University of New Hampshire

Tech Camp

2021 Annual Report

Adapt. Evolve. Innovate.

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.

Dear Friends,

Adapt. Evolve. Innovate. These are the words that best describe how the Tech Camp team stepped up to address the challenges presented by the coronavirus pandemic this past summer. As a safety precaution, UNH made the difficult decision to cancel all on-campus summer youth camps for the second consecutive year, necessitating that we rethink how best to run our programs and engage with students in a meaningful way. It took some creativity, but we ultimately came up with a hybrid approach that included both online and in-person programs, the latter held at Dover High School with students and staff adhering to all necessary health and safety protocols.

While we did scale down the total number of programs offered and limited overall enrollment, it was still a lively and action-packed summer. Even in the midst of an ever-shifting COVID-19 landscape, we were able to launch two significant new programs that address real-world needs in STEM education. The first program, NH CREATES, is part of a broader workforce development initiative at UNH focused on regenerative medicine and biotechnology that is funded by a grant from the National Institutes of Health. The second program, the Dinah Whipple STEAM Academy, explores pre-engineering principles and the Black experience with a goal to build more equity and inclusion in STEM-related fields. Thanks to the generous support of our sponsors and donors, all Tech Camp programs were offered at no cost to participants.

As planning begins for next summer, we look forward to continued growth in all of our programs and expanding the broader Tech Camp community. It's a privilege to make STEM education available to all students who are interested and empowering them to think differently about their future academic pursuits and career paths.

Sincerely,

Carmela Amato-Wierda

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

NH CREATES

Cultivating Interest and Expertise in Regenerative Medicine and Biotechnology

In September of 2020, Tech Camp was awarded a five-year, **$1.2 million grant** from the National Institutes of Health (NIH) through its Science Education Partnership Award (SEPA) program to expand its curriculum to include innovative new projects focused on regenerative medicine and biotechnology.

Part of a broader workforce development initiative at UNH called NH CREATES the Future: The New Hampshire Collaborative for Regenerative Medicine Education and Training for Engineers and Scientists of the Future (or NH CREATES, for short), this grant is intended to educate middle and high school students and teachers about regenerative medicine and biotechnology to cultivate interest and expertise in these fields. New Hampshire is home to a rapidly growing regenerative medicine and biotechnology industry that is already in need of a skilled workforce.

Funds from the NIH grant made it possible for Tech Camp to launch new programs focused on regenerative medicine this past summer. These in-depth, one-week programs for TechVenturers (grades 7-10) and TechLeaders (grades 10-12), respectively, were offered in-person at Dover High School. A related two-week professional development program for middle and high school educators—Tech for Teachers—was also offered, as was a one-week online TechLeaders program focused on bioinformatics.

TechVenturers

Regenerative Medicine: Planaria Project

Led by Jason Pellettieri, Ph.D., a professor of biology at Keene State College, participants in this program studied planaria, a type of flatworm that can regrow lost body parts. Working in the Dover High School science lab, students learned about regenerative medicine and planaria through a variety of hands-on activities. They also helped design and perform a hands-on experiment focused on the environmental factors that influence the ability of planaria to regrow missing body parts.
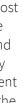
PROGRAM SUMMARY

Students total	12
Female	6
Male	6
7th graders	1
8th graders	2
9th graders	4
10th graders	5

TechLeaders

Regenerative Medicine: Cryopreservation Project

Led by Krisztina Varga, Ph.D., a professor of molecular, cellular and biomedical sciences at UNH, participants in this program learned how researchers are exploring innovative new ways to preserve cells and tissues through cryopreservation. Cryopreservation is a means of storing frozen cells and tissues in liquid nitrogen for long periods of time. Working in the Dover High School science lab, participants learned about cryopreservation through lectures, demonstrations and experiments. Current cryopreservation methods and their limitations were also discussed, as were examples of cryopreservation taking place in the natural world.

PROGRAM SUMMARY

Students total	11
Female	8
Male	3
10th graders	5
11th graders	3
12th graders	3

Tech for Teachers

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 (PBL).

The two-week 2021 Tech for Teachers Institute was held in-person at Dover High School. This year's participants were:

Andrea De Assis
Newmakret Jr. - Sr. High School

Kuyer Fazekas
Dover High School and Career Technical Education Center

Shannon McCracken-Barber
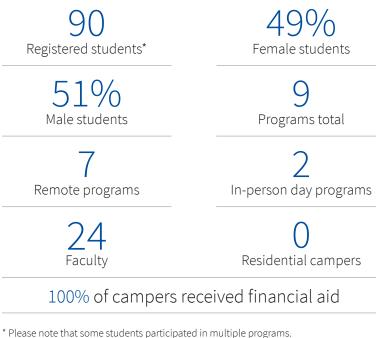Farmington Senior High School

Tina Sturdivant
Pinkerton Academy

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 (SEPA) grant from the National Institutes of Health.
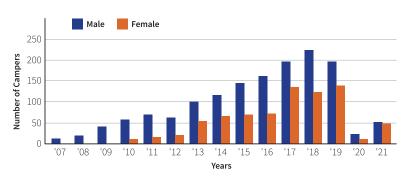
Tech for Teachers is open to both school-based teams and individuals. Upon completion, participants receive a $1,500 award, CEUs, classroom supplies and ongoing support from UNH faculty and graduate students.
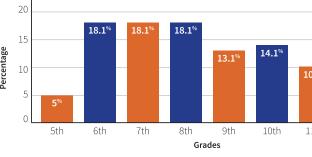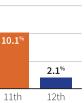
Tech Camp by the Numbers

90
Registered students*

49%
Female students

51%
Male students

9
Programs total

7
Remote programs

2
In-person day programs

24
Faculty

0
Residential campers

100% of campers received financial aid

* Please note that some students participated in multiple programs.

Tech Camp Total Enrollment by Year 2007-2021

Tech Camp Total Enrollment by School Grade

TECH CAMP STAFF AND FACULTY

Leadership Team

Carmela Amato-Wierda, Ph.D.
Director

Fran Meffen, M.S., M.Ed., CAGS
Assistant Director and Tech for Teachers Coordinator

Shawn Gygax
Manager

Faculty Project Leaders

Jason Pellettieri, Ph.D.
Keene State College

Krisztina Varga, Ph.D.
University of New Hampshire

Faculty Project Advisor

Thomas Kelley, Ph.D.
University of New Hampshire

Project Leaders

Emma Burkett
Orion Clachar
Catherine Goodwin
Katarina Jovic
Yu ri Kwon
Curtis Linton
Forouzandeh Mazaherimeybodi
Hannah Miller
Wayne Moulton
Dzijeme Ntumi
Chibuike Ogbo
Joseph Sevigny
Oneil Smith-Elias
Gloria Tawalujan
Devin Thomas
Tiffany Thompson

Project Assistants

John Finacchiro
Aboubacar Konate
Lisa Nash
Kaleigh Powers
Matthew Thompson

Remote Programs
Creating a Dynamic Online Learning Environment

Much like last summer, the majority of all programs were held remotely this year to ensure the health and wellbeing of the entire Tech Camp community. Over the course of each weeklong program, students engaged in a variety of interactive demonstrations and discussions. Working in close collaboration with their teachers, they also participated in numerous hands-on activities and experiments at home. A showcase was held at the end of each session, giving students the opportunity to share their individual projects with parents and guardians via a Zoom presentation.

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

TechSplorers

TechSplorers is a one-week, co-ed program for students entering grades 5-8. This past summer, two online 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; computer coding in Minecraft and Earsketch; and environmental science.

PROGRAM SUMMARY

Students total	37
Female	22
Male	15
5th graders	2
6th graders	18
7th graders	11
8th graders	6

TechVenturers

TechVenturers is a one-week, co-ed program for students entering grades 7-10. This past summer, two sessions were held covering 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. Each session includes professional scientists and engineers serving as projects leaders.

Session A: This weeklong session focused on forensic science. Participants employed classic forensic techniques, such as fingerprinting and ink chromatography, plus a few new ones like cipher and footprint analysis, to help solve a complex murder mystery.

Session B: During this weeklong session, participants were given the opportunity to choose between a project focused on virtual reality/computer coding or civil/structural engineering.

The virtual reality/coding project introduced participants to the exciting world of virtual and augmented reality. During the week, students learned to code, design an escape room scenario and then render their creation in a 3-D virtual environment. As a group, participants tested and refined each other's projects over the course of the week.

In the bridges and structural engineering project, participants designed and modeled a bridge to meet the needs of a specific New Hampshire community. As part of the process, participants tested engineering materials and analyzed data, explored the physics behind existing bridges, and examined the interaction between bridges and their surrounding environment.

PROGRAM SUMMARY

Students total	19
Female	5
Male	14
7th graders	1
8th graders	7
9th graders	8
10th graders	3

TechLeaders

TechLeaders is a one-week, co-ed program for students entering grades 10-12. As part of the NH CREATES workforce development initiative, a new program was introduced this summer focused on bioinformatics. A relatively new and growing discipline, bioinformatics uses computers and databases to answer biological and biomedical questions. Participants in this program explored how to do biochemistry with a computer and learned about proteins, DNA, RNA and entire genomes.

PROGRAM SUMMARY

Students total	11
Female	4
Male	7
9th graders	1
10th graders	1
11th graders	6
12th graders	3

Dinah Whipple STEAM Academy

Expanding Equity and Inclusion in STEM Education

The Dinah Whipple STEAM Academy is a new one-week educational program for students entering grades 7-11 that explores science, technology, engineering, the arts and mathematics (STEAM), as well as the Black experience.

Led by UNH alumna Dzijeme Ntumi '17, '18G, the mission of this new program is to stimulate interest in STEM-related subject areas and careers among students of color who are historically underrepresented in these fields.

For its inaugural year, the Dinah Whipple program was held largely online due to COVID-19 safety concerns. The participants did gather in-person for a fieldtrip that included a boat tour of a new dry dock being built at the Portsmouth Naval Shipyard that was designed by Appledore Marine Engineering, LLC.

Students then enjoyed a picnic lunch and presented the projects that they completed over the week to parents and visitors. Special attendees included Cyndee Gruden, Dean of the UNH College of Engineering and Physical Sciences, Noah Elwood, President of Appledore Marine Engineering, and representatives from the Black Heritage Trails of New Hampshire.

The academy is named after Dinah Whipple, a significant figure in New Hampshire history best known for founding the state's first school for Black children in the early 1800s. Funding for the Dinah Whipple STEAM Academy was provided by Appledore Marine Engineering in Portsmouth.

PROGRAM SUMMARY

Students total	9
Female	4
Male	5
7th graders	5
8th graders	3
11th graders	1

Bridging the Diversity Gap

Tech Camp was fortunate to have alumna Dzijeme Ntumi '17, '18G, serve as the lead instructor and curriculum designer for the Dinah Whipple STEAM Academy during its inaugural summer. A design engineer for the New Hampshire Department of Transportation, Ntumi completed both her undergraduate and graduate degrees in civil engineering at UNH; she has also worked at Tech Camp in various capacities for the past five years.

"This is an important program because in both my personal life and career, I have experienced the inequities that exist in the world of STEM and engineering," says Ntumi. "I don't look like the typical engineer to most people. I'm usually the only Black woman—often the only Black person—at the table. I can now help change that reality."

Born in Ghana and raised in Nashua, Ntumi also helped professor Bob Henry, founder of Tech Camp, to establish a comparable program in South Africa four years ago. The focus of this new program was to bring STEM education to female students from underprivileged areas around Johannesburg.

Thank You to Our Donors and Sponsors!

Thanks to the generosity of our donors and sponsors, Tech Camp was offered at no charge to all participants this year! Grants and financial support received from the organizations noted below covered all tuition and operating expenses, as well as supplies and laptops for our remote learners!

SEPA SCIENCE EDUCATION PARTNERSHIP AWARD
SUPPORTED BY THE NATIONAL INSTITUTES OF HEALTH

DEPARTMENT OF TRANSPORTATION · UNITED STATES OF AMERICA

Appledore Marine Engineering, LLC

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Tech Camp

For more information on Tech Camp, please visit ceps.unh.edu/outreach/tech-camp or contact Carmela Amato-Wierda at ccaw@unh.edu.