT program.

Rider's professional development approach in this NGSS project is designed to provide teachers and administrators with an opportunity to learn more about the new standards and experience NGSS-aligned, exemplar lessons. Teachers then analyze their existing lessons with a "NGSS lens," identify gaps found, and strategize on what support they will need to revise their lessons to align with the new standards.

The outcome of this year-long planning process is a district-generated Action Plan that details the short- and long-term strategies needed to successfully implement the Next Generation Science Standards. Using the results of the gaps analysis as a guide, Rider SELECT will then deliver customized professional development programming that will support districts through the NGSS implementation period.

"Providing K-12 administrators and teachers with meaningful professional development to help them prepare for these new standards is essential," Leary-Elderkin says. "The teams of administrators and teachers participating in this NGSS program have expressed that they feel 'more prepared' and are now in 'a better position' to move forward with planning for implementation of the NGSS as a result for their experience at Rider."

Jacalyn Willis, Ph.D., director of the PRISM program at Montclair State University, has been working with the New Jersey Department of Education to create and pilot a teacher professional development model for NGSS that will also build the capacity of the centers to reach more districts across the state. New Jersey is one of 10 pilot states, and the Rider and Montclair centers will collaborate to implement the new online materials that guide teachers through science lessons that help students learn how to learn, and how to articulate their understandings and questions.

The NGSS and the aligned teacher professional development will improve how teachers teach in a variety of subjects by using research-based methods that engage students, improve their thinking skills, and help them become aware of how to be effective learners. Administrators of New Jersey school districts partnered with the centers recognize the value of building their teachers' pedagogy skills, and have already requested that they be invited to send teams of teachers for the program.

Another recent grant to Montclair State University supported the development of a forthcoming curriculum to help New Jersey teachers meet New Jersey's Core Curriculum Standard 9.1 for 21st Century Life and Career Skills. The new curriculum modules blend K-12 science content with activities that support development of workplace skills such as effective teamwork, critical thinking, problem-solving, creativity, and ethical behavior.

Similar work is under way at the Bristol-Myers Squibb Center for Science Teaching and Learning at Quinnipiac University in Hamden, Connecticut, where director Lucie Howell is working with the university's School of Education and educators from the Hamden, Meriden, New Haven, North Haven and Wallingford public school districts on an innovative program called ORTIS, or On-line Resource Through Integrated STEM.

Using a grant from the Teacher Quality Partnership Grant Program at the Connecticut Office of Higher Education, the partners created – and will deploy and evaluate – online science curriculum units that integrate common engineering education strands and technical literacy, in line with Connecticut's science standards, NGSS and the National Research Council's K-12 Science Framework. Each unit uses a project-based learning activity that follows an engineering design process that is consistent across all units and is designed to encourage students to apply the science knowledge, understanding and skills they have developed through the unit along with their previously accumulated knowledge of math, science, literacy, social studies and technology.

Five units were developed in July 2013: one each for high school biology, chemistry and biochemistry and one each for middle school biological sciences and physical sciences. Six teachers, each from a different school district, were paired with a member of Quinnipiac University's science faculty to develop the units. The units will be available to teachers at the five participating school districts through an online wiki resource developed by a computer science student at the university.

By working in teams with teachers from other school districts who may have different ideas, operating constraints or experiences than themselves, participants developed a greater appreciation for how scientists, engineers or technologists collaborate. Howell says an important outcome of the ORTIS project has been the recognition among participants that teaching needs to be a "team sport."

The teachers' work on ORTIS mimics the experience of an engineering team and encourages them to apply the same engineering design process used in ORTIS to the project-based learning activities they develop for use in their own science classrooms, she says.

"As a result, the teachers and faculty see and experience first-hand the complexities and frustrations of team work, but also learn the terrific benefits that come from a team approach once you push through the difficulties and conflicts," Howell says. "As one participant said to me at the end of their week long summer institute, 'I can't imagine how I will go back to writing curriculum units on my own now after this'."

Our Success Stories

N.J. High School Brings Study of Biology to Life

Chances are your ninth-grade biology class did not have a genetic engineering lab for experiments in DNA extraction and genetic fingerprinting. Students at Lawrence Township High School in Lawrenceville, N.J., however, have that and more thanks to the BioPhase Project. Funded in part by Bristol-Myers Squibb, the BioPhase Project is the focal point of a district biology curriculum that emphasizes hands-on learning, cross-disciplinary problem solving and better understanding of careers in the biosciences.

"We're preparing today's students for jobs that may not even exist yet," said Yvette Panasowich, the district's supervisor for math and science instruction for middle school and high school students. "Our students need to learn the material and learn how to apply that knowledge to new situations and new challenges."

Two grants from Bristol-Myers Squibb enabled the district to purchase about 200 pieces of lab equipment and other supplies that students are using to conduct experiments in DNA extraction, amplification and purification; gel electrophoresis; restriction digests; and a variety of other biotechnical procedures.

One lesson recalls the plot of a Hollywood movie as students interpret DNA fingerprints to identify the viral strain responsible for a potentially deadly (and fictitious) disease outbreak. In another experiment, students observe how resistance to antibiotics develops in common bacteria.

Bristol-Myers Squibb, which operates a facility in Lawrence Township, views its involvement as part of the company's long history of supporting science education and of contributing to its local communities.

"As a science-based company, Bristol-Myers Squibb has long been a champion of reform for scientific education as well as a strong supporter of the communities where our employees live and work," said Frederick J. Egenolf, director, Community Affairs. "Hands-on, inquiry-centered, experiential-learning helps students better understand abstract scientific concepts and get excited about science. We're pleased to help launch just such a program in one of our local communities."

The challenge of improving knowledge of math and science has become especially urgent in today's increasingly global and high-tech economy. According to the U.S. Bureau of Labor Statistics, job openings requiring science, engineering or technical training will have increased by 22 percent from 2004 to 2014.

At the same time, studies show America – while improving – still lags when it comes to preparing students for these jobs. Just 15 percent of American fourth- and eighth-graders reached the “advanced” benchmark on the most recent Trends in International Mathematics and Science Study (TIMSS, 2007) test. By contrast, in Singapore 36 percent of fourth- and eighth-graders achieved the advanced level.

Fundraising for BioPhase was spearheaded by the Lawrence Township Education Foundation, a non-profit organization that raises money to supplement the local school district’s budget. “School budgets everywhere in New Jersey are under increasing pressure and Lawrence Township is no exception,” said foundation Executive Director Diane Senerth. “This new biology curriculum would not have been possible without the generosity of Bristol-Myers Squibb. We are extremely grateful to have them as a neighbor and as a partner in our children’s education.”

Bristol-Myers Squibb has been a national leader in efforts to strengthen science teaching through teacher training, curriculum development and direct funding for state-of-the-art science teaching materials.

The company collaborated with New Jersey’s Rider University to create the Bristol-Myers Squibb Center for Science Teaching and Learning for improving science education at the elementary and high school levels. The company collaborated with Montclair State University to create a similar center.

Bristol Myers Squibb also led the development of RxeSEARCH: An Educational Journey, an innovative, multidisciplinary curriculum to educate youth about how medicines are made. The curriculum, which is now owned by the National Science Resources Center, has been adopted by more than 40 high schools in New Jersey, New York, Connecticut, Massachusetts, Pennsylvania and Iowa. Our Success Stories

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ADDITIONAL APPENDIX MATERIALS
SUBMITTED TO THE
ASSEMBLY EDUCATION COMMITTEE
and
ASSEMBLY SCIENCE, INNOVATION, AND TECHNOLOGY COMMITTEE
for the
March 21, 2019 Meeting

Submitted by Kim Case, Esq., Manager, New Jersey STEM Pathways Network; and Executive Director, Research and Development Council of New Jersey:

Abigail Jurist Levy, Ph.D.; Jacqueline DeLisi, Ed.D.; Josephine Louie, Ed.D.; Erica Fields, Lukas Winfield, Ginger Fitzhugh, “Executive Summary: Office of Science and Technology Policy—State-Federal STEM Summit,” *Education Development Center*, June 25-26, 2018. © 2018 Education Development Center, Inc.

Submitted by Vani Kodandaram, Ph.D., Community Giving Program, and Co-Leader, Network for Women (B-NOW), Bristol-Myers Squibb; **and Bahar Demirdirek, Ph.D.**, Community Giving Program, and Co-Leader, Network for Women (B-NOW), Bristol-Myers Squibb:

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