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## NOVA SYSTEMIC

Northern Virginia Community College's STEM Outreach Program

## ANNUAL REPORT 2019-20

#WeDoSTEM

### NOTE FROM THE DIRECTOR

Reflecting back on the 2019-2020 academic year and virtual summer camps that followed, I can confidently say that this is the strongest and most cohesive NOVA SySTEMic team in the program's ten-year history. Having rebuilt the team going into the fall of 2019, with restructured responsibilities for the STEM Coordinators, a pending grand opening of the NOVA Fab Lab and expanded career services programs through my new Perkins V federal grant responsibility, I was excited for the year ahead - but unaware our focus would become reactionary to a global pandemic. The team ably demonstrated leadership and compassion with new programming to support students and parents seeking opportunities in STEM. Though separated by distance for most of the year, I'm proud of the unified front they displayed in helping each program succeed.

NOVA and the VCCS provided the IT support structures needed to enable remote learning, virtual career exploration events and hybrid summer STEM camps. The team worked through the challenges of setting up remote 3D printers and laser engravers to produce PPE and student projects. We fostered partnerships with community and industry groups to support student engagement in STEM, both near and far, as participants from northern Virginia, the Brooks Crossing Innovation Lab, robotics teams (across the country), and ISACA (across the globe) engaged in programs that were delivered remotely.

Over the past year, I worked to align our STEM outreach program with the needs of the region and NOVA's strategic plan. I'm excited for 2021 and beyond as our grant work to fund these new initiatives through federal, state and foundation grants comes to fruition. Expanding northern Virginia's capacity for STEM is essential to the regional economy. I'm grateful for the progress achieved during the pandemic and for all the year's accomplishments. We have an incredibly strong foundation for progress and growth in the years ahead.

Josh Labrie Director, NOVA SySTEMic

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NOVA SYSTEMIC WE DO STEM



We Do STEM Expos, coordinating NOVA STEM Day on multiple campuses, engaging with local STEM events at libraries and schools, participating in NoVA Maker Faires and bringing STEM to community events and educational conferences such as Celebrate Fairfax and Youth for Tomorrow's Country Fair & Auctions.



We Do STEM Teacher PD, operating hands-on teacher professional development workshops to support the growing demands of the workforce. We help STEM teachers to increase their skills as technologies develop, providing formal and informal support in many areas including cybersecurity, coding, robotics, and making.

## **STEMCOMPETITIONS**

We Do STEM Competitions, supporting student challenges and competitions which provide superb opportunities for students to practice their technical skills while also developing collaborative soft skills. We host community robotics teams, a VEX IQ league, and two first-rate signature robotics events: The VA VEX Robotics State Championship (States) and Night at the Museum (NATM).



We Do STEMinars, delivering STEM workshops throughout the year to bring new STEM technologies to light and new students into STEM. Many of these sessions are offered for free and cover a broad range of STEM topics including makerspaces, 3D printing, cybersecurity, robotics, coding, virtual game development and more.



We Do STEM Camps, providing opportunities during the summer for elementary (starting at 4th grade), middle, and high school students to explore and develop interest and skills in STEM and the engineering design process. Camp curriculums include hands-on projects such as coding, VEX robotics, fabrication, cybersecurity, 3D printing, rocketry, and more.



We Do STEM Careers, spearheading on-campus NOVA Career Exploration Days for secondary and post-secondary students to support them in becoming career-ready for internships and post collegiate employment. We engage in onsite and virtual activities with regional STEM organizations and provide professional development opportunities for current NOVA students.



We Do STEM Grants, centered around career development, design challenges, bridge programs, and teacher professional learning that focus on underrepresented and military-connected populations in STEM. We also have many on-going grants: Perkins V for CTE initiatives and a Cloud Computing grant that allows faculty to develop curriculum.

## 

We run NOVA's Fab Lab, which provides state-of-the-art support for NOVA's Engineering Technology degree program as well as hands-on STEM opportunities for college students, staff, and community members. The Fab Lab Makerspace is a hub for cutting-edge workshops, demonstrations, project collaborations with NOVA classes, tours, field trips, and special events to help enhance learning and develop STEM skills.

# STEMEXPOS

#### We Do STEM Expos

Through STEM EXPOs we partner with school divisions and community organizations to highlight STEM educational pathways and careers. We improve participation in STEM from underrepresented populations and bring thousands of students onto a college campus to envision being a future NOVA student.

#### **NOVA STEM Day**

In 2019 we held NOVA STEM Day in October at the Loudoun Campus and in December at the Alexandria Campus. Both featured free exhibits, workshops, and hands-on activities that drew hundreds of students and parents to NOVA campuses and provided community learning opportunities led by staff, faculty and student volunteers alongside community groups and industry professionals.

#### Local Expos Support/Community Events

We brought high quality hands-on activities to local and regional community STEM exhibits at schools and colleges, demonstrating engineering, design and coding through VEX Robotics, micro:bit, Arduino, Sphero and OSMO, supporting elementary to secondary students both in exhibit and classroom formats. NOVA utilized the VEX system with sensors and coding to demonstrate intelligent manufacturing at the NoVA MakerFaire.



## "

We're pleased to see so many local children come to our campus with their families and get excited about working with STEM. The key is to capture that early, natural enthusiasm that children feel for science and technology in a way that will carry them all the way through to choosing a rewarding career. Our STEM Days are not only lots of fun; they give us a window into the inspiring talent of a new generation.

> Dr. Julie Leidig Provost, NOVA Loudoun



#### The STEMZone

We held our 4th annual STEMZone at the Youth for Tomorrow Country Fair & Auctions. NOVA brings STEM to this popular event to support at-risk students and engages the community in robotics, coding and making.

In-Person Events Sept 2019 - Mar 2020

In-Person Attendance Sept 2019 - Mar 2020

**10 24,834** 15 cancelled events Mar 2020 - Aug 2020 Projected attendance: 7500 - 10,000

I am pleased to extend my warmest greetings to all who are gathered for NOVA STEM Day on the Alexandria Campus.

It is vital to the future prosperity of our Nation that our young people are equipped with skills in science, technology, engineering, and math.

This event plays an important part in that skill development as it encourages students to become interested in these subject areas through fun, hands-on exhibits and workshops.

I commend NOVA SySTEMic for hosting such an important event for families in Northern Virginia.

Mak R. Waner

Mark Warner United States Senator, VA





**Supported our STEM Expos** 



**STEM Day Loudoun** 

**STEM Day Alexandria** 

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#### We Do STEM Teacher PD

Expanding our regional capacity for STEM education, we offered teacher professional development courses in Cybersecurity, Programming, and Robotics.

We supported developing STEM teacher content knowledge in foundational and new areas while building a community of practice across regional school divisions.

Through ongoing hands-on sessions and feedback, we developed better methods for applying STEM content to instructional practice to effectively meet state and national standards.

"

This is the highest quality training I've had in many years. This is going back through the industry the last 15-20 years. I have never had anything as high quality as this.

Wes Clark, Cybersecurity Teacher John Champe High School



Supported STEM Teacher PD





hours of teacher professional development provided.



school divisions represented: ACPS, APS, FCPS, LCPS, MPCS, PWCS.



#### Cybersecurity

High school Cybersecurity teachers learned about human weaknesses and personal security, setting up and securing networks, threats and vulnerabilities of computers and networks, and operating system security. In addition, supplemental resources provided opportunities for teachers to continue their learning following the sessions. Teachers were then able to share these resources with their students.

#### **Robotics**

Middle and high school teachers discovered the potential of VEX robotics for teaching programming, teamwork, design strategy, and connecting robotics to real-world robotic use in manufacturing. They learned about the VEX IQ and V5 robotic systems, classroom organization and management, the VEX robotics competition, computer-aided design (CAD) and fabrication, advanced programming capabilities, and the engineering design process.

#### Programming

Teachers in the Programming course were provided an introduction to programming that was directly applicable to their middle school computer science classrooms. Attendees were able to explore the Java, JavaScript, and Python coding languages and used the Arduino and micro:bit microcontrollers as tools to apply what they learned. They were taught strengths and weaknesses of each language, the importance of syntax when coding, and what physical and virtual tools are available to refine their skills after completing the sessions.



## **FAB LAB**



(L-to R) Zuzana Steen (Micron), Ann Wheeler (PWC Board of Supervisors Chair), Dr. Chad Knights (NOVA Vice President), Dr. Molly Lynch (NOVA MA Provost), Dr. Anne Kress (NOVA President), Delegate Tom Rust (GO Virginia), Tom Murtha (Micron), The Hon. Hal Parrish (Mayor of Manassas), The Hon. Preston Banks (City of Manassas Park Vice Mayor)

## Grand Opening - January 2020

On January 13, 2020, Northern Virginia Community College opened the doors to a state-of-the-art engineering technology Fabrication Laboratory, or Fab Lab. The week-long event kicked off with a prestigious ribbon-cutting to thank members of the institution's partners in the business and legislative community for the support of engineering technology programs. Grand opening events included demonstrations of Fab Lab equipment, student and teacher STEM field trips to the lab, Lunch & Learn opportunities for faculty and staff, Robotics Night Open House, and a College Open House. Over 275 attendees participated in the opening week activities.

#### **NOVA Fab Lab Supported By:**









NOVA BOARD OF DIRECTORS | BAE SYSTEMS | LOCKHEED MARTIN | ARCONIC FOUNDATION | PWC SERVICE AUTHORITY | FORT BELVOIR NIGHT VISION LABS

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The Fab Lab serves as a hub to the developing technology workforce and supports NOVA's industry aligned Engineering Technology program. It is leveraged by NOVA SySTEMic to inspire K-12 interest in STEM and to encourage students to pursue careers in engineering technology.

The creation of the Fab Lab is in response to the many expanding technology companies in Northern Virginia that have spearheaded tech partnerships with NOVA. It was only made possible through collaboration with **Micron Technology, Inc.,** who will invest \$3 billion to expand memory chip production capabilities at its Manassas plant with plans to create 1100 new jobs by 2030, and **GoVirginia.** U.S. Army's Night Vision and Electronic Sensors Directorate (NVESD) and BAE Systems also supported the Fab Lab development.

Fab Lab spaces such as a Woodshop, Maker Space, Computer Control & Design Center, and a 3-D Printing Workshop provide building blocks for careers in engineering technology. These spaces are open access and inclusive multi-nodal innovator spaces with the mission to apply STEM principles and integrate them into applicable concepts for students of all levels. The space serves NOVA students and staff while also supporting outreach programs for K-12 participants, college-ready students, STEM teacher professional development, and industry professionals.

"

The NOVA Fabrication Laboratory is more than an advanced technology classroom. It is the solution to suicide, the solution to finding your purpose in life, the answer to living your passion. Everyone deserves the opportunity to learn and NOVA provides that opportunity through partnerships with key companies and organizations.

The Honorable Victor Angry Neabsco District Supervisor



## "

The space is about letting everyone know that this is the career path for them. More often than not, people may not see themselves in this capacity. 'WE DO STEM' – it's about moving the region forward. We are celebrating more than a cool learning space. What we show is industry-aligned and industry-required training labs. The facility represents our dedication at NOVA for industry pathways that drive our regional economies.

> Dr. Anne Kress NOVA President



## Fab Lab Online

After COVID-19 hit in March 2020, it was no longer possible to have the community visit the Fab Lab, so we focused on the design element of fabrication. We were able to offer 3D printing classes where students learned the basics of dimensional design using Tinkercad to create their projects. The fundamentals of programming a CNC router was made possible via Easel; a free tool-pathing and design program which taught students the difference between subtractive and additive manufacturing. Inkscape, a free vector design program, provided students the tools to create cutting and engraving files for use on our laser cutters. These projects and files were then uploaded directly to the Fab Lab for fabrication, and shipped back to participants once completed.

We also pre-fabricated a number of kits for future assembly, which were shipped out prior to the camps. These were designed to emphasize both dexterity and problem solving skills. A balsa wood plane kit challenged students to solve the variables of gliding by altering and re-inventing components around a fuselage. A sewable circuit kit taught students how to create a light-up emoji with conductive thread and sewable electronic components.

We were able to engage students in the myriad processes that digital fabrication requires to be successful. Another positive outcome was that by eliminating machine access, students were far less intimidated by the physical mechanics, and more inspired by the design and problem solving process itself, meaning that projects were not limited by a student's fear of how it would be built. What we initially perceived as a hurdle was in fact a stepping stone to a more holistic approach to digital fabrication education.

## Fab Lab PPE

We used our Fab-Lab capabilities to design, prototype, and fabricate DIY face shields for COVID-19 front line workers. In May 2020, we delivered NOVA Fab Lab crafted **Personal Protective Equipment (PPE)** to the oncology team at Virginia Hospital Center in Arlington. NOVA Fab Lab Manager Richard Sewell assembled more than 300 Laser-Cut Cast-Acrylic Face Shields and Gerry Hofler from the NOVA Medical Education Campus facilitated the delivery.







### Fab Lab Programs & Attendance

#### Attendance Grand Opening Week Activities

- VIP Ribbon Cutting (88)
- CNC Router Demonstrations (16)
- Lunch & Learns (5)
- Robotics Night Open House (66)
- NOVA Students/Faculty/Staff Open House (91)
- 5 Robotics Teacher Professional Development

#### **126** K-12 Field Trips

• Public and private school students 4th to 12th grades.

#### Priday Night Lights: Robotic Scrimmages

• Community high school teams and their coaches/parents from around the Northern Virginia Area.

#### 70

276

- **Group Tours & Presentations** 
  - Prince William County Head Start Parents.
  - Prince William County High School Counselors.
  - NOVA students/faculty.
  - Prince William County Lifelong Learning Institute.
  - Military Child Education Coalition Prince William County Schools 9th-12th graders.

#### 28 NOVA Class Collaborations

- NOVA Engineering students assigned an engineering build challenge by their professor.
- Fab Lab staff trained students on how to use a CNC wire bender, laser cutters, 3D printers, air nailers, a table saw, and miter saw.

#### 494 Fab Lab Related STEMinars

- Virtual sessions offered to the community on a variety of fabrication topics: 2D & 3D software design, laser cutting and engraving, fabrication, additive manufacturing (3D printing), engineering design challenges, coding with micro:Bit, e-textiles, robotics, and 3D scanning.
- Participants age range from 10 and older.
- 46 individuals participted in hybrid STEMinars involving hands-on fabricated or material kits.

#### **73** Fabrication Summer Camps

 173 participants in 15 Fab Lab STEM Camps with personalized designed projects fabricated and shipped.



#### **MAKERSPACE** EQUIPMENT







CNC Wire Bender

Thermoforming Center







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3D Printer
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3D Scanner L

Laser Cutter & Engraver







Heat Press

Computerized Sewing Machine



#### WOOD SHOP EQUIPMENT



D Printer





#### We Do STEM and CTE Competitions

Students and teachers refine their STEM talents through competitions. In 2019-20 we supported regional STEM competitions, science fairs, school-district sponsored activities, especially VEX Robotics. We organized and ran two signature robotics competitions: **Night at the Museum (NATM)** and the **VEX robotics State Championship (States).** We also supported local schools and community organizations by renting fully-loaded 16ft VRC and 14ft VIQC trailers for local VEX events, offering staff support through our STEM Interns who helped setup, run, and pack equipment.

#### Why VEX Robotics?

VEX Robotics (VRC and VEXIQ) is integrated into many of the school divisions through PLTW, Scouts, and TSA, making it an excellent platform to get students started in STEM so that they are prepared beyond our camps and competitions. Students who participate in VEX Robotics demonstrate a number of qualities we strive to teach such as teamwork, collaboration, communication, creativity in problem solving, critical thinking skills, and time management. Furthermore, VEX competition participants exhibit workforce skills such as patience and persistence in addition to their technical skills, making them ideal candidates to help teach the younger generation through summer camps and workshops.

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In 2019-20 we hosted **Robotics Community Teams** at 3 NOVA campuses: Alexandria, Loudoun, and Manassas. Students from all over the region could join, especially those who did not have immediate access to a team through their school. Teams were made up of 3-4 students who designed, built, and programmed a robot to compete in the current VEX Challenge. We hosted 7 teams (5 VEX IQ, 2 VRC), 3 of which qualified for the State Championship. In the summer, students were able to engage in design thinking, building, and programming a robot as well as game strategy through a hybrid team program.



We also hosted a **VEX IQ League** as a platform for regional teams to compete in monthly head-to-head matches to improve their skills. 19 teams (including 6 NOVA teams) comprised the league and met on Saturdays from October to January, with the finals taking place in February 2020 at the U.S. Patent and Trademark Office. The League Champion, along with another top performing team, earned a spot at the Virginia Robotics State Championship (States20).

VEX Teams & Leagues Supported By:



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This has been a wonderful experience for both [my children]. They really enjoyed learning and working with VEX. Mr. Harris and Ms. Lisbeth have been great teachers. They have been awesome and so patient with my kids and I am grateful for all their hard work and dedication. We look forward to other classes in the future!

> Jessica, Parent of Comm. Team Students

### **League Participants**

- Williamsburg Middle School (APS)
- Mark Twain Middle School (FCPS)
- Franklin Middle School (FCPS)
- Community Based Teams (NOVA, Glen Allen, Ashburn)











NOVA and the Smithsonian teamed up to engage students from 31 states in a signature VEX Robotics event - Night at the Museum (NATM), hosted at the Smithsonian National Air and Space Museum, Udvar-Hazy Center. The elite 2-day competition, considered one of the toughest tournaments in the nation to win, was designed to test and inspire young engineers and computer scientists in front of some of the nation's greatest engineering accomplishments, including the Space Shuttle Discovery and the SR-71 Blackbird. Teams had to qualify as Tournament or Skills Champions or by winning an Excellence or Design Award in their local regions. They were also required to demonstrate success in engineering, coding, and documentation of their design process. The event was open to the public to raise awareness of the need for students to pursue STEM and encourage community engagement and support.

#### NEWS



ABC7 Washington ran a feature story

















## REGISTERED HIGH SCHOOL TEAMS INCLUDING 118x TOURNAMENT CHAMPIONS

**105x** ROBOT SKILLS CHAMPIONS



32x DESIGN AWARDS



Engineering meets chess. The thing I enjoy most about covering a robotics tournament, this sport of the mind, is these are the young men and women in 20 years who are going to fix or invent the thing that saves us.

> Jay Korff ABC7 News, Washington

These students are engaged. The skill sets that they are working on applies to coding and engineering and really building towards our future workforce, which is in demand.

> Josh Labrie Director, NOVA SySTEMic

This changed my life. This made me want to go into computer science and engineering and before this I had no idea what I wanted to do.

> Peter Benitez Junior, Woodbridge Senior HS







## **The VA VEX Robotics State Championship**

Since 2014, NOVA SySTEMic has run the VEX Robotics State Championship (called States). This year, States20 was held on March 6 & 7 in Doswell, VA. 140 commonwealth teams (elementary to high school) competed for a chance to represent Virginia at the 2020 World Championship. Of the 140 teams at States20, 81% were from Northern Virginia. The 2-day tournament was comprised of students playing the plastic platform VEX IQ game, Squared Away (elementary and middle school) and the more advanced metal platform VRC game, Tower Takeover (middle and high school). Like an athletic event, States is known for passion and intensity as students hone their teamwork and STEM skills in competition. It takes more than 100 volunteers to make this event a success. We recruit student and adult volunteers as well as college students from institutions all over the commonwealth. Of the 40 judges at States20, over 50% were college students. Many Northern Virginia teams secured places at the World Championship by earning Tournament Champion, Design or Excellence awards. In all, States20 produced 34 VEX Worlds Qualifying Awards.









## STATES 20 VIRGINIA VEX ROBOTICS STATE CHAMPIONSHIP









VRC TEAMS

**81%** of 140 teams from Northern Virginia



#### WORLD CHAMPIONSHIP QUALIFYING SPOTS

VRC TEAMS



Robotics has definitely inspired me to pursue a degree in STEM and I want to specialize in Computer Science and Engineering.

> Eleanor, HS Junior VA VEX State Championship

VEX robotics can help you with learning basic STEM techniques when you're younger and also help you develop relationships and teamwork with other teams so you can immediately jump into the workforce with programming skills and able to build and work with people.

> Aidan, HS Freshman VA VEX State Championship

They are actually learning the skills that the workforce requires.

"

Dan Mantz, CEO Robotics Education & Competition Foundation (RECF)









Although our STEM Career Exploration Events were held virtually after March 2020, we hosted an in-person Career Fair at the NOVA Annandale Campus in November 2019.

**In 2019-20, we added the STEM Careers program to our outreach roster.** STEM Careers helps high school and college students with career exploration and serves to connect them to and prepare them for full-time internships and careers in STEM fields. To facilitate the program we hired a STEM career coordinator and an IET (Information and Engineering Technology) career coach. We coordinated on-campus NOVA Career Exploration Days (showcasing STEM Certification programs) for K-12 and college students, engaged in onsite activities with local STEM organizations, and provided professional development opportunities for current NOVA students to support their current and post-collegiate internship and job search strategies.

With the shift to virtual activities, we had the opportunity to partner with more industry and business partners, both inside and outside the NOVA service area. The increase in virtual experiences allowed for the SySTEMic and IET teams to share their collaborative and innovative career readiness ideas through a national podcast with the National Career and Technical Education Association (NCLA).



### **STEM Career Exploration Events**

Sept 2019 - Aug 2020

#### **In-Person (8 Events)**

Resume Skills Workshop (6 sessions) Career Exploration Fair (200+ Attendees) Micron Career Day

#### Virtual (25 Events)

**Branding Workshop AWS Resume Preparation** Loudoun Virtual Career Exploration Fair Interviewing Skills Workshop (6 sessions) **AWS Interview Preparation Digital Realty Mock Interviews** Navigating the Job and Internship Search **Building a Standout Resume** Security Clearance Information Session Industry Certifications: Cert Your Worth Use Online Power Tools to Build Your Career **Topics in Cybersecurity Panel** NOVA Programs: Cybersecurity and Veterinary Tech Elevating Your Personal Brand through Podcasting NOVA Programs: Automotive and Horticulture Tech Networking with NOVA: STEM/IET/CTE Careers Trivia Leveraging Your Networks Using LinkedIn Job Salary Negotiation Tips Mock Interviews and Industry Partners Leidos and LinkedIn

STEM Career Exploration Supported By:









#### **Number of Participants** Per STEM Career Phase

I have gained so much from participating in STEM career activities. It has been incredibly helpful to learn about professional development, especially the jargon pertaining to different fields of expertise. I am so grateful for the opportunities for networking with a variety of companies and collaborating with such an awesome team.

> **Roxcelle, NOVA Student** American Sign Language Interpreter

Thank you for the wonderful opportunity to participate in the panel. It was my first experience speaking on a panel with other professionals and I enjoyed it a lot! Thank you for all your hard work and making the Student Life at NOVA much more productive and interesting.

> **Jika, NOVA Graduate Spring Workshops Attendee/Panelist**

Thank you so much for instructing this lesson! It was really useful information. I'm very excited to apply it in the future.

> Kaya, High School Senior **Resume & Interview Session**





In 2020, our STEM camps transitioned from in-person to virtual. While this posed clear challenges, it also opened up new opportunitites, including student access to camps from outside our typical service area and across the country. We also offered camp access to the entire household for the price of one registration. Our virtual STEM camp tracks were **Coding, VEX Robotics, Cybersecurity,** and **Fabrication.** 



Led by teachers and college students enrolled in STEM programs, our camps introduce fundamental STEM topics and skills at an early age to generate interest in science, technology, engineering, and math. Camps are focused on hands-on, project based learning for students to explore STEM fields and to chart a course for future STEM education and workforce opportunities.



"

What my child liked most was the different programs used and getting to choose items to be printed and sent back to them.

> STEM Camp Student Fabrication

Honestly, it was really cool! I know this is not the ideal way to teach, but I've really been enjoying this week. Cryptology is definitely something I might consider looking into as a career!

> Valerie STEM Camp Student

My daughter LOVED this camp (coding). I thought "virtual" camp would be a drag for her, but it was wonderful!

> Bridget STEM Camp Parent

#### Camps by the numbers

This summer we had over 500 registrations across 4 tracks of camps with around 300 unique students. Almost five percent of our participants attended camps from 11 other states (plus Washington DC) outside the Commonwealth.



Close to 25% of students attended 2 or more camps this summer, with some attending up to 6 camps. Our camps usually have a 60/40 male-female ratio, but our data shows that female participation rates are higher in the upper elementary and early middle school ages. This is why we start early in recruitment and engagement of underrepresented students in the STEM workforce.



## 552 VIRTUAL STEM CAMP REGISTRATIONS

"

It was amazing. He was completely engaged every day for two straight weeks. And with two working parents we did not have to supervise or run logistics for him. We were really lucky to have this!

#### **STEM Camp Parent**

I liked the brute-force lab, I thought it was fun. I learned about the birthday paradox and thought it was interesting that it was used when thinking about finding passwords and eventually resulted in security being improved.

> Andrew STEM Camp Student

The Instructors were very helpful and dealt with computer issues with grace and clear guidance.

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**STEM Camp Parent** 



#### We Do STEMinars

In 2020 we launched our Virtual STEMinars so that students, staff, and the community could explore STEM technologies from home. Led by STEM staff and faculty, STEMinars provided opportunities for participants to learn about many STEM topics through discussions, information sessions, sample projects, and hands-on kits.

#### **Virtual STEMinars Highlights**

- First time offering all-virtual STEM Outreach.
- Offered Cybersecurity, Python Programming, Cloud Computing, Inkscape, 3D Scanning, 3D Printing, SketchUp, Coding in Microbit, Electric Circuits, VEX (VRC, IQ, VR) and more.
- Some fabrication sessions included a unique hybrid approach – virtual live instruction with a hands-on component. Material kits were shipped out in advance or participants' custom designs were fabricated and shipped out after the session (with an extension activity).
- Provided training on a newly released virtual coding and robotic environment, VEX VR.
- Retrained our staff.
- Many participants were trained in using the following design software: TinkerCAD, Fusion 360, Inkscape, and SketchUp.
- Used free software for more equitable access to all community members, students, and staff.

STEMinars Supported By:



#### **1509** VIRTUAL PARTICIPANTS

#### WORKSHOP AGE RANGE 10-65



Total Virtual STEMinar Sessions including ISACA & IET Topics.



hours of Virtual STEMinar instruction provided.



NOVA professors who led Virtual STEMinar sessions.





#### We Do STEM Grants

We developed and applied for multiple grants in 2019-20 that were centered around **career development**, **bridge programs** (transitioning students from high school to college), **makerspaces, fabrication design challenges** (for secondary/post-secondary students) and **teacher professional learning** (for secondary and post-secondary instructors). These grants have focused on specific populations, primarily under-served and underrepresented populations in STEM and military-connected students.

We are responsible for developing, implementing and managing NOVA's **Perkins V** grant: *The Strengthening Career and Technical Education for the 21st Century Act*, which is focused on expanding opportunities for every student to explore, choose, and follow programs of study in CTE and credentials of value. Perkins V is a federal grant that comes through the **Virginia Department of Education**.

In 2019-20, NOVA's Perkins funding was used to support CTE initiatives including the Fab Lab and career service programs. Perkins mini-grants provided a Vapotherm Precision Flow Plus machine for faculty in the Respiratory Therapy Program at MEC and professional development training for the automotive department in advanced hybrid technology. Perkins funded the IET testing voucher program for students who were taking credentialing exams (115 vouchers were issued to 98 students). NOVA received data for 75 of those exams with students having a pass rate of nearly 50% across all exams and 100% pass rate in CISCO CCNA.

**NOVA completed the 2nd year of an NSF ATE grant to build out the first Cloud Computing degree program in the Commonwealth.** Through the grant NOVA completed a 2-year AAS and a 1-year CSC for students to learn in-demand skills and curriculum and materials were developed for a new class (ITN 254 Infrastructure: Installation and Configuration). The cloud degree programs have 26 students enrolled in the CSC and and 261 students in the AAS thanks to the NSF Advanced Technological Education grant program.













#### **Central Office & NOVA FAB LAB Team**



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## NOVA SYSTEMIC



### WE DO **STEM** SCIENCE • TECHNOLOGY • ENGINEERING • MATH







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