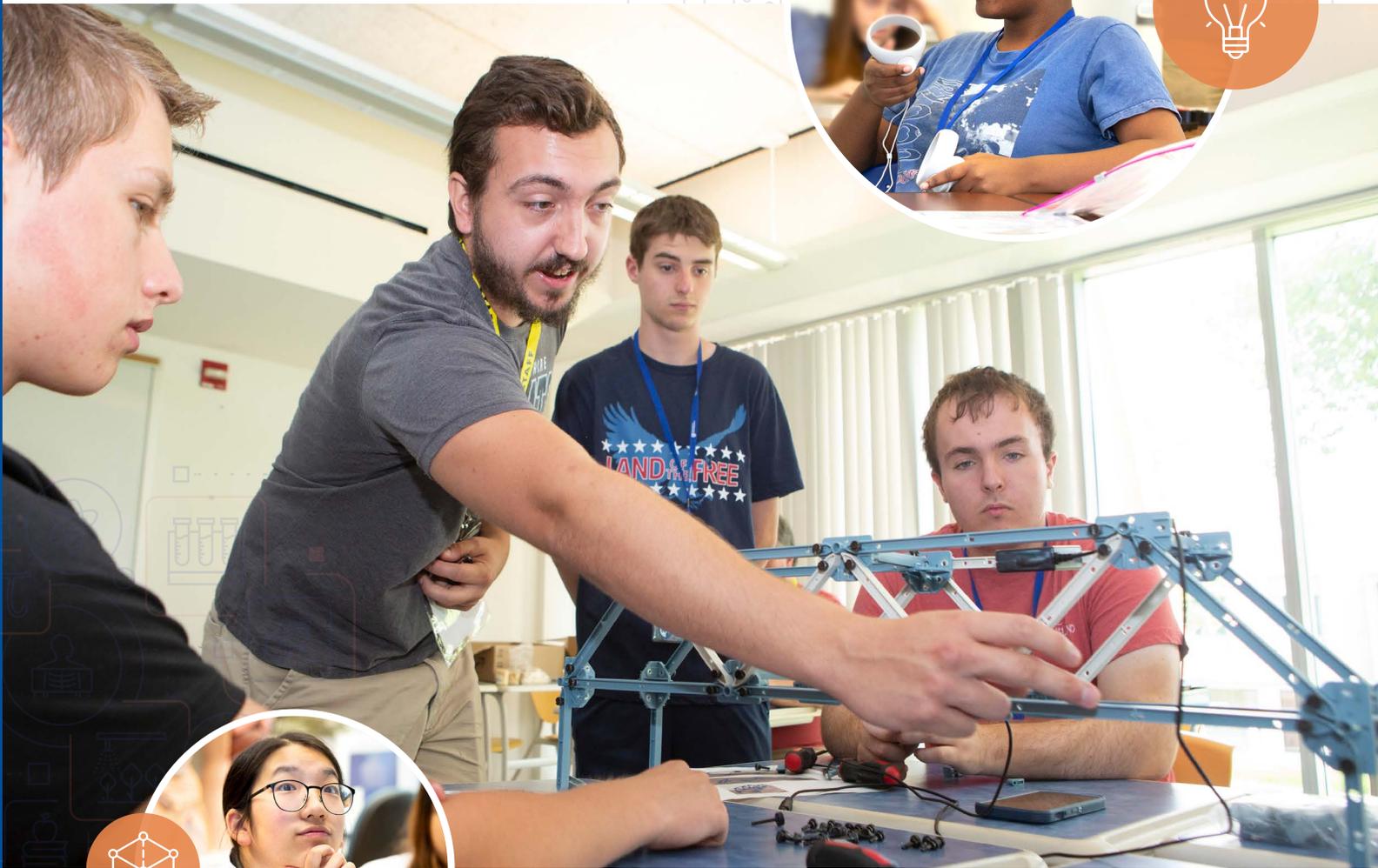




**Inspiring Creativity**  
and Innovation

**Expanding Access**  
and Diversity

**Building New Pathways**  
to Success





UNH Tech Camp was founded in 2007 to inspire middle and high school students through collaborative, hands-on activities that bring science, technology, engineering and mathematics to life.

Offered through the College of Engineering and Physical Sciences, Tech Camp covers a wide range of subject areas—from robotics and regenerative medicine to virtual reality and forensic science—that are explored through a dynamic, project-based curriculum. The emphasis is on problem solving, creative thinking and having fun.

Since its beginning, Tech Camp has fostered a diverse and inclusive community with a goal to make STEM education available to all curious learners regardless of skill level or experience.

# UNH TECH CAMP

### Dear Friends,



**I always relish** the start of Tech Camp each summer and the burst of positive energy and enthusiasm that fills Kingsbury Hall and all our labs and classrooms. By bringing together a diverse cross section of students, teachers, staff and industry experts who are all curious and eager to collaborate, share information and learn from one another, we have created a vibrant STEM community that is truly awe-inspiring. This year was no different!

**In total**, we ran 15 projects over the course of three weeks in July with more than 150 student participants. Most of our campers were from New Hampshire, Massachusetts and Maine, but we had a number from farther afield, including students from Texas, California and England. We also hosted 12 middle and high school educators for our two-week Tech for Teachers Institute.

**This summer** marked the third year for NH CREATES, our successful workforce development initiative focused on regenerative medicine and biofabrication. Funded by a grant from the National Institutes of Health, this program is intended to build pathways to future education and career opportunities in New Hampshire's rapidly growing biotech industry. All programs are offered at no cost to participants and students of all STEM levels are welcome.

**As a testament** to the importance of NH CREATES, Richard Fabrizio from the NH Business and Industry Association visited Tech Camp this summer to see our campers in action. He also learned about Manchester CREATES, an expansion of this initiative now being planned for the UNH Manchester campus.

**Another successful** workforce development initiative offered at Tech Camp this summer was funded by the New Hampshire Department of Transportation enabling us to offer free programs focused on bridge engineering and construction to several dozen students. A big win for all parties involved.

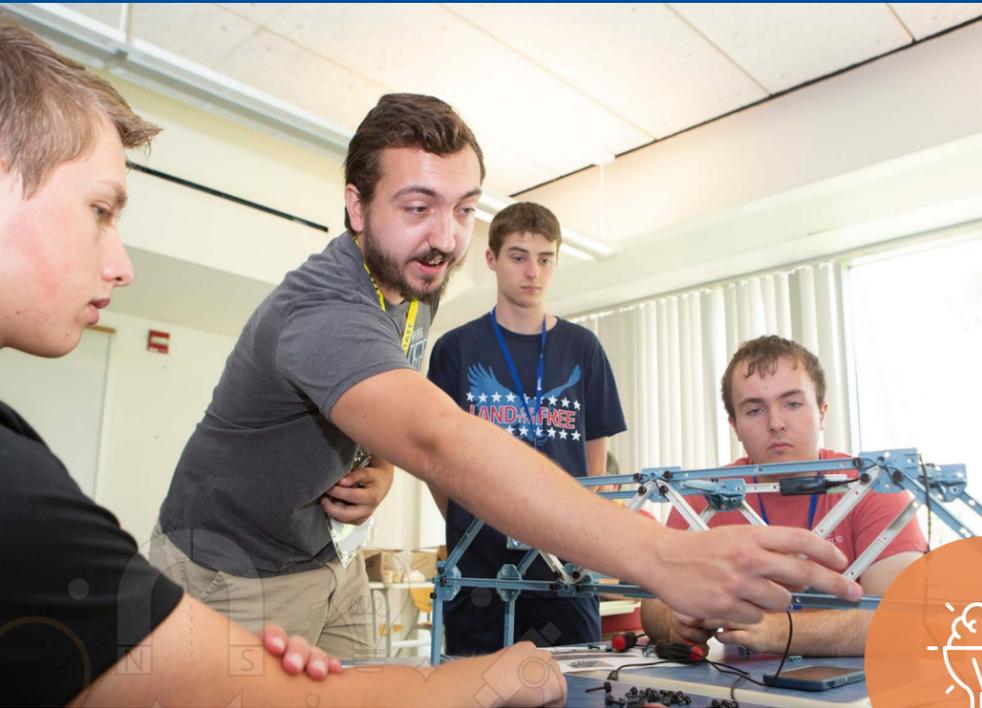
**Finally**, in addition to the organizations already mentioned, I also want to thank all of the other generous sponsors and donors who supported Tech Camp this summer. Your commitment to making STEM education available to all who are interested is making a real impact!

Sincerely,

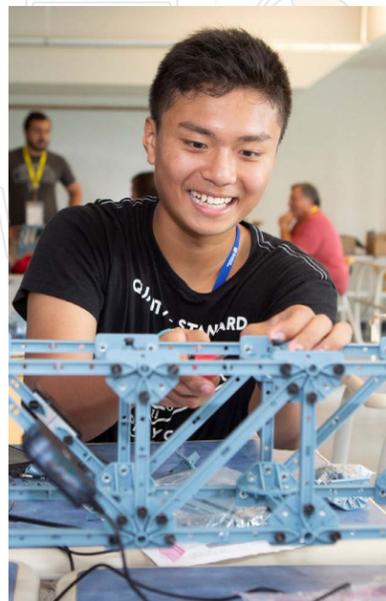
*Carmela Amato-Wierda*

Carmela Amato-Wierda, Ph.D.  
Associate Professor of Materials Science  
Director of UNH Tech Camp





## Fostering Critical Thinking and Problem-Solving Skills Through Project-based Learning



Over the course of three busy weeks in July, close to 160 middle and high school students participated in one of Tech Camp's 15 programs, the majority choosing the residential option and staying on campus. Thanks to the generosity of our sponsors and donors, 69 percent of our campers attended at no cost—tuition and housing included. Central to the mission of Tech Camp is to make STEM education accessible to all curious learners.

As is always the case at Tech Camp, all programs were taught in a project-based learning format with students engaging in a variety of collaborative, hands-on activities, interactive demonstrations and lab experiments. Studies have shown that active learning of this kind leads to enhanced critical thinking and problem-solving skills. At the end of each Tech Camp session, a showcase was held, giving students the opportunity to share their individual projects with parents, family and friends.

Support for Tech Camp was provided in part by the Federal Highway Administration and the New Hampshire Department of Transportation. For the past nine years, Tech Camp has served as a host for the National Summer Transportation Institute, a program focused on raising awareness around transportation-related career opportunities. A grant from the Essex County Community Foundation through its Greater Lawrence Summer Fund also provided financial support for five students attending from the Lawrence Family Development Charter School.

## Tech Camp Programs

### TechSplorers



TechSplorers is a one-week, co-ed program for students entering grades 5-8. This past summer, two sessions were held, each focusing on a similar set of topics and activities. The goal of the program is to introduce middle school students to a wide variety of STEM subject areas and associated career opportunities. Each session includes professional scientists and engineers serving as projects leaders. Among the topics covered during the TechSplorers program were civil engineering, with an emphasis on bridge design and construction, electrical engineering, freshwater ecology, earth science and forensics. One activity also had students design and build a taco truck and then create a business plan, budget and menu to make it a viable operation.

### TechVenturers



TechVenturers is a one-week, co-ed program for students entering grades 8-10. This past summer, two sessions were held covering several different subject areas. The goal of the program is to provide more experienced students with the opportunity to explore STEM topics of their choice in an in-depth, project-based learning environment. The programs offered this summer focused on structural and transportation engineering (with a focus on bridge design), computer coding and game design, forensic science and remote-controlled cars. As part of the NH CREATES initiative, a program focused on organisms that can regenerate lost body parts was also offered.

### TechLeaders



TechLeaders is a one-week, co-ed program for students entering grades 10-12. Several projects this year were focused on regenerative medicine and biofabrication as part of the NH CREATES workforce development initiative and included some crossover with the TechVenturers program. Projects included bioinformatics, cryopreservation and molecular visualization. An additional project focused on transportation engineering was also offered.

## GRANT-FUNDED PROGRAMS FOCUS ON BRIDGE DESIGN AND CONSTRUCTION

The Bridge Project is a weeklong program for grades 8-10 developed by UNH alumnae Lisa Nash and Hannah Miller focused on the many and varied engineering principles that go into designing and constructing a bridge. Started five years ago, the free program features an array of hands-on activities, demonstrations, field trips and guest speakers. "The overarching goal is to help students deepen their critical thinking skills and learn to ask insightful questions," says Nash.



Funded by the Federal Highway Administration and New Hampshire Department of Transportation as part of the National Summer Transportation Institute (NSTI) program, the Bridge Project is also intended to introduce students to educational opportunities and careers that exist in today's transportation industry.

"Like all Tech Camp programs, we use a project-based learning format that engages students in activities that explore real-world problems and challenges," explains Miller. "This year, we focused on two current bridge projects underway in New Hampshire."



Over the course of the week, students got a chance to survey each of these sites and hear directly from experts in the field. These

lessons were then paired with a variety of classroom activities, demonstrations and guest speakers.

Both Nash and Miller agree that this kind of immersive learning experience can be transformational for students. By the end of the Bridge Project, a number of participants expressed a newfound love for engineering that they could see pursuing in college or as a career. In addition to the Bridge Project, NSTI also funded a weeklong program called Transportation Engineering and two daylong programs for younger students.

# Cutting-edge Programs Focused on Regenerative Medicine and Biofabrication

New Hampshire is home to a growing number of biotech startups focused on regenerative medicine and biofabrication, the production of living cells, tissues and organs. This relatively new industry has the potential to revolutionize how a range of complex medical conditions are treated, earning southern New Hampshire a national reputation for entrepreneurship and innovation.

As this burgeoning biotech industry continues to take root, access to a skilled workforce is increasingly important to its long-term prosperity. To help address New Hampshire's current and future workforce needs, NH CREATES was launched in 2020 to help cultivate interest and expertise in the biosciences through an array of free summer learning opportunities for middle and high school students and a paid professional development program for teachers. These educational programs are all funded by a five-year, \$1.2 million grant from the National Institutes of Health through its Science Education Partnership Award program.

This summer, Tech Camp offered four weeklong NH CREATES programs for students in grades 8-12 focused on growing tissue, freezing and storing cells, bioinformatics and molecular visualization; the Tech for Teachers Institute also focused on these subjects and the development of related curriculum that will be shared with students and peers.



## NH CREATES EXPANDS TO MANCHESTER

In September 2022, a coalition led by the City of Manchester and the Advanced Regenerative Manufacturing Institute was awarded a \$44 million Build Back Better Regional Challenge grant from the U.S. Economic Development Administration. Funds from this grant are being used to create a biofabrication cluster in the Manchester Millyard and support scientific research, business development, community partnerships and an array of education and workforce cultivation initiatives. The biofab cluster is expected to generate 7,000 direct and 40,000 indirect jobs in New Hampshire.

Manchester CREATES, a new initiative at UNH Manchester launched over the summer with funds from the Build Back Better grant, will play an essential role in filling these new jobs. An expansion of the NH CREATES program started on the UNH Durham campus in 2020, the initiative will offer free summer learning opportunities for students and teachers starting in 2024.



## MATT YOUNG RECEIVES NH BIOMADE EDUCATION SEED GRANT

**Matt Young, Ph.D.**, project leader of the molecular dynamics program this summer, was named the recipient of a 2023 education seed grant from NH BioMade. Young will use these funds to further develop his molecular dynamics curriculum for different grade levels at New England College, where he is an assistant professor, UNH Manchester and the Seacoast School of Technology.

NH BioMade is a program funded by the National Science Foundation to advance New Hampshire's growing biomaterials industry through educational, research and workforce development projects.

The goal of the seed grant program is to support the development of curriculum or training for educators in order to better prepare students to enter a career or academic pathway in biomaterials or advanced biomanufacturing. Young earned both an M.S. and Ph.D. in organic chemistry from the University of New Hampshire.

## NH CREATES Programs

### Bioinformatics Project

In this program, participants learned how to use computer technology and biological databases to collect, process and analyze large amounts of information related to proteins, DNA, RNA and entire genomes. Bioinformatics is a relatively new and growing discipline used to answer complex biological and biomedical questions.

### Cryopreservation Project

In this program, participants learned how researchers are exploring innovative new ways to preserve cells and tissues through cryopreservation, a means of using liquid nitrogen to deep-freeze biological materials for long periods of time. Through lectures and hands-on experiments, current cryopreservation methods were demonstrated and explained as were their limitations.

### Molecular Visualization Project

In this program, participants gained an enhanced understanding of biomolecular structures using advanced molecular visualization software tools and virtual reality headsets. Through a variety of computer-based activities, molecular geometry, bonding, structure and dynamics were explored, helping students to develop "visuospatial" thinking.

### Planaria Project

In this program, participants studied planaria and other organisms that can regenerate lost body parts. Through a variety of hands-on activities, students learned about regenerative medicine and planaria. They also helped design and perform an experiment focused on the environmental factors that influence the ability of planaria to regrow tissue and cells.





“I’ve had the privilege of knowing some of these students for three years now, and it’s been amazing to see how they’ve grown in confidence and bonded as a group,” says Lazares. “They’re like a family now and truly have each other’s backs. If we’re covering difficult subject matter, they work through it together.”

The namesake of the Dinah Whipple STEAM Academy was a significant figure in New Hampshire history best known for founding the state’s first school for Black children in Portsmouth circa

1806. The former enslaved New Hampshire native went on to become a revered teacher and community leader.

The Dinah Whipple STEAM Academy is offered at no cost to participants thanks to the generosity of Appledore Marine Engineering in Portsmouth.

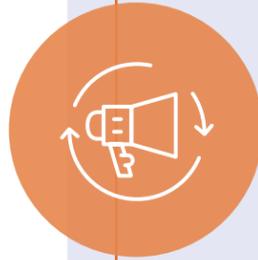
## Bridging the Diversity Gap

While the primary focus of the Dinah Whipple STEAM Academy is to stimulate interest in science and engineering among students of color, UNH alumna Dzijeme Lazares ’17, ’18G, sees the mission as being far more expansive. “For me, an equally important aspect of the program is creating a supportive learning environment that puts students at ease and helps them develop a sense of confidence and curiosity that can be applied to all aspects of their lives,” says Lazares, a design engineer for the New Hampshire Department of Transportation who founded the program in 2021.

Over the past three years, Lazares and her unique approach to STEAM education, which also weaves in lessons on the Black experience and African American history, has earned a loyal following. Since the Dinah Whipple program was started, more than 30 students have attended the weeklong program. Based on a cohort learning model, participants attend the camp for consecutive summers and stay connected throughout the academic year through a series of field trips. This summer, a third cohort was added for younger students with 24 campers participating in total.



**Appledore Marine Engineering, LLC**



## REPRESENTATION MATTERS UNH DOCTORAL STUDENTS SHARE EXPERTISE AND INSIGHT

As the Dinah Whipple STEAM Academy continues to grow, Tech Camp is leveraging the expertise of doctoral students from the College of Engineering and Physical Sciences to lead programs, share their expertise and mentor students.

This past summer, Stella Ansa, King-James Egbe and Femi Olugbon joined the Dinah Whipple team to work with students in grades 8-10. All hail from western Africa and share a passion for STEM education and inspiring young Black students to pursue careers in science and engineering.

“Representation matters,” says Ansa, a native of Ghana who is studying electrical and computer engineering. “All STEM fields benefit from diverse perspectives. Having people of color, especially in rooms where design decisions are being made, allows them to bring their unique lived experiences to the table.”

“Programs like Dinah Whipple play a vital role in breaking down barriers and providing opportunities for underrepresented students to excel in STEM-related fields,” adds Olugbon, a native of Nigeria also studying electrical and computer engineering. “It’s not only about education but also about empowerment and creating a brighter, more equitable future for all.”

Over the course of the weeklong program, a variety of science and engineering topics were covered through hands-on activities, collaborative projects and demonstrations. One memorable exercise had the students brainstorm ideas on how to use smart technology to assist individuals with disabilities. They also got a chance to express their creativity through painting exercises and learn about the Black experience and African American history.



**“Programs like Dinah Whipple play a vital role in breaking down barriers and providing opportunities for underrepresented students to excel in STEM-related fields.”**

Ansa, Egbe and Olugbon all agree that the Dinah Whipple program provides a fertile learning environment for students. “It was fascinating to set the stage for the students and witness their curiosity and creativity blossom,” says Egbe, a native of Nigeria who is studying civil engineering. “It was even more rewarding to observe them develop a newfound appreciation for STEM.”

Olugbon agrees: “The reaction from the students was incredibly positive and enthusiastic. They showed a genuine interest in STEM concepts and were eager to explore and learn. Their curiosity was infectious, and it was rewarding to see them engage with the material and ask insightful questions.”



## Regenerative Medicine and Project-based Learning

The Tech for Teachers Institute is a dynamic, paid professional development program open to middle and high school teachers from across all STEM subject areas. The focus of the program is two-fold: building knowledge of an emerging technology—this year’s topic was regenerative medicine—and the transformation of instructional practice through project-based learning.

Working in collaboration with fellow teachers, UNH faculty and graduate student mentors, industry professionals and educational experts, participants in the Tech for Teachers Institute designed projects to implement during the upcoming school year. This program is part of NH CREATES, a broader workforce development initiative at UNH and funded by a Science Education Partnership Award grant from the National Institutes of Health.

Tech for Teachers is open to both school-based teams and individuals. Upon completion, participants receive a \$1,500 award, CEUs, classroom supplies and ongoing support from UNH faculty and graduate students.



### Participants

**Sue Bissell**  
Oyster River Middle School

**Abigail Clark**  
Portsmouth Middle School

**Joseph Fortier**  
Conant Middle High School

**Elizabeth Hoyt**  
Portsmouth High School

**Matthew Krug**  
K.A. Brett School

**Karen McAlpine**  
Moultonborough Academy

**Scott Nattrass**  
A. Crosby Kennett Middle School

**Madelaine Plauche**  
K.A. Brett School

**Denise Rock-O’Hara**  
Elm Street Middle School

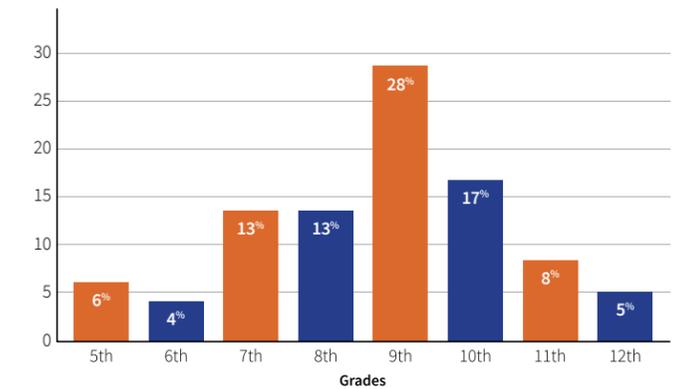
**Fiana Shaw**  
Pinkerton Academy

**Megan Thompson**  
Oyster River High School

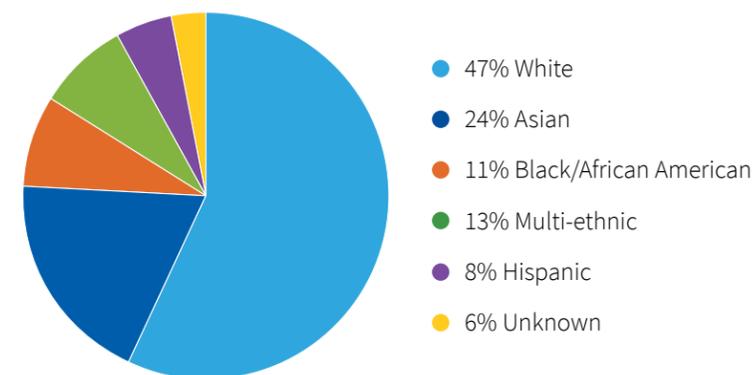
### Tech Camp by the Numbers

159 Registered campers	49 Instructional staff	15 Programs
54% Male campers	45% Female campers	1% Non-binary campers
29% Commuting campers	71% Residential campers	69% Attended for free

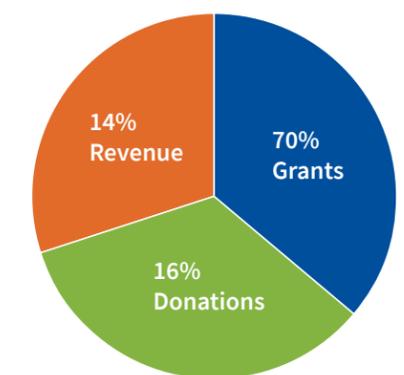
### Tech Camp Total Enrollment by School Grade



### Tech Camp Racial-Ethnic Demographics



### Tech Camp Funding



### Tech Camp Staff and Faculty

#### Leadership Team

- Carmela Amato-Wierda, Ph.D. *Director*
- Amy Booth *Assistant Director and NH CREATES Project Director*
- Joey Cote *Residential Program Director*
- Shawn Gyax *Camp Manager*
- Shannon McCracken-Barber *Manchester CREATES Project Director*

#### Faculty Project Leaders

- Diliang Chen, Ph.D. *University of New Hampshire*
- MD Shaad Mahmud, Ph.D. *University of New Hampshire*
- James Newcomb, Ph.D. *New England College*

#### Faculty Project Advisors

- Jason Pelletieri, Ph.D. *Keene State College*
- Edward Song, Ph.D. *University of New Hampshire*
- Matthew Young, Ph.D. *New England College*
- Qiaoyan Yu, Ph.D. *University of New Hampshire*
- Erin Bell, Ph.D. *University of New Hampshire*
- Eshan Dave, Ph.D. *University of New Hampshire*
- W. Kelley Thomas, Ph.D. *University of New Hampshire*
- Krisztina Varga, Ph.D. *University of New Hampshire*

#### Project Leaders

- Matthew Allen
- Stella Ansah
- Andrea de Assis
- Logan Brown
- Emma Burkett
- King-James Egbe
- Felicia Formisano
- Catherine Goodwin
- Lawrence Gordon
- Yuri Kwon
- Dzijeme Lazares
- Spencer McKinnon
- Hannah Miller
- Wayne Moulton
- Ingrid Norton
- Femi Olugbon
- Stephen Simpson
- Tiffany Thompson
- John Wilderman

#### Project Assistants

- Jonathan Baldini
- Allie Bell
- Owen Bell
- Sabby Clemmons
- Daniel Heath
- Norm Messa
- Lisa Nash
- Will Scala
- Talha Siddique
- Jason Simon
- Matthew Thompson
- Anika Vittands

#### Counselors

- Emma Burr
- Jack Croteau
- Clara Delgado
- Katherine Janicki
- Shahrukh Khan
- Jason Perra
- Gloria Tawalujan

# Making STEM Education Available to All Curious Learners!

Thanks to the generosity of our donors and sponsors, 69 percent of our Tech Camp programs were offered at no cost to participants this year! Grants and financial support received from the organizations listed below covered tuition and housing for 129 students and helped offset expenses for all who attended.

## Donors

**Appledore Marine Engineering  
Center for Assessment  
The Chinburg Family  
Chinburg Management, LLC  
The Elwood Family  
Formax  
Leinsing, Karl  
Liberty Mutual Insurance  
Maxfield Real Estate  
Meffen, Allastair  
Society of American Military Engineers**

**QA Café  
William J. Cusack Scholarship Fund  
UNH (603) Challenge Funds**

## Grant Sponsors

**Essex County Community Foundation  
New Hampshire Department of Transportation  
National Institutes of Health/SEPA**

We would also like to thank our partner organizations and STEM colleagues for sharing their expertise with students over the summer and providing added resources to enhance the learning experience.

**NH GoodRoads Association  
Pike Industries  
UNH College of Engineering and Physical Sciences  
UNH College of Life Sciences and Agriculture  
Lamprey River Watershed Association**



For more information on Tech Camp, please visit [ceps.unh.edu/outreach/tech-camp](https://ceps.unh.edu/outreach/tech-camp) or contact Carmela Amato-Wierda at [carmela.amato-wierda@unh.edu](mailto:carmela.amato-wierda@unh.edu).

