

DEFENSE STEM EDUCATION CONSORTIUM EVALUATION DATA CHAPTER 2020-21



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EXECUTIVE SUMMARY

This data chapter uses text, data, and graphics to provide an overview of the Defense STEM Education Consortium (DSEC) 2020–21 evaluation data for programming that occurred during the time period of September 2020 to August 2021. All data contained in this report was self-reported by DSEC STEM Outreach Partners and Hub Lead Organizations (described below). AIR gathered data for this report via the *DSEC Participation Survey*, the *DSEC Outcomes and Reflections Survey*, a location data template, and the *DSEC Network Connectivity Survey*. For participation data, respondents reported the collection method used. These included registration, headcount, estimation, and not reported. Definitions of these methods, as well as a more detailed overview of the data collection process, can be found in the DSEC Evaluation section of this report.

ABOUT DSEC

The Defense STEM Education Consortium (DSEC) is a collaborative partnership between academia, industry, not-for-profit organizations, and government that aims to broaden STEM literacy and develop a diverse and agile workforce to power the U.S. innovative defense infrastructure. (See consortium graphic below.) Aligned to the [Federal STEM Education Strategic Plan](#) and the [DoD STEM Strategic Plan](#), DSEC seeks to inspire the next generation of scientists and engineers through investments in STEM enrichment programs for students and educators, STEM workforce engagement, program evaluation, and public outreach.

DEPARTMENT OF DEFENSE STAKEHOLDERS

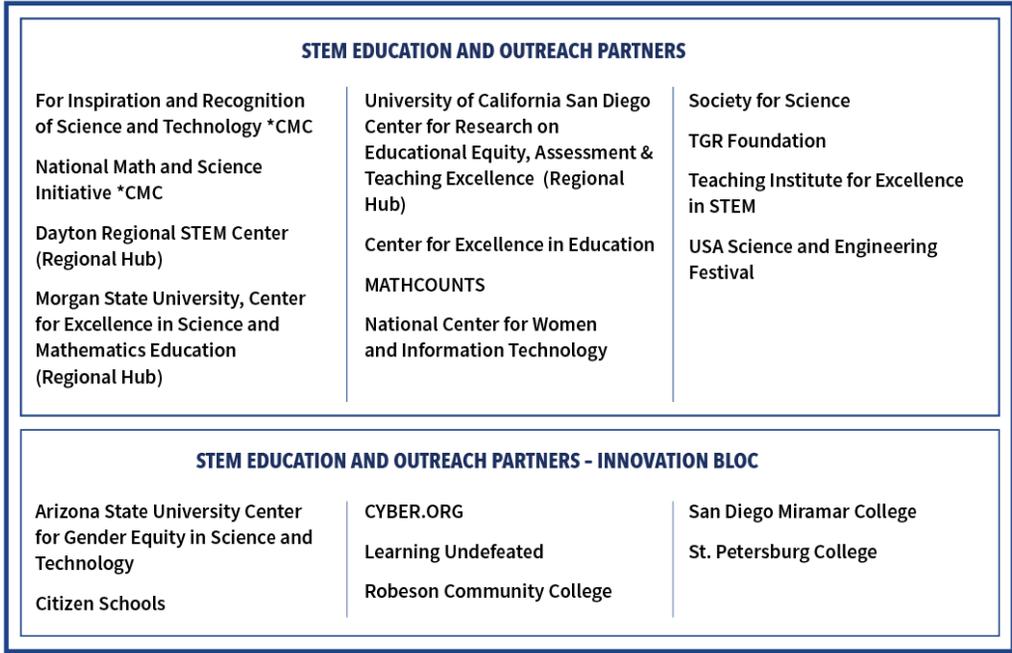
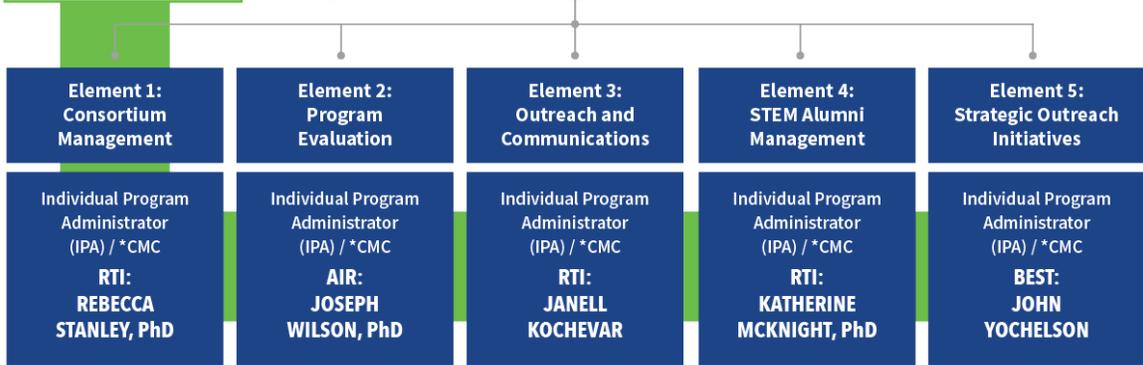


Cooperative Agreement Manager (CAM) / *CMC
DoD STEM
LOUIE LOPEZ
 Alternate CAM
TYLAR TEMPLE



Consortium Chair (CC) / *CMC
RTI INTERNATIONAL (LEAD ORGANIZATION)
ANGELA H. QUICK, EdD

Project Management and Integration (PMI)
RTI INTERNATIONAL



Local Program Coordinator(s) (LPC)
 AS NEEDED

*CMC: Consortium Management Committee Member

WHO IS PART OF DSEC?

1 Consortium Management Committee (CMC). Manages and integrates DSEC activities.

- Element 1 Consortium Management: RTI
- Element 2 Program Evaluation: AIR
- Element 3 Outreach and Communication: RTI
- Element 4 STEM Alumni Management: RTI
- Element 5 Strategic Outreach Initiatives: BEST
- FIRST and NMSI

2 STEM Outreach Partners. Deliver content, sustain networks of educators, and underpin the credibility of DoD as a trusted resource.

3 Hub Lead Organizations. Expand the reach of DoD STEM programs, establish connections with DoD laboratories, and identify opportunities to leverage partner collaboration within the hub areas of Dayton, OH, DC/Maryland/Virginia, and San Diego, CA.



HOW DID DSEC ORGANIZATIONS CONNECT?

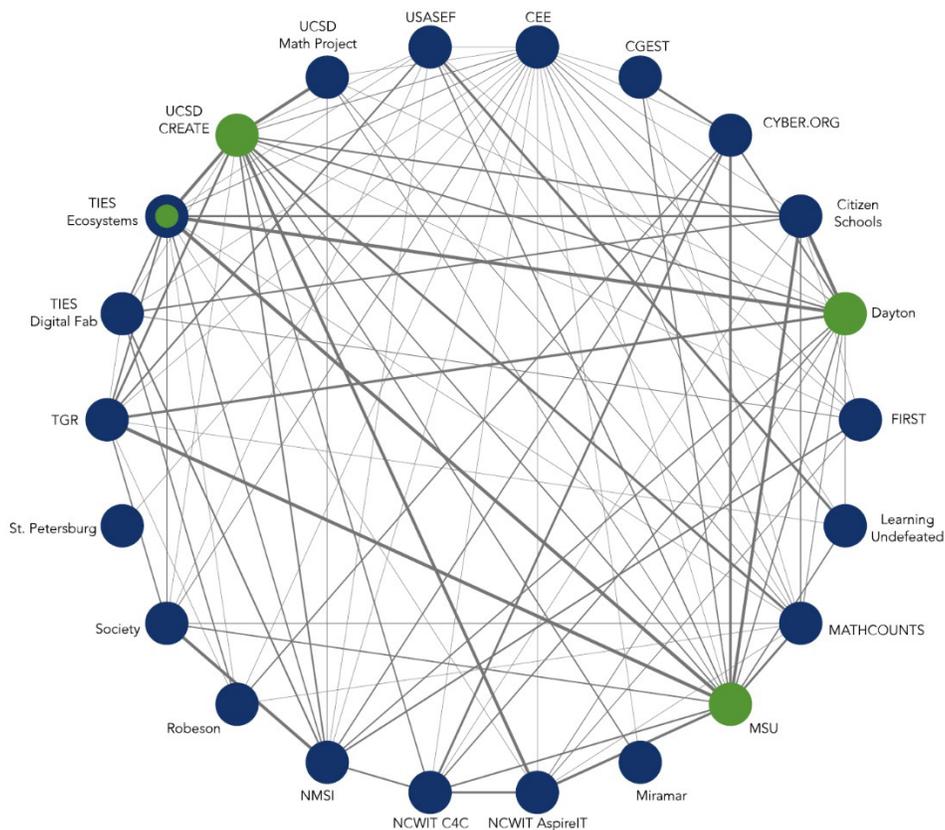
Throughout 2020–21, partners provided information on which other consortium members they interacted with and how they interacted with them. Thicker lines represent interactions at the coordinating and collaborating levels and thinner lines represent interactions at the networking and communicating levels.

DSEC partner organizations (shown as blue and blue and green dots in the sociogram) and hub leads (shown as green dots in the sociogram) reported a total of 100 connections from August 2020 to July 2021.

On average, each organization reported connecting to nine other organizations.

The network has a density of 43%, meaning that slightly less than half of all possible connections occur in the network.

Eighty percent of the reported interactions between DSEC organizations occurred at the networking and communicating levels. Twenty percent of the reported interactions occurred at the coordinating and collaborating levels.



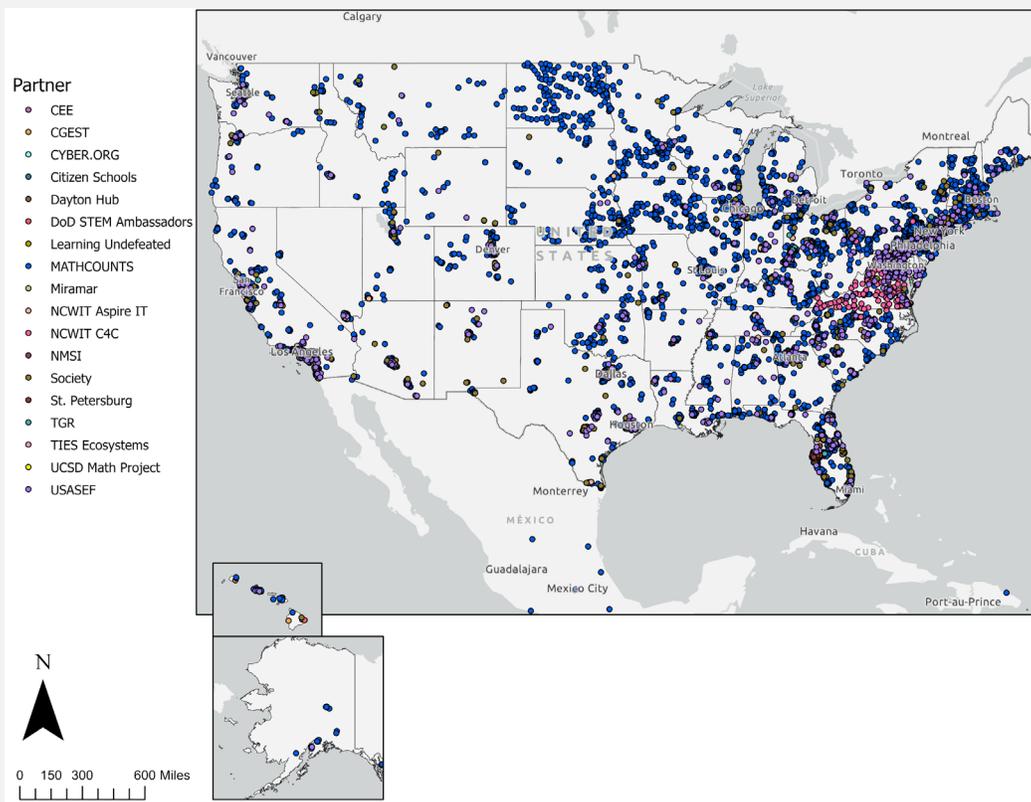
Solid blue circles represent STEM outreach partner organizations. Solid green circles represent Hub Leads. The blue circle with a green center represents TIES Ecosystems, indicating their role as a Hub Lead Support Partner.

Thicker lines represent interactions at the coordinating and collaborating levels and thinner lines represent interactions at the networking and communicating levels.

- **Networking:** exchanging information
- **Communicating:** building a shared understanding
- **Coordinating:** creating complementary programming
- **Collaborating:** jointly designing or delivering programming

WHERE DID DSEC ACTIVITY OCCUR IN 2020-21?

DSEC programming reached participants in every U.S. state and the District of Columbia, as well as many international locations. Participants were particularly numerous along the East Coast, in Florida, and in central and southern California. This can be compared to the 2019–20 DSEC programming, which took place across 39 states and DC. The wider reach of DSEC partners in the 2020–21 school year may be contributed to programs being offered virtually.



DSEC WORK IS ORGANIZED USING THE DSEC FUNDAMENTALS

- **Engage** students and educators in meaningful STEM experiences
- **Serve** students who are military-connected and/or underrepresented in STEM
- **Connect** to the DoD STEM workforce
- **Leverage** the network as a force multiplier
- **Evolve** the approach based on data

WHO WAS INVOLVED IN DSEC ACTIVITIES IN OPTION YEAR 1 (SEPTEMBER 2020–AUGUST 2021)?

The below graphs and tables display data on those that participated in programming offered by DSEC STEM Outreach Partners and Hub Leads. Consortium members self-reported their data through surveys administered by Element 2 (AIR). Information is shown on an aggregate level and broken down by participant type: student, teacher, and other type of participant (e.g., school counselors, school administrators). Volunteers are not included as participants; their information is separately recorded in its own chart.

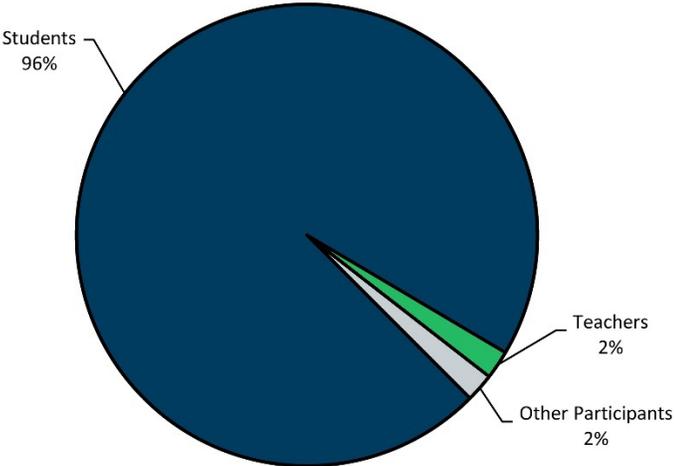
The category “Not Reported” in this graph represents student participants for which DSEC STEM Outreach partners did not collect demographic data. Details are provided in the individual Partner Snapshots.

WHO DID DSEC PARTNERS SERVE?

1

OVERALL PARTICIPANTS

111,758

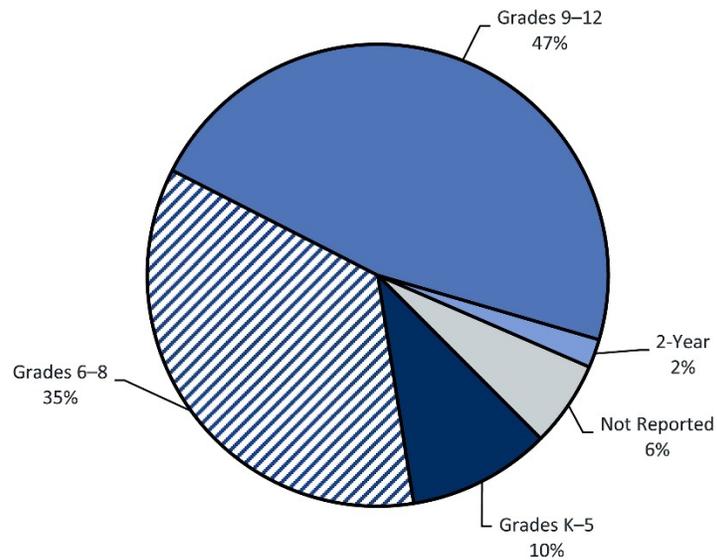


Students	Teachers	Other Participants
107,586	2,417	1,755

STUDENTS SERVED

107,586

PARTICIPANTS BY GRADE BAND



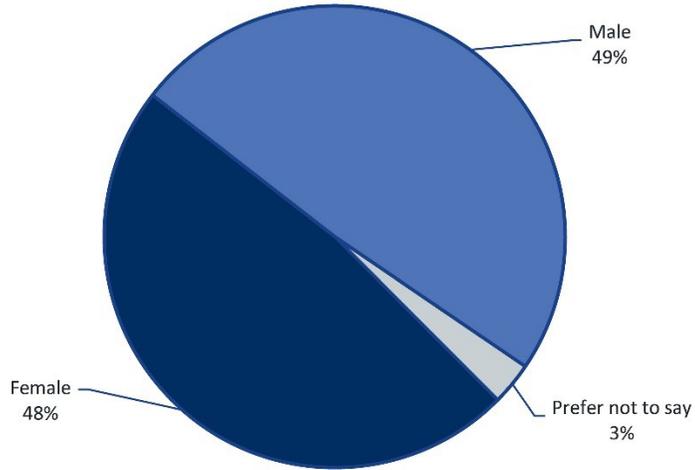
4-Year, Graduate, and Not in School are $\leq 0.5\%$ and not visible in the graph.

Grades K-5	Grades 6-8	Grades 9-12	2-Year	4-Year	Graduate	Not in School	Not Reported*
10,421	37,357	50,383	1,751	576	319	225	6,704

NOTE. Demographic data was reported from registration, headcount, and estimation.

* A partner experienced technical difficulties with online registration for their event and was unable to collect grade level data.

GENDER: 99,257

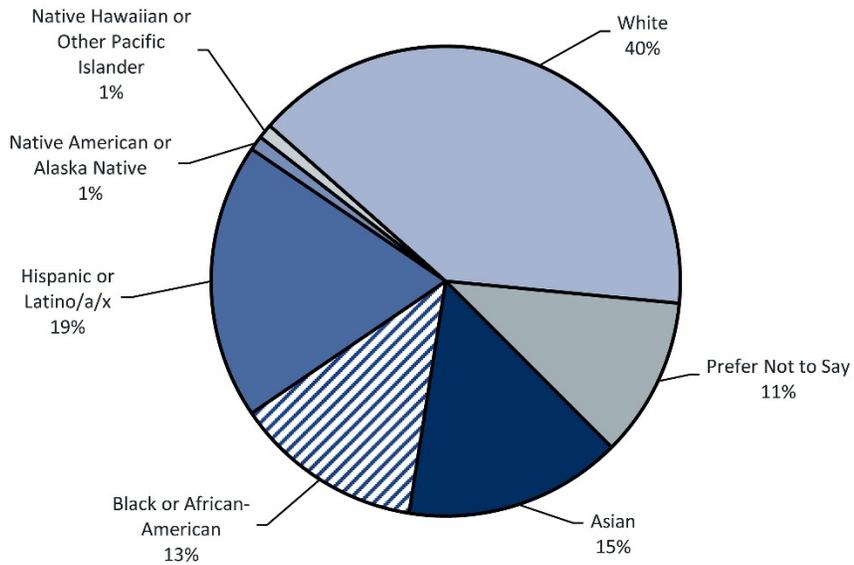


Non-binary is < 0.5% and not visible in the graph.

Female	Male	Non-binary	Prefer Not to Say
47,813	48,068	127	3,249

NOTE. Demographic data was reported from registration, headcount, and estimation.

RACE/ETHNICITY: 77,380



28% of student participants did not have demographic information reported.

Asian	Black or African-American	Hispanic or Latino/a/x	Native American or Alaska Native	Native Hawaiian or Other Pacific Islander	White	Prefer Not to Say
11,812	10,109	14,881	545	999	30,720	8,314

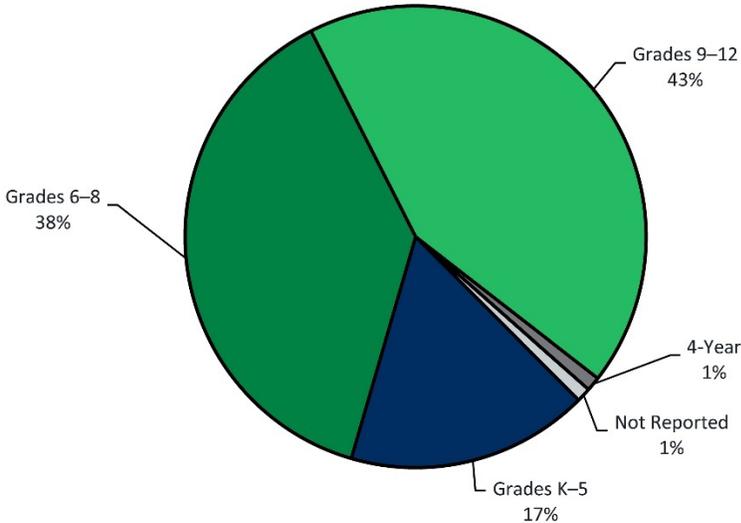
NOTE. Demographic data was reported from registration, headcount, and estimation.

Only gender and race/ethnicity data of sufficient confidence level in regard to the collection method used were included in the overall calculation for these categories. As such, overall totals from these two graphs will not match each other or the overall student participant total. Details are provided in the individual Partner Snapshots.

3

TEACHERS SERVED
2,417

PARTICIPANTS BY GRADE LEVEL TAUGHT



2-Year is < 0.5% and not visible in the graph.

Grades K-5	Grades 6-8	Grades 9-12	2-Year	4-Year	Not Reported
420	930	1,032	6	35	65

NOTE. Demographic data was reported from registration, headcount, and estimation.

4

OTHER PARTICIPANTS SERVED

1,755

School Counselors	School Administrators	University Personnel	Community Members	Parents	Other*
1,429	71	21	83	20	131

* Role not defined.

5

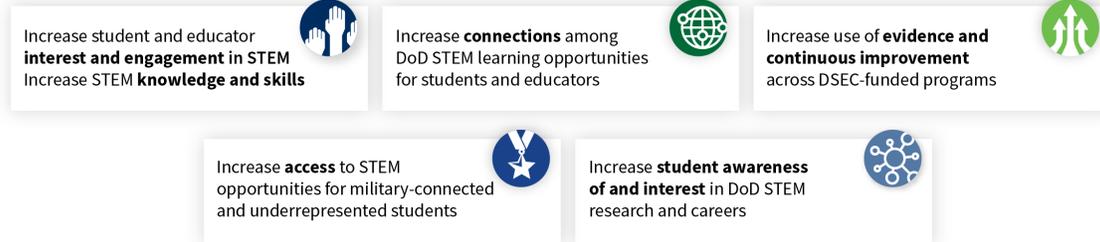
VOLUNTEERS

1,211

Teacher Volunteers	Program Alumni	Other Adult Volunteers	Other Student Volunteers	DoD Volunteers
32	67	129	41	942

78% of volunteers were DoD affiliated, with 95% of DoD volunteers working with *FIRST*.

OUTCOMES



KEY FINDINGS FOR OPTION YEAR 1

Element 2 reviewed qualitative and quantitative data provided by STEM Outreach Partners and Hub Lead Organizations and assessed them against DSEC logic model outcomes. Overall Key Findings are located in the Overview Section. High-level takeaways include:

- Participation in DSEC-funded programming showed an overall increase of 107% from Base Year (2019–20)* to Option Year 1 (2020–21). This is associated with an increased number of partners and programs, as well as the pivot to virtual learning environments.
- Teacher participation in DSEC-funded programming showed an overall decrease of 36% from 2019–20 to 2020–21. This is associated with challenges schools faced during the pandemic, such as exhaustion/burnout from transitioning to virtual/blended learning environments as teachers tried to schedule required learning activities within a day, leaving little time for additional pursuits.
- DSEC began collecting demographic data (gender, race/ethnicity) for students in 2020–21 to develop a baseline for measuring progress towards increasing STEM learning options for military-connected and underrepresented in STEM students.
- DSEC partner organizations and hub leads reported a total of 100 connections from August 2020 to July 2021, spanning from networking to collaborating. Eighty percent of reported connections occurred at the networking and communicating level, demonstrating that many organizations are engaged in exchanging information and building shared understanding. Twenty percent of reported connections occurred at the coordinating and collaborating levels, demonstrating that partners are engaged in altering programming to complement others as well as jointly designing and delivering programs.

- DoD-affiliated volunteers increased 29% from 2019–20 to 2020–21. Of these DoD-affiliated volunteers, 77% worked with *FIRST*.

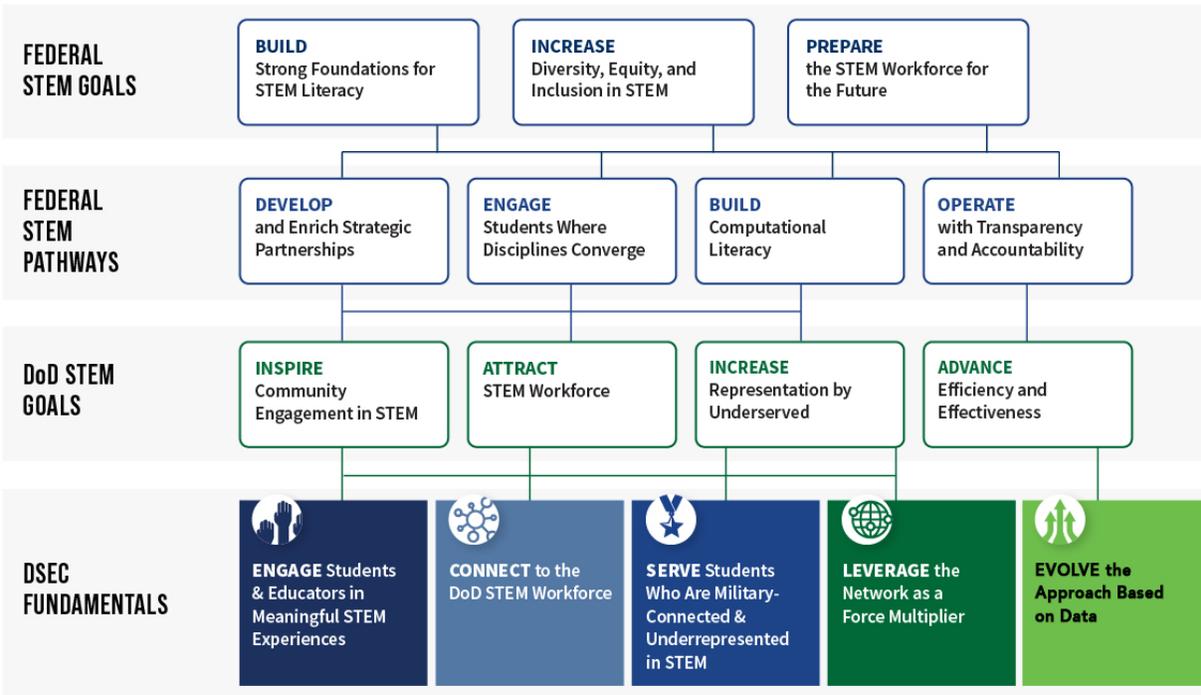
* Base Year 2019–20 data can be found [here](#).

OVERVIEW OF DSEC

DSEC STRATEGY

The Defense STEM Education Consortium (DSEC) is a collaborative partnership between academia, industry, not-for-profit organizations, and government that aims to broaden STEM literacy and develop a diverse and agile workforce to power the U.S. innovative defense infrastructure. Aligned to the [Federal STEM Education Strategic Plan](#) and the [DoD STEM Strategic Plan](#), DSEC seeks to inspire the next generation of scientists and engineers through investments in STEM enrichment programs for students and educators, STEM workforce engagement, program evaluation, and public outreach.

The below graphic shows the alignment of DSEC Fundamentals to the federal STEM goals.



DSEC EVALUATION

DSEC ELEMENT 2

Program Evaluations: Data Collection, Assessment/Analysis and Reporting

The American Institutes for Research® (AIR®) manages Element 2. AIR's work is driven by four goals:

- Develop priority questions and evaluation agendas in collaboration with the Department of Defense (DoD) and consortium members.
- Improve data availability, consistency, and quality for DoD STEM programs.
- Generate new evidence about DoD STEM programs.
- Support learning and continuous improvement through the consortium.

ELEMENT 2 MILESTONES

In Option Year 1, AIR worked toward the following milestones related to the four overarching goals:

- Set clear data expectations and requirements for STEM Outreach Partners and Hub Lead organizations.
- Support STEM Outreach Partners—including Innovation Bloc partners and Hub Leads—in clearly defining DSEC activities, outputs, and outcomes.
- Work with DSEC members to ensure the completion of data requests and the timely reporting of the evaluation findings.
- Develop products and reports that are useful to DSEC and DoD STEM.

PURPOSE OF THIS REPORT

This report provides information to answer the following questions:

- Which participants (students, educators) engaged in DSEC-funded STEM outreach programming?
- Who did DSEC serve, in terms of gender, race/ethnicity, military connectedness, and grade level?
- Where did programming take place, and what locations do participants come from?
- How did DSEC connect as a network?
- What was the impact of COVID-19 on DSEC programming during 2020–21?
- Did STEM Outreach Partners and Hub Leads make progress toward achieving the outcomes identified in their DSEC Logic Models?
- What did STEM Outreach Partners and Hub Leads consider to be their greatest achievements and challenges during the past year?
- What recommendations should DSEC consider as it moves into Option Year 2?

DATA REPORTING PROCESS

All data contained in this report was self-reported by the STEM Outreach Partners and Hub Leads. AIR used four methods to gather and analyze data for this report:

AIR administered the *DSEC Participation Survey* in July 2021 to all 23 STEM Outreach Partners and Hub Leads, asking respondents to report on their programming from September 2020 to August 2021. This survey collected quantitative data (participant counts, demographic data, volunteer information) for the 46 STEM outreach programs. The survey response rate was 100%.

Respondents provided data for student and teacher participants:

STUDENTS

GRADE LEVEL

Grade level they are in:

- K-5
- Grades 6, 7, 8, 9, 10, 11, 12 (asked individually)
- 2-year and/or tech college undergraduate
- 4-year college undergraduate
- College graduate (master's, doctoral candidates)
- Not in school

MILITARY-CONNECTED STATUS

Military-connected status as defined by DoD STEM in Option Year 1:

- **Military-child:** dependents of members of the Active Duty Armed Forces
- **Military-connected:** military child plus the dependents of members of the National Guard and Reserves
- **Military-affiliated:** military-connected plus the dependents of Veterans
- **Military-connected schools:** schools where a minimum of 10% of the student population is military-connected

GENDER

- Female
- Male
- Non-binary
- Prefer not to say

RACE/ETHNICITY

- Asian
- Black or African-American
- Hispanic or Latino/a/x
- Native American or Alaska Native
- Native Hawaiian or Other Pacific Islander
- White
- Prefer not to say
- Not Reported

TEACHERS

GRADE LEVEL

Grade level they are teaching:

- K-5
- Grades 6, 7, 8, 9, 10, 11, 12 (asked individually)
- 2-year and/or tech college undergraduate
- 4-year college undergraduate
- College graduate (master's, doctoral candidates)
- Not in school

MILITARY-CONNECTED STATUS

Military-connected status either themselves or working in a school that is considered military-connected.

- **Military-child:** dependents of members of the Active Duty Armed Forces
- **Military-connected:** military child plus the dependents of members of the National Guard and Reserves
- **Military-affiliated:** military-connected plus the dependents of Veterans
- **Military-connected schools:** schools where a minimum of 10% of the student population is military-connected

UNDERREPRESENTED IN STEM

Personal underrepresented in STEM status, as defined by DoD STEM in Option Year 1:

- Low income students
- Racial and ethnic minorities that are historically underrepresented in STEM (i.e., Alaska Native, Native Americans, Black or African Americans, Latinx/Hispanics, Native Hawaiians and other Pacific Islanders)
- Students with disabilities
- Students with English as a second language
- First-generation college students
- Students in rural, frontier, or other Federal targeted outreach schools
- Females in certain STEM fields (e.g., physical science, computer science, mathematics, or engineering)

TITLE I

Do they teach in a Title I school?

Respondents provided data for people other than students or teachers:

DOD STEM PERSONNEL

- Participant or volunteer
- DoD affiliation

OTHER PARTICIPANTS

Roles:

- School counselors
- School/district administrators
- University personnel
- Community members
- Parents
- Other

VOLUNTEERS (OTHER THAN DOD STEM)

Background:

- Teacher volunteers
- Program alumni volunteers
- Parents
- Other adult volunteers
- Other student volunteers

For participation data, respondents reported the collection method used. These included:

- Registration – the partner used a registration form to collect data. In some cases, this was provided directly by the participant, while in others a teacher or coach registered a class or team.

- Headcount – the partner inferred information based on what was seen during program implementation.
- Estimation – the partner estimated information based on their knowledge of participants. Estimation varied considerably across partners. Some partners chose to report data as estimation because they were lacking specificity for a small number of participants, while others broadly estimated the makeup of participants.
- Not Reported – the partner did not collect this data from their participants, or the estimation provided was not of sufficient basis to include.

AIR administered the *DSEC Outcomes and Reflections Survey* in July 2021 and asked all 23 STEM Outreach Partners and Hub Leads to report on their programming from September 2020 to August 2021. The survey response was 100%. This survey asked respondents to provide their perspectives on the following topics:

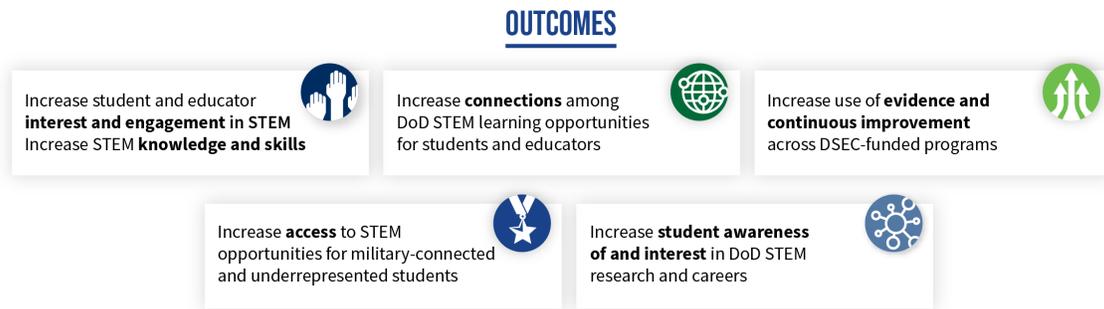
- Progress toward or evidence of achieving outcomes identified in their DSEC logic models. AIR identified specific immediate changes and primary outcomes from partners' DSEC logic models and asked the partner to respond to them. Partner responses were edited by AIR for clarity and conciseness.
- COVID-19's effect on programming during Option Year 1, and lessons learned that STEM Outreach Partners and Hubs will use moving forward. AIR coded responses to identify common themes across partners and hubs.
- Greatest accomplishment and challenge over the past year. Partner responses were edited by AIR for clarity and conciseness.

In addition, STEM Outreach Partners provided Element 2 with *location data by program* via an Excel template. Partners provided school-based ZIP code information for participants at the school level and, when possible, at the individual level. These data were used to create the ArcGIS maps found in this report as well as for updating the online ArcGIS maps.

During 2020–21, STEM Outreach Partners and Hub Leads completed the *DSEC Network Connectivity Survey* monthly to provide data on their interactions with other partners and Hub Leads. The average response rate across all survey administrations was 98%. AIR analyzed the data to create the sociograms seen throughout this report

KEY FINDINGS

Element 2 reviewed qualitative and quantitative data provided by STEM Outreach Partners and Hub Leads and assessed them against DSEC logic model outcomes. We present the following findings for each outcome.



INCREASE STUDENT INTEREST AND ENGAGEMENT IN STEM.

Increase student interest and engagement in STEM. Increase STEM knowledge and skills. Student participation in DSEC-funded programming increased from 56,717 participants in 2019–20 to 111,127 participants in 2020–21—an overall increase of 107%. This is associated with an increase of STEM Outreach Partners from 13 in 2019–20 to 19 in 2020–21, as well as an increase in the number of programs delivered from 24 in 2019–20 to 47 in 2020–21. The increase in programs delivered is associated with partners being able to pivot their programming to a virtual learning environment.

Teacher participation in DSEC-funded programming showed an overall decrease of 36% from 2019–20 to 2020–21 or 3,657 teachers to 2,350 teachers, respectively. This is associated with challenges schools faced during the pandemic, such as exhaustion/burnout from transitioning to virtual/blended learning environments as teachers tried to schedule required learning activities within a day, leaving little time for additional pursuits.

INCREASE ACCESS TO STEM OPPORTUNITIES.

Increase access to STEM opportunities for military-connected and underrepresented in STEM students. DSEC began collecting demographic data (gender, race/ethnicity) for students in 2020–21, resulting in a clearer picture of which programs are engaging military-connected and underrepresented in STEM students. 2020–21 can serve as a baseline with which to measure progress for this outcome in future years.

Location data showed an increase in programming from 39 states and DC represented in 2019–20 to all 50 states in 2020–21. This is associated with the increased use of virtual programming which allowed for further reach than in-person events. While partners initially saw virtual programming as a challenge to be overcome, many now see the possibility of a virtual environment extending their programming reach.

INCREASE CONNECTIONS AMONG DOD STEM LEARNING OPPORTUNITIES.

Increase connections among DoD STEM learning opportunities for students and educators. DSEC partner organizations and hub leads reported a total of 100 connections from August 2020 to July 2021, spanning from networking to collaborating. Eighty percent of reported connections occurred at the networking and communicating level, demonstrating that many organizations are engaged in exchanging information and building shared understanding. Twenty percent of reported connections occurred at the coordinating and collaborating levels, demonstrating that partners are engaged in altering programming to complement others as well as jointly designing and delivering programs. Further, 70% of organizations, or 15 out of 22, have at least one connection at the coordinating or collaborating level. The three hub leads (DRSC, MSU, and UCSD CREATE) and hub lead support partner (TIES Ecosystem) reported the highest level of connectivity, indicating they play key roles in connecting with consortium members. The partners that joined DSEC midway through 2020–21 (Learning Undefeated, Robeson, Miramar, and St. Petersburg) reported lower levels of connectivity; however, all four established connections with other partners in the consortium.

INCREASE AWARENESS AND INTEREST IN DOD STEM CAREERS.

Increase student awareness of and interest in DoD STEM research and careers. Overall volunteer counts increased 3% from 1,177 in 2019–20 to 1,211 in 2020–21. DoD-affiliated volunteers increased 29% from 730 volunteers in 2019–20 to 942 in 2020–21. Of these DoD-affiliated volunteers, 77% worked with *FIRST*.

In responses on the *DSEC Outcomes and Reflections Survey*, partners noted that use of a virtual learning environment enabled them to have more DoD-affiliated speakers from more varied locations at their program sessions. Because of this, students were potentially provided with greater learning opportunities related to DoD research and careers.

DSEC added Innovation Bloc partners at the community college level in Option Year 1. These partners included internships and career pathways work in their programming to increase the number of students moving towards STEM careers, particularly in the DoD STEM modernization priorities of biotechnology and cyber technology.

INCREASE USE OF EVIDENCE AND CONTINUOUS IMPROVEMENT.

Increased use of evidence and continuous improvement across DSEC-funded programs. The *DSEC Participation Survey* asked STEM Outreach partners and Hub Leads to indicate which data collection methods they currently use. 90% of partners reported using participant surveys, and 84% reported using participation records, which shows that the majority of DSEC members are collecting data that could be used to inform program improvement.

NETWORK CONNECTIVITY

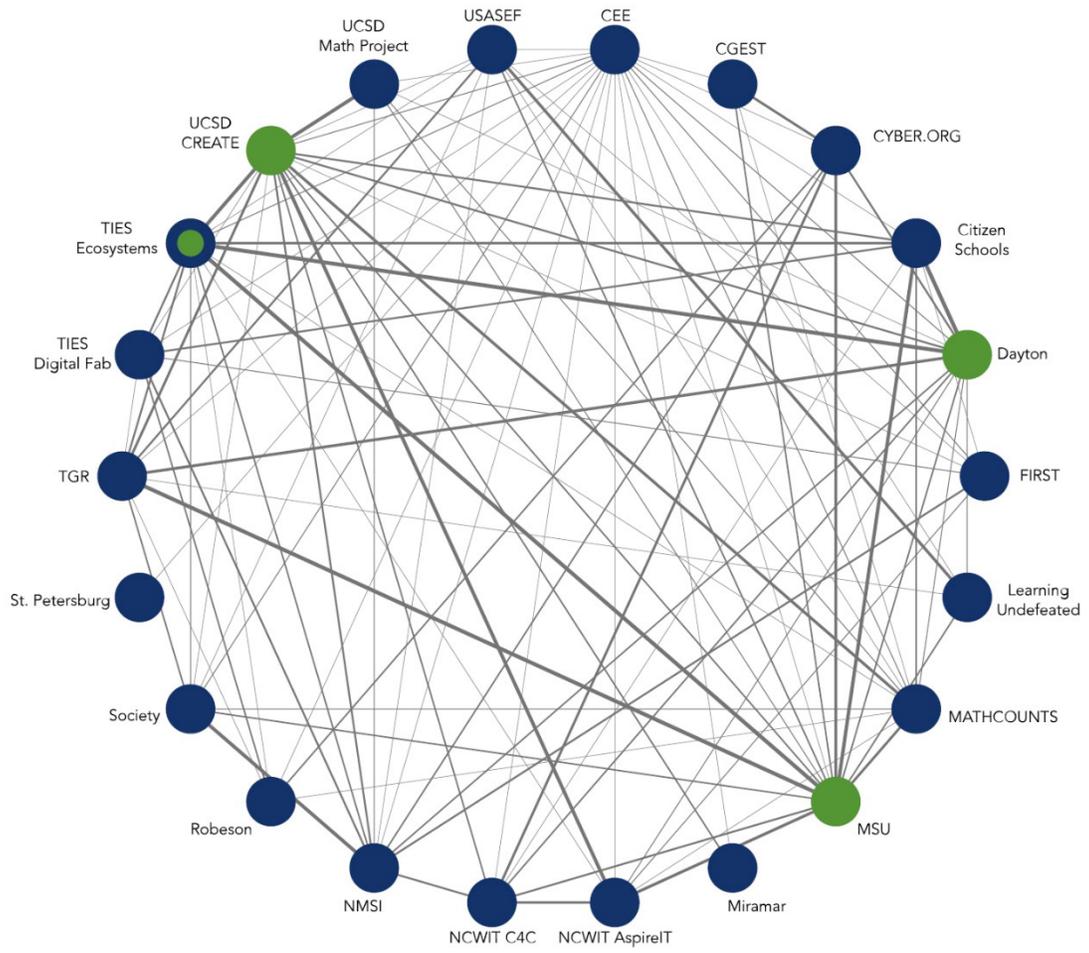
AIR used social network analysis to understand interactions among STEM Outreach Partners, Hub Leads, and the Hub Lead Support Partner. Throughout 2020–21, partners participated in the monthly DSEC Connectivity Survey to provide information on which other consortium partners and hubs they interacted with, how they interacted with them, and how those connections pertained to focal populations, such as those historically underrepresented in STEM or military connected.

In the network maps, each organization is represented by a colored circle.

- **Solid blue circles** represent STEM outreach partner organizations
- **Solid green circles** represent Hub Leads.
- The **blue circle with a green center** represents TIES Ecosystems, indicating their role as a Hub Lead Support Partner.

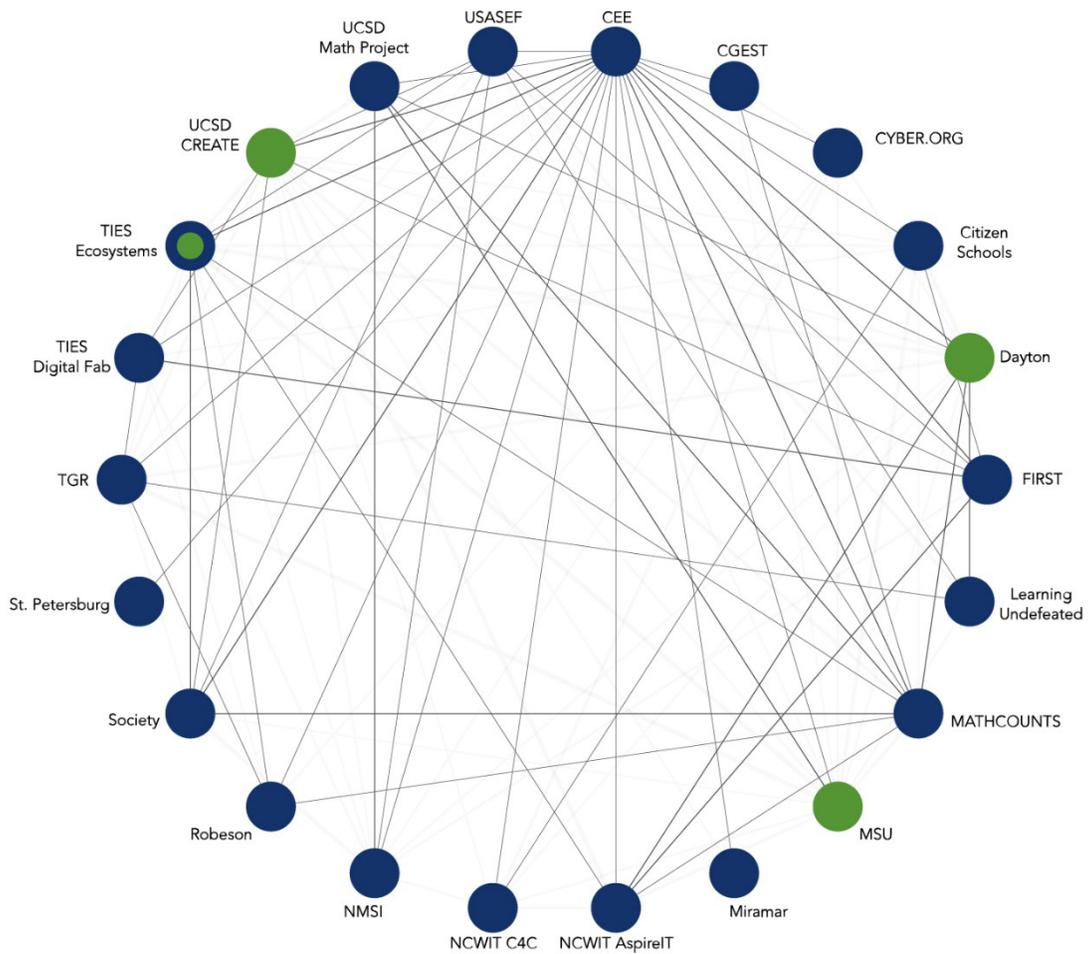
Thicker lines represent interactions that tend to be at the coordinating and collaborating levels which require a deeper level of involvement, whereas thinner lines represent interactions at the networking and communicating levels which require a lighter level of involvement. The number of interactions between partners ranges from 1 to 21.

OVERALL



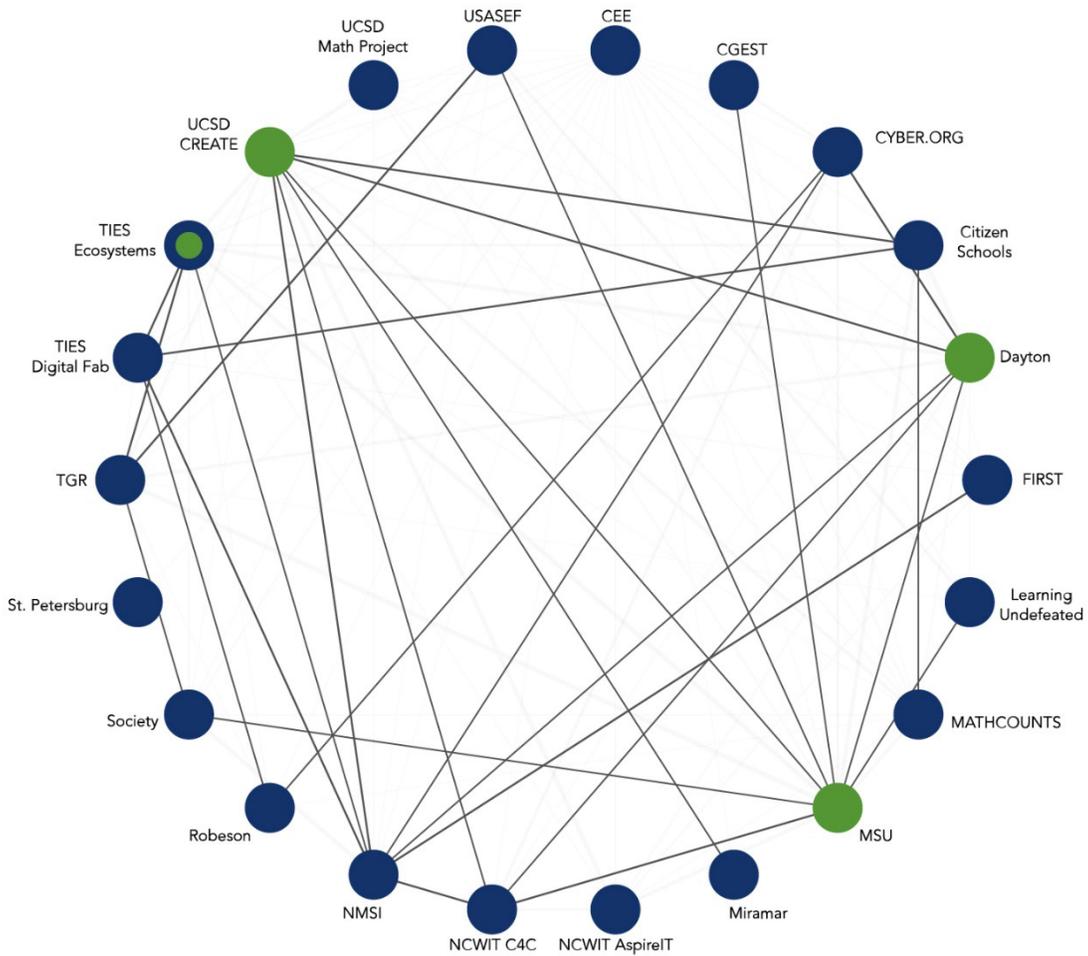
NETWORKING

Networking means that your organization exchanges information with the other organization for mutual benefit, such as sharing information about schools or districts or volunteer recruitment.



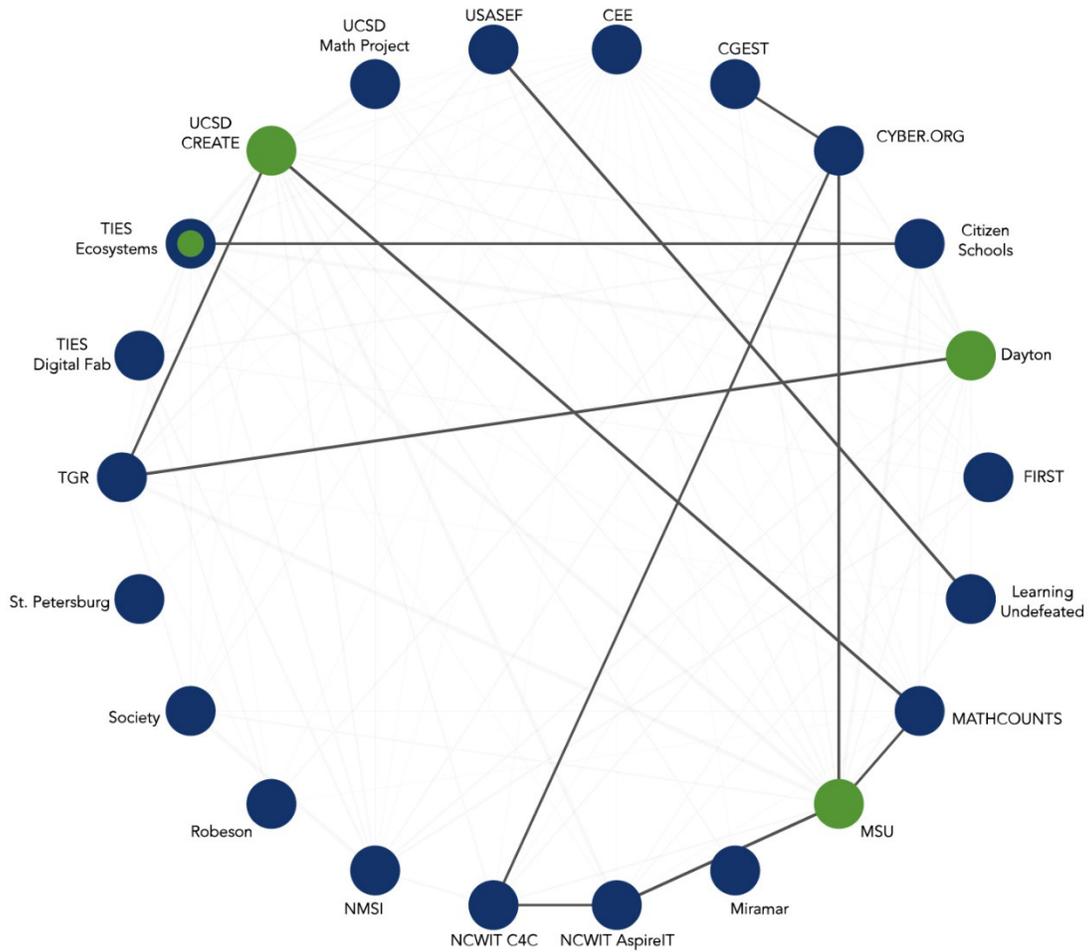
COMMUNICATING

Communicating means that your organization works with the organization to build a shared understanding of an issue and your roles in addressing the issue, such as a shared commitment to provide programming in an underserved area.



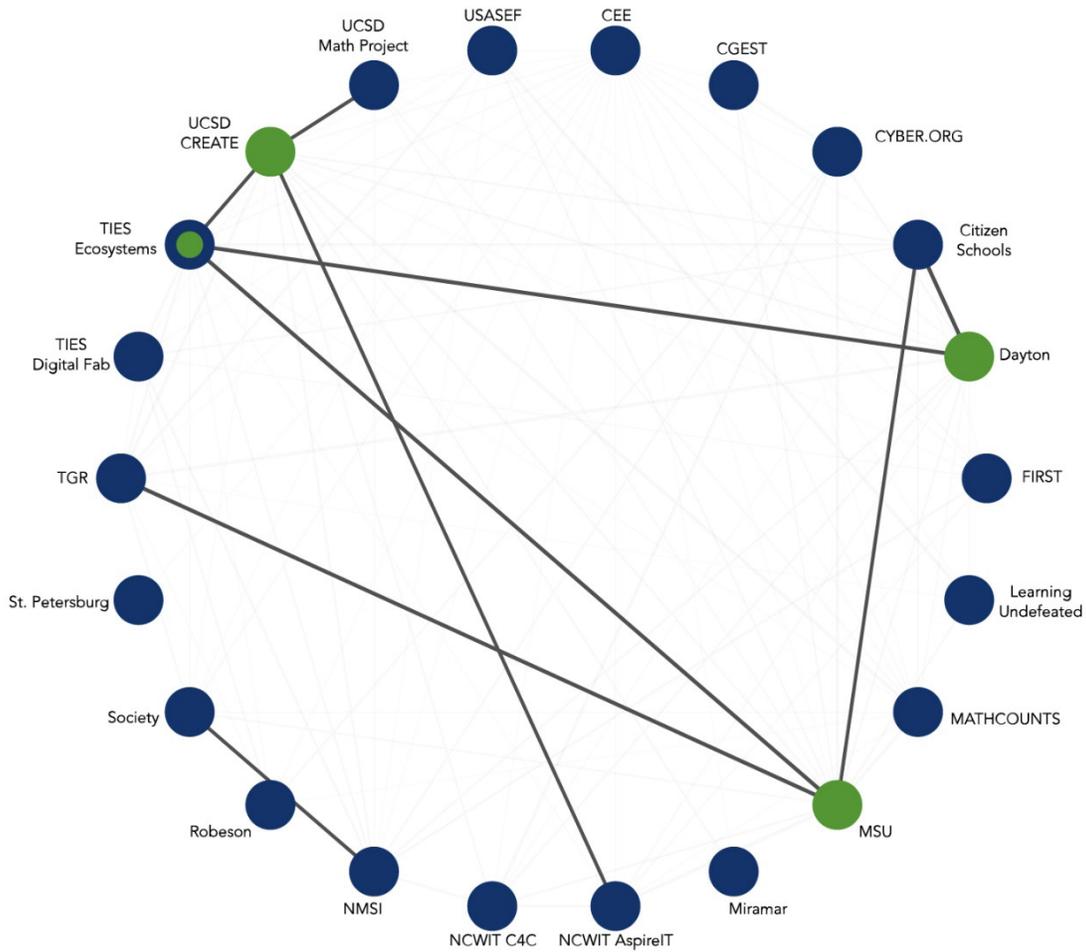
COORDINATING

Coordinating means that your organization is altering your program design or delivery to complement the organization's programming, such as changing timelines or program content.

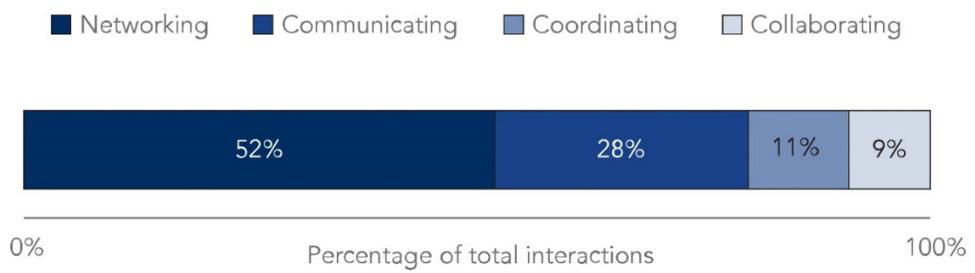


COLLABORATING

Collaborating means that your organization jointly designs or delivers programs with the other organization and, together, your organizations have shared decision-making in the process.



No interaction means that an organization did not self-report a connection to the corresponding organization.



To calculate the level of interaction between any two partners over Option Year 1, AIR used an average of the reported levels of interaction across survey administrations, taking into account that some partners joined DSEC midway through the year. For analyses related to the focal populations (military-connected students, underrepresented students, DoD facilities and personnel, and DoD STEM alumni) AIR summed reported interactions across the survey administrations rather than taking an average.

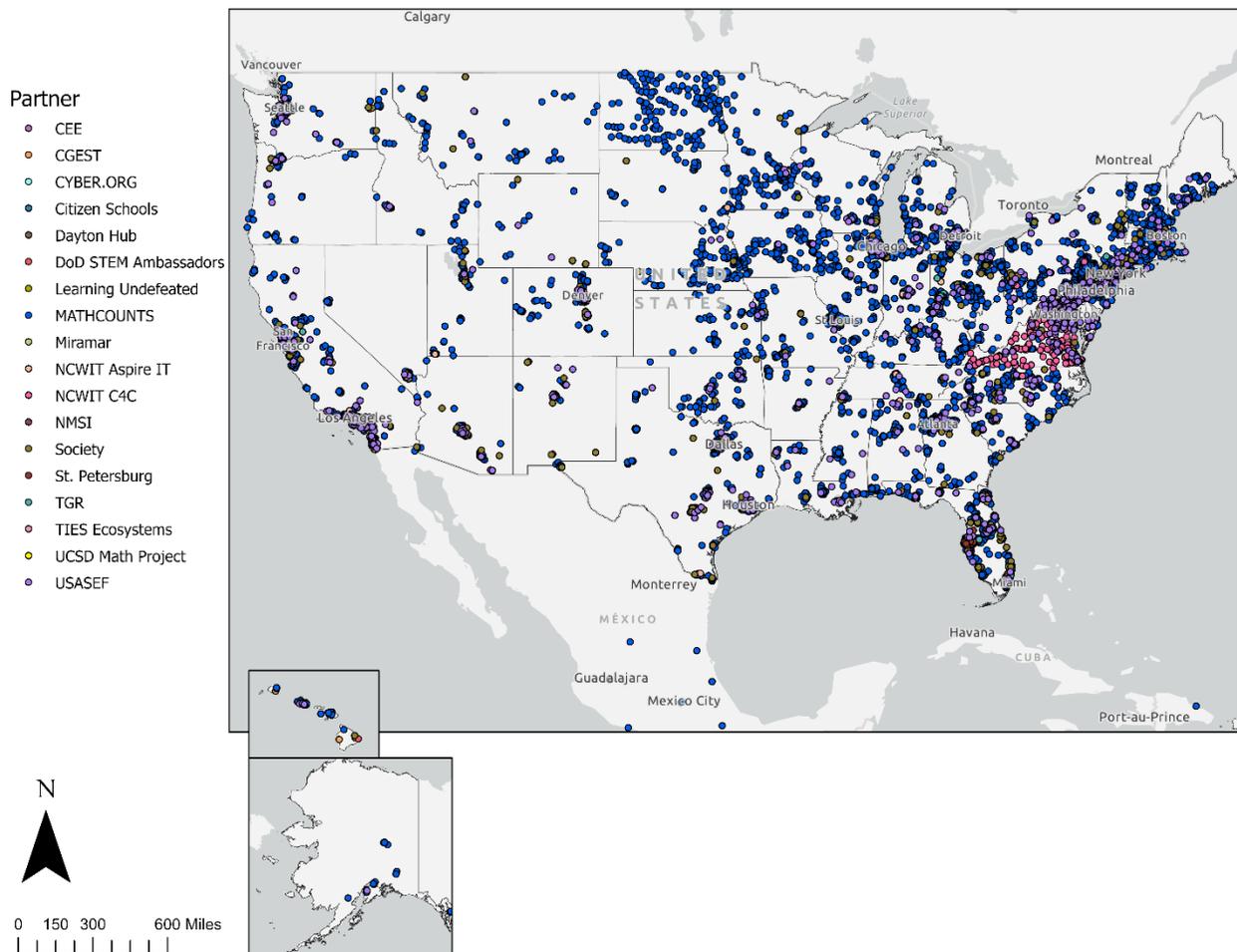
FINDINGS

DSEC Partners and Hub Leads reported 100 connections from August 2020 to July 2021.

- On average, each organization reported connecting to nine other organizations.
- The network has a density of 43%, meaning that slightly less than half of all possible connections occur in the network.
- Eighty percent of the reported interactions between DSEC organizations occurred at the networking and communicating levels. Twenty percent of the reported interactions occurred at the coordinating and collaborating levels.

GEOGRAPHIC REACH (WITH U.S. MAP)

DSEC programming reached participants in every U.S. state and the District of Columbia, as well as many international locations. Participants were particularly numerous along the East Coast, in Florida, and in central and southern California. This can be compared to the 2019–20 DSEC programming, which took place across 39 states and DC. The wider reach of DSEC partners in the 2020–21 school year may be contributed to programs being offered virtually.



PARTNER EVALUATION SYNOPSIS

WHICH ORGANIZATIONS DID DSEC FUND?



STEM EDUCATION AND OUTREACH PARTNERS

Within DSEC, STEM Education and Outreach Partners deliver programming and sustain networks of educators. They are categorized in the following manner:

CMC MEMBERS

These partners received more than \$1.5 million from DSEC and DoD STEM. The two DSEC partners in this category—NMSI and FIRST—were funded initially by DoD STEM and then became part of the Consortium when it was formed in 2019. Because of their large revenue source, both NMSI and FIRST have representatives on the Consortium Management Committee (CMC).

ONGOING PARTNERS

These partners are among the original members of DSEC. Yearly funding for each partner ranges between \$250,000 and \$675,000. DSEC Outreach Partners include CEE, MATHCOUNTS, NCWIT, the Society for Science (Society), the TGR Foundation (TGR), TIES, and USASEF. In 2020, additional partners—Citizen Schools, ASU CGEST, UCSD Math Project, and CYBER.ORG, NCWIT’s Counselors for Computing and the TIES Digital Fabrication Lab—were added through Innovation Bloc funding. In Option Year 1, these partners are now considered STEM Outreach Partners.

INNOVATION BLOC PARTNERS

In Option Year 1, DSEC brought in additional STEM outreach partners who were funded for \$150,000 to \$275,000 each. These new grantees were Learning Undeclared, San Diego Miramar College, Robeson Community College, and St. Petersburg College.

WHO DID DSEC PARTNERS SERVE?

WHAT TYPES OF PROGRAMS WERE DELIVERED?

From September 2020 to August 2021, STEM Education and Outreach Partners implemented programming focused on students, teachers, and other participants through in-person, virtual, or hybrid delivery. Details on their programs can be found in the following Partner Snapshot section.

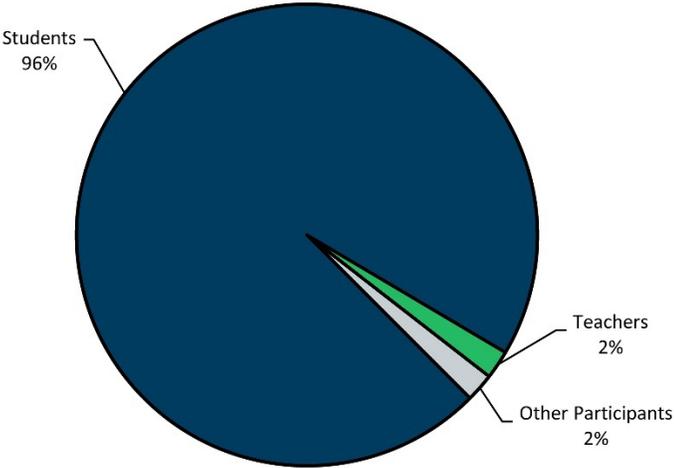
31	24	8
Student-serving programs	Educator*-serving programs	Programs serving both teachers and students

* Educator is any adult working with students in a school or an out-of-school program.

WHO WAS INVOLVED IN DSEC ACTIVITIES IN OPTION YEAR 1 (SEPTEMBER 2020–AUGUST 2021)?

1

OVERALL PARTICIPANTS
111,758

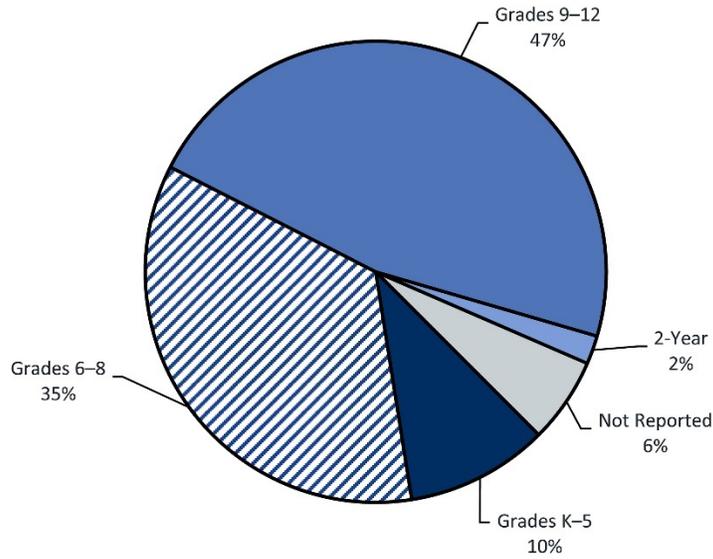


Students	Teachers	Other Participants
107,586	2,417	1,755

STUDENTS SERVED

107,586

PARTICIPANTS BY GRADE BAND



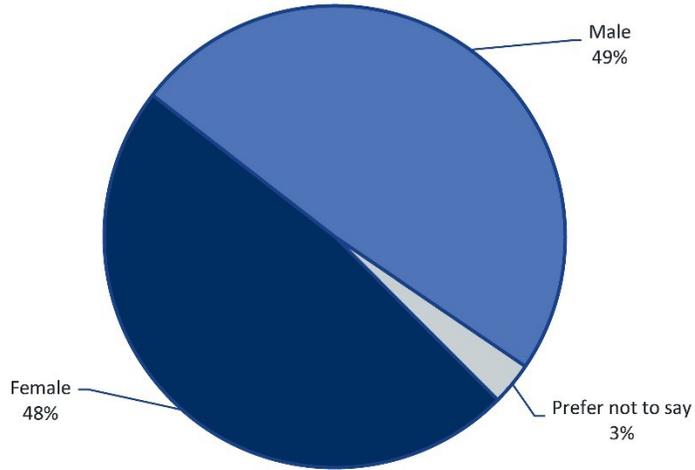
4-Year, Graduate, and Not in School are ≤ 0.5% and not visible in the graph.

Grades K-5	Grades 6-8	Grades 9-12	2-Year	4-Year	Graduate	Not in School	Not Reported*
10,421	37,357	50,383	1,751	576	319	225	6,704

NOTE. Demographic data was reported from registration, headcount, and estimation.

* A partner experienced technical difficulties with online registration for their event and was unable to collect grade level data.

GENDER: 99,257

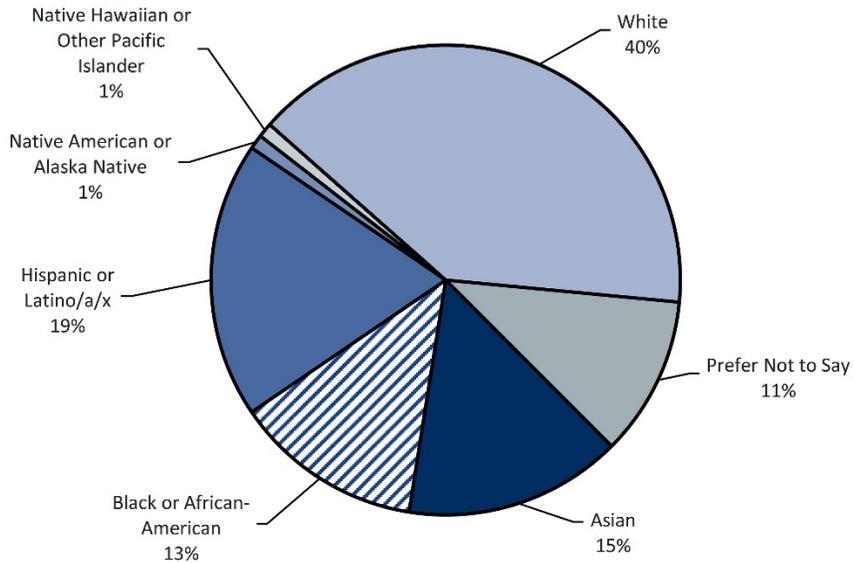


Non-binary is < 0.5% and not visible in the graph.

Female	Male	Non-binary	Prefer Not to Say
47,813	48,068	127	3,249

NOTE. Demographic data was reported from registration, headcount, and estimation.

RACE/ETHNICITY: 77,380



28% of student participants did not have demographic information reported.

Asian	Black or African-American	Hispanic or Latino/a/x	Native American or Alaska Native	Native Hawaiian or Other Pacific Islander	White	Prefer Not to Say
11,812	10,109	14,881	545	999	30,720	8,314

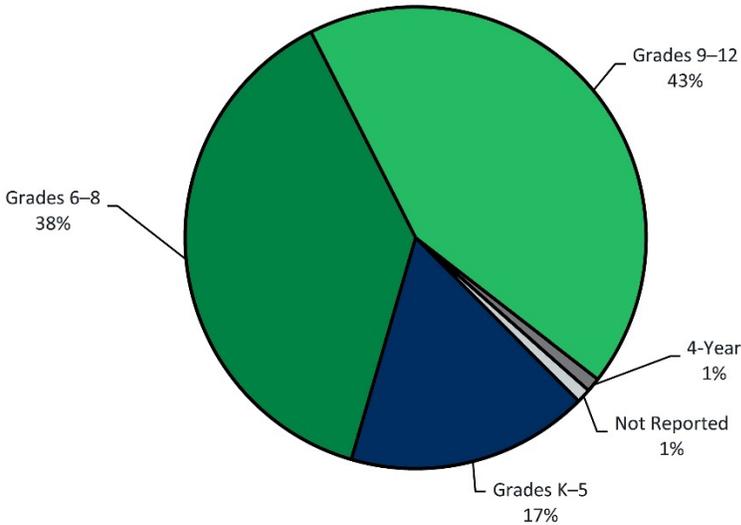
NOTE. Demographic data was reported from registration, headcount, and estimation.

Only gender and race/ethnicity data of sufficient confidence level in regard to the collection method used were included in the overall calculation for these categories. As such, overall totals from these two graphs will not match each other or the overall student participant total. Details are provided in the individual Partner Snapshots.

3

TEACHERS SERVED
2,417

PARTICIPANTS BY GRADE LEVEL TAUGHT



2-Year is < 0.5% and not visible in the graph.

Grades K-5	Grades 6-8	Grades 9-12	2-Year	4-Year	Not Reported
420	930	1,032	35	6	65

NOTE. Demographic data was reported from registration, headcount, and estimation.

4

OTHER PARTICIPANTS SERVED

1,755

School Counselors	School Administrators	University Personnel	Community Members	Parents	Other*
1,429	71	21	83	20	131

* Role not defined.

5

VOLUNTEERS

1,211

Teacher Volunteers	Program Alumni	Other Adult Volunteers	Other Student Volunteers	DoD Volunteers
32	67	129	41	942

78% of volunteers were DoD affiliated, with 95% of DoD volunteers working with *FIRST*.

LIMITATIONS

For 2020–21, DSEC asked STEM Outreach Partners to collect demographic data for students served that included gender, race/ethnicity, and whether students are military-connected. These data are used to study DSEC’s progress for the Serve Fundamental (increase opportunities for military-connected and underrepresented in STEM). The extent to which STEM Outreach Partners met this request varied considerably. Demographic information is detailed by program and partner in their individual snapshot sections, including how the partner collected the data (e.g., registration, headcount, estimation, or not reported).

IMPACT OF COVID-19

The ongoing pandemic continued to affect how STEM Outreach Partners and Hub Leads provided programming. Element 2 asked partners and hubs to respond to two items as part of the *DSEC Outcomes and Reflections Survey*:

- “Summarize any programmatic challenges presented by COVID-19 during the Option Year 1 period and how you were able to work-around and/or address these challenges.”
- “Summarize any new opportunities or learning that emerged from your work during the COVID-19 pandemic and how you are incorporating this into future DSEC work.”

Partner responses were coded and aggregated to determine the themes discussed in this section. These themes may shed light on the challenges and opportunities partners faced, along with the possibilities going forward.

CHALLENGES

Partner responses to this question clustered into three major themes: data collection, virtual programming, and participation.

DATA COLLECTION

Partners experienced challenges with survey data collection, including lower survey response rates following virtual events, compared with in-person events held in prior years. Additionally, the types of data available and the expectations about gathering data from schools and informal partners changed during COVID-19, particularly because access to students and teachers was limited. Partners faced challenges in gathering data from teachers (see Participation) and tracking military-connected students' participation through surveys.

VIRTUAL PROGRAMMING

The virtual nature of teaching and learning during COVID-19 shifted many partners' programming online. Those that required face-to-face engagement canceled their events. Many modified their plans so that they could deliver virtual events. In transitioning to virtual programming, some technology barriers emerged for underrepresented groups (e.g., students from low-income households) and participants who were unable to engage in hands-on STEM experiences. To address these barriers, partners such as MATHCOUNTS mailed resources to participants in the form of STEM kits and event boxes to provide hands-on experiences and laboratory techniques, flexible curricular options, and fun opportunities to engage with the event.

PARTICIPATION

As the COVID-19 crisis continued on, partners discovered that participation across groups of teachers, counselors, administrators, and students suffered because of limited access to resources and students in schools. Some partners had difficulties coordinating speakers and volunteers for events, and many volunteers cited burnout/exhaustion as reasons for not participating. Some teachers, counselors, and administrators experienced exhaustion/burnout, as well. Their participation in additional activities (particularly in the summer) was limited because of exhaustion/burnout from COVID-19 diagnoses, challenges transitioning to virtual/blended learning, and stress from daily challenges in schools. Therefore, the partners developed workarounds to support teachers, counselors, students, and administrators experiencing exhaustion or burnout, such as decreasing virtual event hours to reduce screen time for students and shifting programming to informal education spaces to not overwhelm schools.

NEW OPPORTUNITIES

Partner and hub responses to this question clustered into three major themes: broader audience, continuing programming, and partnerships.

BROADER AUDIENCE

Partners found that they could reach a broader audience due to the virtual nature of programming during the COVID-19 pandemic. All-virtual sessions garnered national participation, increasing participation among participants in other geographic areas. Many partners used this as an opportunity to develop new relationships with stakeholders, strengthen existing partnerships, and increase their footprint across the nation. The virtual nature of partners' work encouraged more engagement across traditionally underrepresented (e.g., low-income, rural, military-connected) or under resourced communities with low populations, that they may not have had the bandwidth to support in prior years. For example, NMSI was able to open up opportunities to more underrepresented students, and MATHCOUNTS expanded their reach to students from every U.S. region, military connected students, students of color, and girls.

CONTINUING PROGRAMMING

Partners plan to continue offering programs that were successful during the pandemic to participants. Given success with these programs, partners are excited to offer live virtual events as well as "on demand" events. For example, TIES found success with its on-demand programming at the DMV Hub's STEM Expo. Their success demonstrated that on-demand events, which are recorded and hosted online, can be accessible resources to more participants, beyond the day of the event. Adjustments to the partners' programming during COVID-19 also led to the development of some fully online curricula going forward. Meanwhile, other experiences, such as Learning Undeclared's Emerging Leaders program, successfully transitioned to a hybrid format, allowing them to retain 81% of their participants and remain adaptive to the ever-changing landscape of COVID-19.

PARTNERSHIPS

DSEC STEM Outreach Partners engaged in positive partnerships with each other and with Hub Leads that they feel will strengthen their programs. These partnerships resulted in co-presentations and work together at conferences, programming sessions, and professional development sessions. Partners expressed optimism in leveraging these partnerships to scale their efforts and promote their collective programs' impact.

PARTNER EVALUATION: PARTNER SNAPSHOTS

PARTNER INTRODUCTION

This section provides a snapshot of each partner's DSEC-funded activities. Partner profiles are listed by their membership level: CMC Members, Ongoing Partners, and Innovation Bloc Partners.

Each individual profile snapshot includes the following:

- **Progress toward logic model outcomes.** Each partner worked with Element 2 (AIR) to create a logic model focused on their DSEC-funded programming. This logic model conveyed how programs map to DSEC fundamentals, the immediate changes expected from program implementation, and the primary outcomes that followed implementation. From these logic models, we identified 3-4 immediate changes or primary outcomes and asked partners to provide information on their progress towards or evidence of meeting these benchmarks via the DSEC Outcomes and Reflections Survey. Partner responses in this report have been edited for clarity and conciseness.
- **Accomplishments and challenges in 2020-21.** Data collection activities asked partners to share what they felt were their greatest accomplishments and challenges over the past year. Partner responses in this report have been edited for clarity and conciseness.
- **Programs and participant data.** Partner statements of work provided program descriptions for each profile. Partners self-reported their participant data electronically via the DSEC Participation Survey.
- **Geographic reach.** Partners used an Excel template to document location data. Data across partners varied between the participant ZIP code level and the school level.
- **Network connectivity.** During 2020–21, STEM Outreach Partners and Hub Leads completed a monthly survey to provide data on their interactions with other partners and hubs. The data chapter presents this information in sociograms to show who a partner connected with and the type of connection that was made.

CMC MEMBER: FOR INSPIRATION AND RECOGNITION OF SCIENCE AND TECHNOLOGY (FIRST)



PARTNER PROGRAMS AND ACTIVITIES

For Inspiration and Recognition of Science and Technology (*FIRST*) provides programming for students in Grades PreK-12 in mentor-led activities that develop not only STEM skills but also communication and leadership skills. *FIRST*'s DSEC programming includes community-based and school-based teams.

FIRST provides a progression of team-based robotics challenges and opportunities designed to introduce students to engineering and coding in an engaging, inclusive, and creative classroom or after-school learning environment where students work collaboratively:

***FIRST*LEGO League** engages students ages 4-14 in guided robotics programming that emphasizes teamwork, discovery, and innovation.

During the 2020–21 season (OY1), *FIRST* switched to a league system that incorporated *FIRST* LEGO League Junior (2019–2020) to create a new organizational structure:

- *FIRST* LEGO League Discover, serving Grades PK-1, ages 4-6, non-competitive events.
- *FIRST* LEGO League Explore, serving Grades 2-4, ages 6-10, non-competitive events
- *FIRST* LEGO League Challenge, serving Grades 4-8, ages 9-14, both non-competitive and competitive events

***FIRST*Tech Challenge** focuses on students in Grades 7-12 (ages 12-18) who form teams that design, build, program, and operate robots for competitions.

***FIRST*Robotics Competition** is a program for high school students (Grades 9-12, ages 14-18) to gain engineering experience by working as a team to raise funds, design a team "brand," and build and program robots to compete against other teams. Students build an increased understanding of mechanical and electrical engineering principles and can network with

other *FIRST* participants, mentors, and coaches during the design process and following the events.

***FIRST*: Class Packs** are curricular options for educators to implement in either classrooms or structured afterschool settings for students in pre-kindergarten through Grade 12. These materials are only available to schools and organizations rather than through community-sponsored teams. DSEC currently only sponsors Class Packs at the PK-1 grade level which aligns with *FIRST* Lego League: Discover level.

PROGRESS TOWARD LOGIC MODEL OUTCOMES

INCREASE STUDENT CODING AND PROGRAMMING SKILLS.

Increase student coding and programming skills. Participants in the *FIRST* LEGO League, *FIRST* Tech Challenge, and *FIRST* Robotics worked to increase their coding and programming skills. Age-appropriate concepts and techniques were introduced during each program, designed to help prepare participants for potential future STEM careers. In a participant survey conducted at the end of the 2020–21 season, an average of 88% of *FIRST* LEGO League participants reported an increase in coding/programming skills. For *FIRST* Tech Challenge, 67% of participants reported an increase in these skills. For *FIRST* Robotics Competition participants, 52% of participants report an increase for coding/programming skills.

INCREASE STUDENT TEAMWORK.

Increase student teamwork. *FIRST* emphasizes core values, which include discovery, innovation, impact, inclusion, teamwork, and fun, in all programming. In a survey conducted at the end of the 2020–21 season, 88% of respondents of *FIRST* LEGO League, 91% of *FIRST* Tech Challenge, and 89% of *FIRST* Robotics reported an increase in teamwork skills.

INCREASE STUDENT KNOWLEDGE OF ENGINEERING PRINCIPLES AND PROCESSES.

Increase student knowledge of engineering principles and processes. The more advanced programs of *FIRST* Tech Challenge (for ages 12–18) and *FIRST* Robotics Competition (for ages 14–18) are designed to help students gain an understanding of engineering principles and how they are applied, particularly in mechanical and

electrical engineering. At the end of the 2020–21 season, *FIRST* surveyed participants, asking if they had an increased understanding of the engineering process. Eighty-nine percent of respondents from *FIRST* Tech Challenge reported an increased understanding of the engineering process, and 81% of respondents for *FIRST* Robotics Competition reported an increased understanding of the engineering process.

DEVELOP CONNECTIONS TO A STEM LEARNING NETWORK.

Develop connections to a STEM learning network that includes fellow students and STEM professionals. Throughout the season, student participants network with other *FIRST* participants, mentors, and/or coaches during the design process and at events. *FIRST* has a broad set of volunteers, educators, and sponsors that include more than 200 Fortune 500 companies. Each of the *FIRST* teams that receive funding through DSEC also work directly with at least one member of the DoD STEM workforce, offering student participants insight into the STEM careers available within DoD. 724 DoD STEM employees served as coaches and mentors to the teams to ensure that students' STEM experiences at *FIRST* are connected to the DoD STEM workforce and DoD careers.

ACCOMPLISHMENTS AND CHALLENGES IN 2020–21

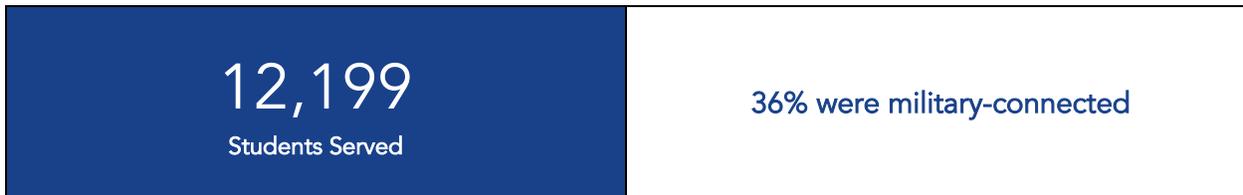
Among *FIRST*'s accomplishments this year was keeping its DSEC-sponsored teams connected with DoD employees who mentored the teams as volunteers throughout the season. These employee mentors expose *FIRST* participants to real-world STEM career opportunities within the DoD and build lasting relationships with the participants. This direct connection to a DoD employee provides student participants insight into STEM careers available within the DoD.

Navigating COVID-19 and its ramifications on in-person events were challenges for *FIRST* during 2020–21. At the end of January 2021, *FIRST* decided to suspend all official in-person robotics competitions. *FIRST* allowed Tech Challenges and LEGO league events to be held remotely or in a hybrid fashion depending on local conditions. With health and safety at the forefront, *FIRST* continued to work with educators, parents, and community leaders to offer program and event modifications.

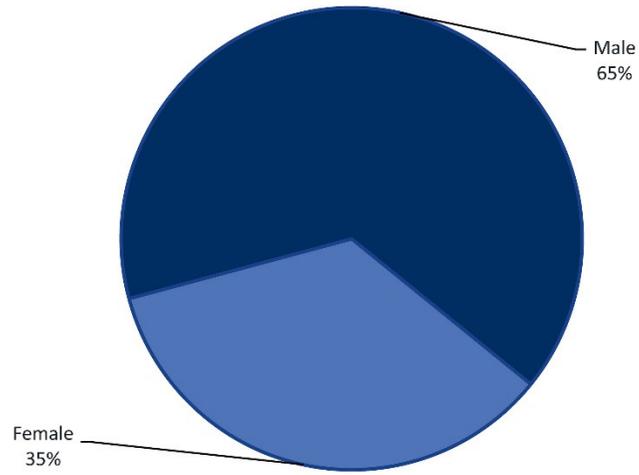
NOTE. DEMOGRAPHIC DATA WAS REPORTED AS REGISTRATION.

Registration. The partner used a registration form to collect data. In some cases, this was provided directly by the participant, while in others a teacher or coach registered a class or team.

STUDENTS

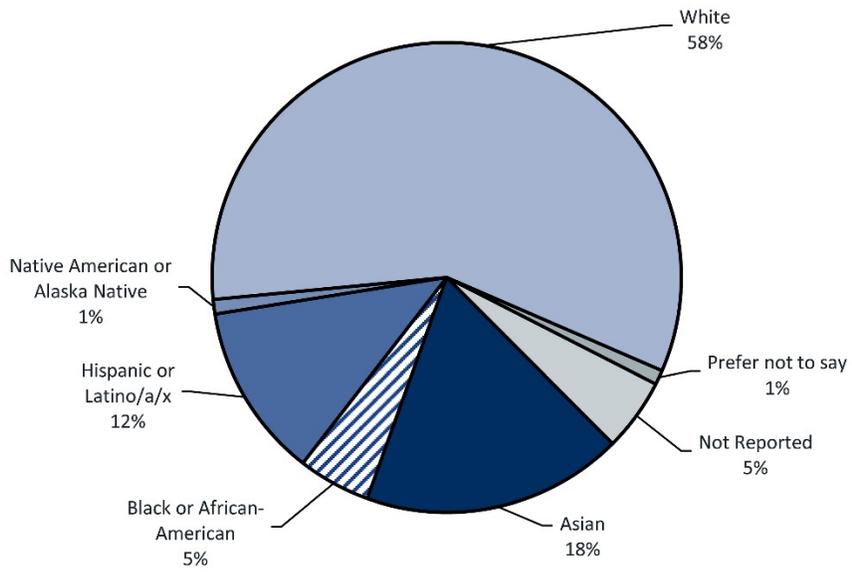


STUDENT GENDER



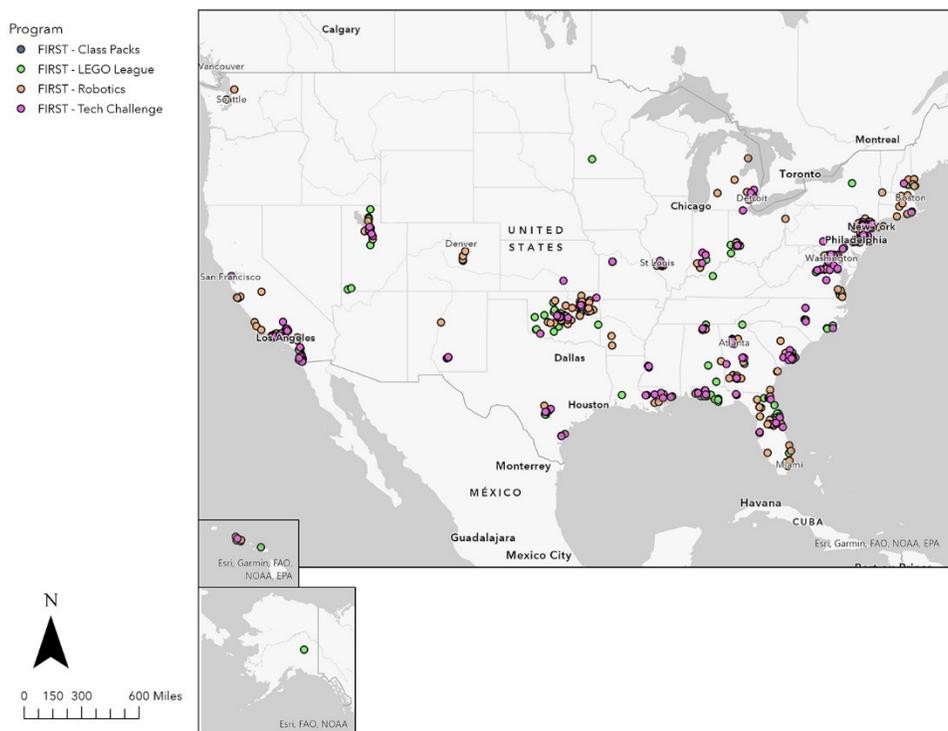
NOTE. Demographic data was reported from registration.

STUDENT RACE/ETHNICITY



GEOGRAPHIC REACH

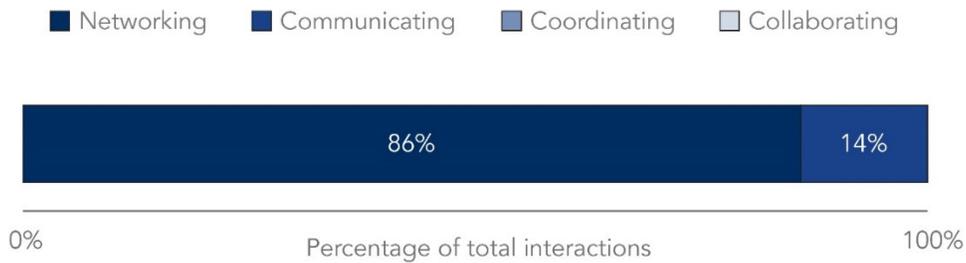
FIRST programming includes both school-based as well as community-based teams. These teams were spread across 34 states in the United States, with the largest clusters of teams on the East Coast as well as Florida and Oklahoma. *FIRST* programming also includes DoDEA schools located throughout the world, which can be viewed by scrolling out in the map.



NETWORK CONNECTIVITY

FIRST is connected to six other DSEC partners and one hub lead. In total, *FIRST* is connected to seven other organizations within the network, which is slightly lower than the average of nine.

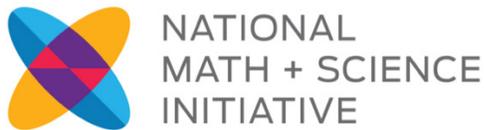
FIRST's connections occurred primarily at the networking level.



- **Networking:** exchanging information
- **Communicating:** building a shared understanding
- **Coordinating:** creating complementary programming
- **Collaborating:** jointly designing or delivering programming

To calculate the level of interaction between any two partners over Option Year 1, AIR used an average of the reported levels of interaction across survey administrations, taking into account that some partners joined DSEC midway through the year. For analyses related to the focal populations (military-connected students, underrepresented students, DoD facilities and personnel, and DoD STEM alumni) AIR summed reported interactions across the survey administrations rather than taking an average.

CMC MEMBER: NATIONAL MATH AND SCIENCE INITIATIVE (NMSI)



PARTNER PROGRAMS AND ACTIVITIES

The National Math and Science Initiative (NMSI) provides programming for schools and teachers.

College Readiness Program (CRP) supports high school Advanced Placement (AP) coursework, predominantly in STEM content areas, to better prepare students for college and the workforce. Programming within CRP includes:

- **Teacher supports** include hands-on training and classroom resources
- **Student supports** include study resources aligned to their AP classes and additional study supports

Laying the Foundation Summer Academy helps Grade 6-12 teachers build and maintain STEM subject matter expertise to enhance their leadership in classrooms.

PROGRESS TOWARD LOGIC MODEL OUTCOMES

INCREASE THE NUMBER OF STUDENTS TAKING AP STEM EXAMS.

Increase the number of students taking AP STEM exams. Despite disruptions caused by the pandemic, NMSI continued to provide STEM AP opportunities to students and teachers through the College Readiness Program (CRP). CRP students took more than 27,000 AP exams in Spring 2021, with over 10,000 students earning qualifying scores of 3 or better.

STUDENTS APPLY TO POSTSECONDARY EDUCATIONAL INSTITUTIONS.

Students apply to postsecondary educational institutions. As part of the College Readiness Program (CRP), NMSI works towards having students apply to postsecondary educational institutions as an outcome. NMSI requests data from the National Student Clearinghouse in the fall.

ENABLE STUDENTS TO SEE THEMSELVES IN STEM CAREERS.

Enable students to see themselves in STEM careers. On the Spring 2021 teacher survey, 113 out of 171 teachers reported that their participation in NMSI's program resulted in their students developing an awareness of STEM careers and STEM DoD research careers.

INCREASE TEACHER CONFIDENCE IN ENGAGING STUDENTS IN STEM CONTENT.

Increase teacher confidence in engaging students in STEM content. On the Spring 2021 teacher survey, 113 out of 171 teachers agreed that they were confident in teaching technical STEM skills to their students. On the same survey, 137 out of 171 teachers agreed that they had a strong understanding of the concepts they need to teach in their STEM field.

ACCOMPLISHMENTS AND CHALLENGES IN 2020-21

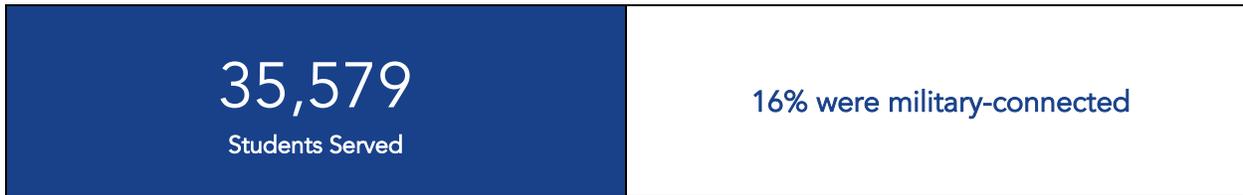
Given the disruptions resulting from the pandemic in the past academic year, NMSI was still able to offer teacher training and open up opportunities for students who were underrepresented in STEM disciplines. More than 35,000 students took AP STEM courses in schools served by NMSI, and more than 5,800 of them were self-identified as military connected.

One of NMSI's challenges this year was obtaining teacher feedback; not as many teachers in the CRP completed surveys as was expected. In response, NMSI better articulated expectations to the teachers in the Laying the Foundation Summer Academy regarding data collection requirements.

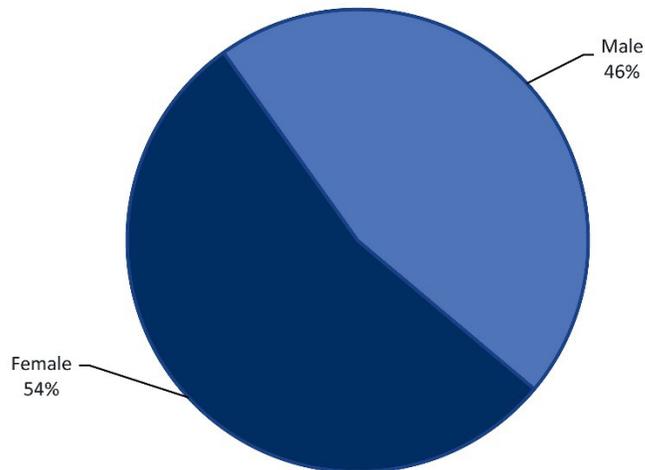
NOTE. DEMOGRAPHIC DATA WAS REPORTED AS REGISTRATION.

Registration. The partner used a registration form to collect data. In some cases, this was provided directly by the participant, while in others a teacher or coach registered a class or team.

STUDENTS



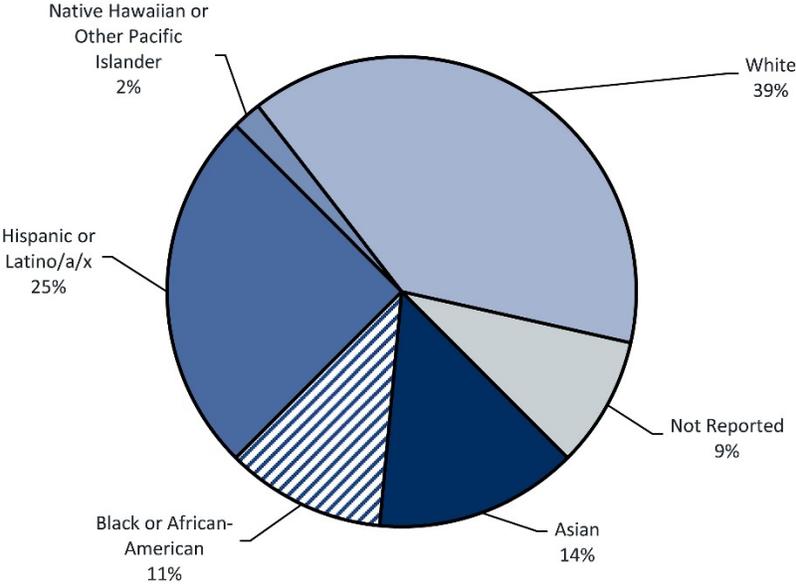
STUDENT GENDER



Non-binary is < 0.5% and not visible in the graph.

NOTE. Demographic data was reported from registration.

STUDENT RACE/ETHNICITY



Native American or Alaska Native and **Prefer not to say** are < 0.5% and not visible in the graph.

NOTE. Demographic data was reported from registration.

TEACHERS

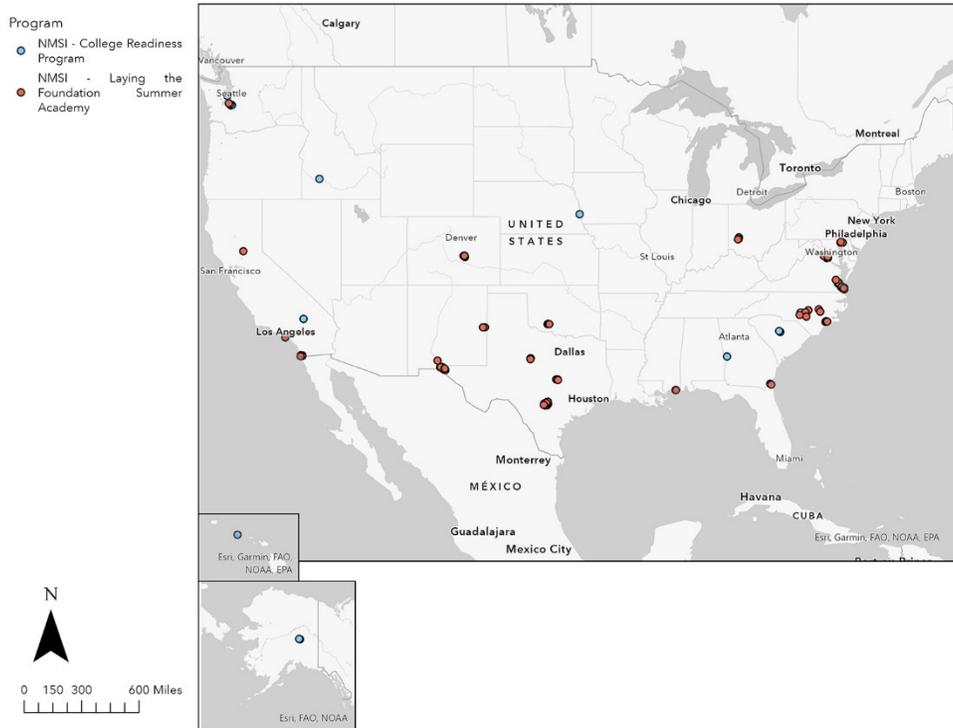


TEACHER UNDERREPRESENTED POPULATION DATA NOT REPORTED.

TEACHER TITLE I DATA NOT REPORTED.

GEOGRAPHIC REACH

Schools in 17 states participated in the NMSI programming, with concentrations in Texas, Washington, D.C., North Carolina, and Virginia.



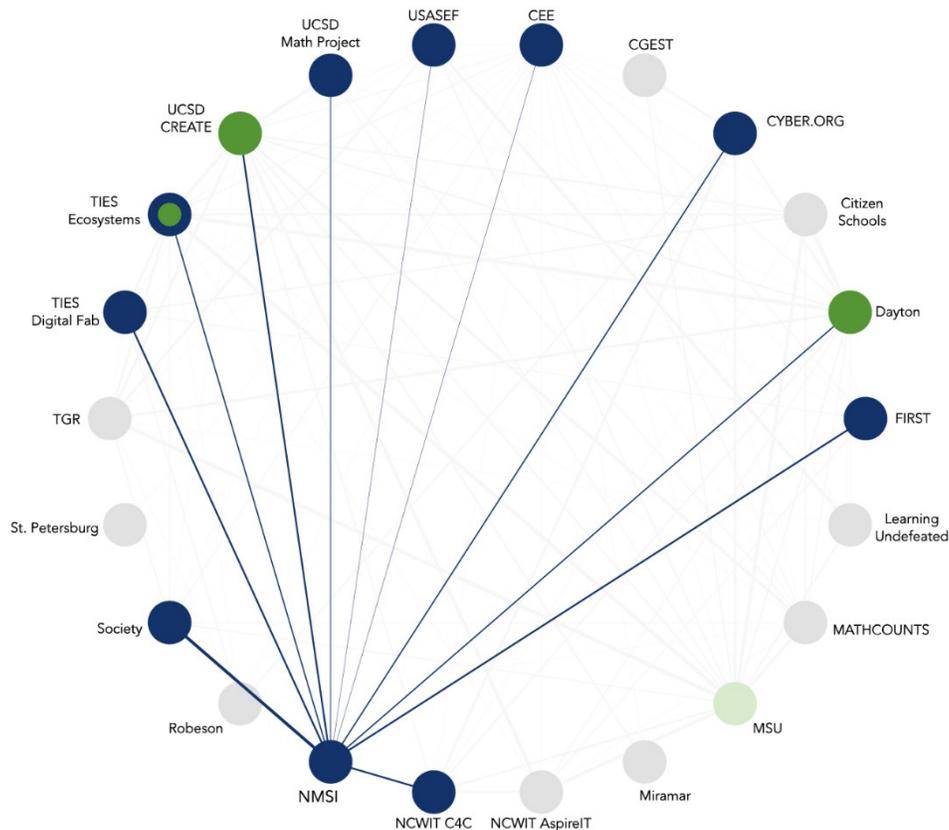
NETWORK CONNECTIVITY

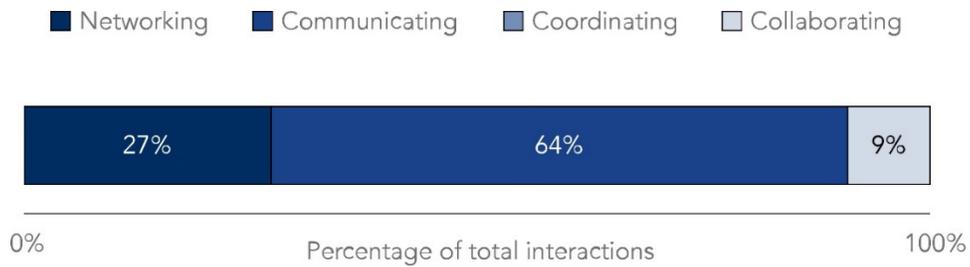
NMSI is connected to eight other DSEC partners, one Hub Lead Support Partner, and two hub leads. In total, NMSI is connected to 11 other organizations within the network, which is slightly greater than the average of nine.

NMSI's connections occurred primarily at the communicating level, with connections also occurring at the networking and collaborating levels.

NMSI reported receiving support from nine organizations (CYBER.ORG, Dayton, *FIRST*, TIES Ecosystems, TIES Digital Fab, Society, UCSD CREATE, UCSD Math Project, and USASEF) with coordinating outreach or delivering programs to military-connected students. Eleven organizations (CEE, Dayton, CYBER.ORG, *FIRST*, MATHCOUNTS, NCWIT AspireIT, NCWIT C4C, Society, TIES Digital Fab, TGR, and UCSD CREATE) reported receiving support from NMSI related to this focal population.

NMSI reported receiving support from nine organizations (CYBER.ORG, Dayton, *FIRST*, Society, TIES Digital Fab, TIES Ecosystems, UCSD CREATE, UCSD Math Project and USASEF) with coordinating outreach or delivering programs to schools that serve underrepresented students. Nine organizations (CEE, CYBER.ORG, *FIRST*, Society, NCWIT C4C, TIES Digital Fab, TIES Ecosystems, UCSD CREATE, and USASEF) reported receiving support from NMSI related to this focal population.





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- **Communicating:** building a shared understanding
- **Coordinating:** creating complementary programming
- **Collaborating:** jointly designing or delivering programming

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ARIZONA STATE UNIVERSITY CENTER FOR GENDER EQUITY IN SCIENCE AND TECHNOLOGY (CGEST)



PROGRESS TOWARD LOGIC MODEL OUTCOMES

BUILD PARTICIPANTS' ABILITY AND SKILLS TO PRESENT THEIR FINDINGS AND WORK.

Build participants' ability and skills to present their findings and work. This year, participants created and presented a project that reflected their identities and actions to address a social issue in their community. Participants programmed using micro bits (spring 2021), created short public service announcements for presentation, and designed and presented topics of interest through the coalition projects (fall 2020).

DEVELOP A COMMUNITY OF SUPPORT.

Develop a community of support among their peers, parents, cultural advisors, and community. Programming goals included learning the importance of collaboration as groups shared their thoughts connected to the content and social issues. CGEST created videos of women of color in computer science careers as representation and motivation for the participants and exposed them to multiple mentors through guest speakers from CYBER.ORG, Hawaii community partners, and mentor teachers. These lessons were designed to encourage the young women through the connectedness tenet of culturally responsive computing to understand their responsibilities to self and community for social change.

UNDERSTAND THE EFFECTS OF DATA CREATION ON OTHERS.

Understand the potential effects of data creation, data collection/storage, and data dissemination on participants and others. The Cyber Warriors program purposefully includes a focus on improving access into the field of computer science for female students of color. CGEST conveyed to participants how their actions will impact future groups of Cyber Warriors and the importance of gaining their feedback so that others can be educated about what is needed to help them thrive in the field.

ACCOMPLISHMENTS AND CHALLENGES IN 2020-21

Being able to reach 32 Native Hawaiian girls, a historically underrepresented population, from the local community was a major accomplishment during 2020–21. CGEST revised its curriculum based on fall 2020 participant feedback to create a stronger curriculum for spring 2021. Responding to the Native Hawaiian community's input strengthened the work to encourage cultural pride and activism through the curriculum.

CGEST found it difficult to deliver an engaging online curriculum because Zoom fatigue became an issue. In response, CGEST made adaptations to the curriculum and shifted from 3-hour to 2-hour sessions.

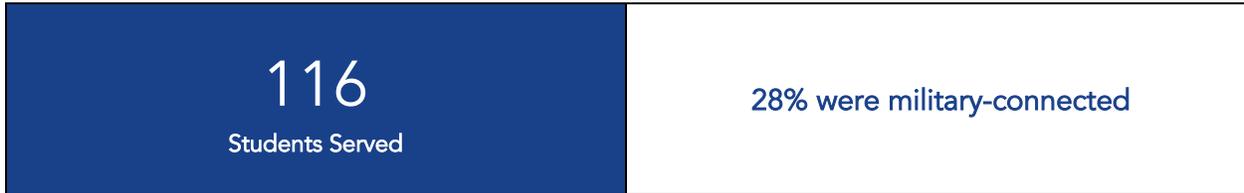
PROGRAMS AND PARTICIPANT DATA

CGEST's work with DSEC brings young women in Grades 9–12 into the **CompuGirls Cybersecurity Warriors Program**. In this program, young women learn to apply culturally responsive computer science learning to modern challenges inherent in their own communities. Through this program, young women from under-anticipated, underrepresented, and/or underserved communities develop and grow their identities as emerging cybersecurity advocates, leaders, and experts and go on to pursue degrees in computer science and/or cybersecurity.

NOTE. DEMOGRAPHIC DATA WAS REPORTED AS REGISTRATION.

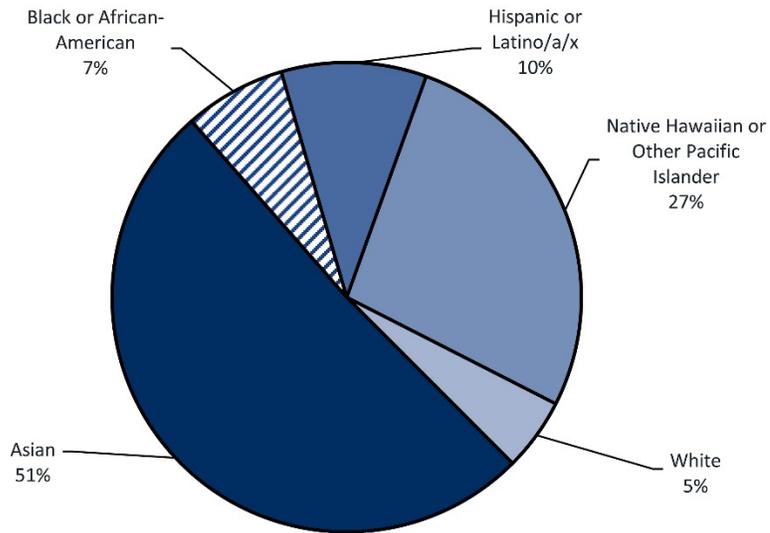
Registration. The partner used a registration form to collect data. In some cases, this was provided directly by the participant, while in others a teacher or coach registered a class or team.

STUDENTS



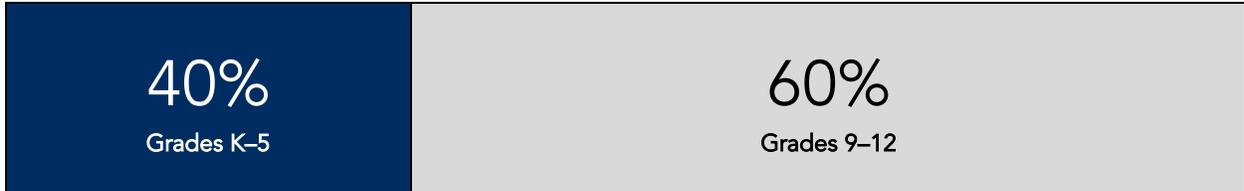
STUDENT GENDER: 100% FEMALE

STUDENT RACE/ETHNICITY



NOTE. Demographic data was reported as registration.

TEACHERS

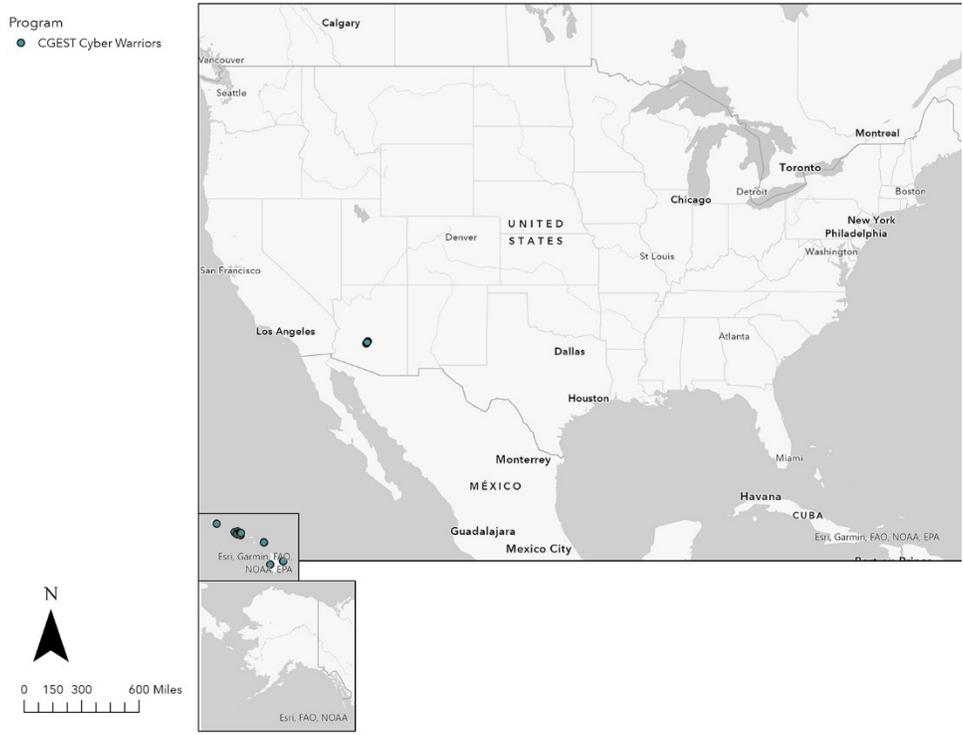


TEACHERS FROM UNDERREPRESENTED POPULATIONS: 100%

TEACHER TITLE I DATA NOT REPORTED.

GEOGRAPHIC REACH

The majority of CGEST participants' schools (30) were in Hawaii, with a small number in Arizona (three).



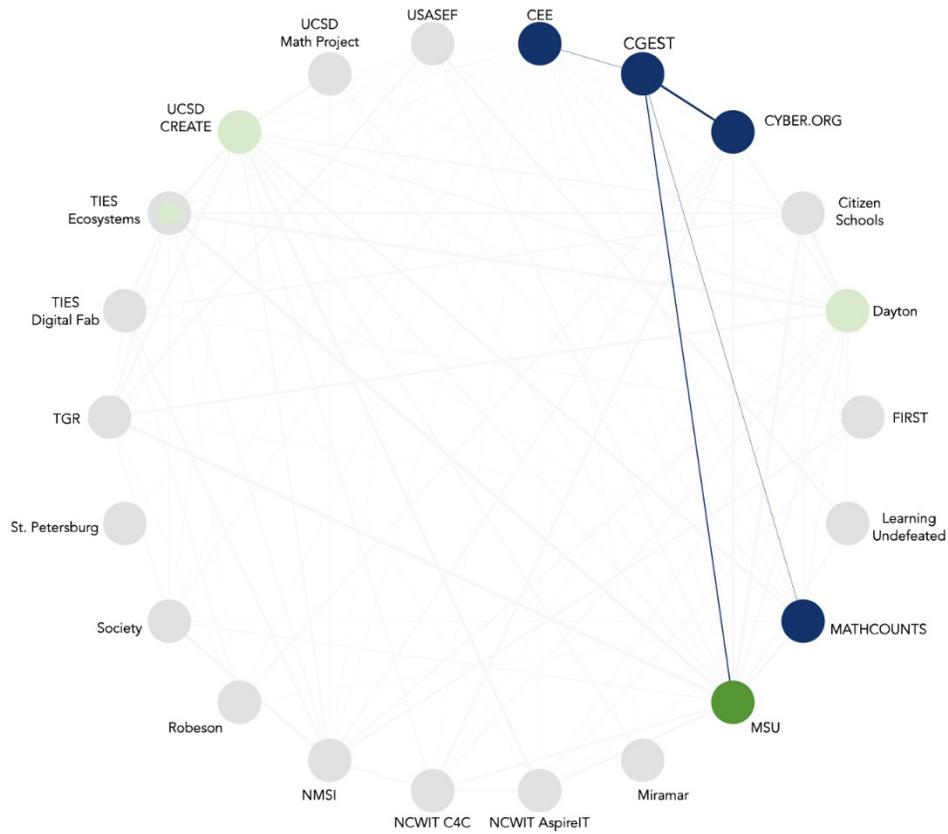
NETWORK CONNECTIVITY

CGEST is connected to three other STEM Outreach Partners and one Hub Lead. In total, CGEST is connected to four other organizations within the network, which is lower than the average of nine.

Fifty percent of CGEST’s connections occurred at the networking level. CGEST also interacted with one organization at the communicating level and one organization at the coordinating level.

CGEST reported receiving support from one organization (CYBER.ORG) with coordinating outreach or delivering programs to military-connected students. One organization (CYBER.ORG) reported receiving support from CGEST related to this focal population.

CGEST reported receiving support from two organizations (CYBER.ORG and MSU) with coordinating outreach or delivering programs to schools that serve underrepresented students. Three organizations (CYBER.ORG, MATHCOUNTS, and MSU) reported receiving support from CGEST related to this focal population.



Networking
 Communicating
 Coordinating
 Collaborating



0% Percentage of total interactions 100%

- **Networking:** exchanging information
- **Communicating:** building a shared understanding
- **Coordinating:** creating complementary programming
- **Collaborating:** jointly designing or delivering programming

To calculate the level of interaction between any two partners over Option Year 1, AIR used an average of the reported levels of interaction across survey administrations, taking into account that some partners joined DSEC midway through the year. For analyses related to the focal populations (military-connected students, underrepresented students, DoD facilities and personnel, and DoD STEM alumni) AIR summed reported interactions across the survey administrations rather than taking an average.

CENTER FOR EXCELLENCE IN EDUCATION (CEE)

Excellence

Center for Excellence in Education

PROGRESS TOWARD LOGIC MODEL OUTCOMES

INCREASE SKILLS IN STEM FOR SCHOLARS.

Increase skills in STEM for scholars, such as process skills, report writing, and communication. Students attend academic lectures and workshops the first week and then engage for about 1 month in original scientific research mentored by scientists and engineers around the globe. At the end, students complete written reports and deliver oral presentations at a symposium. Through this experience, CEE anticipated participants would gain skills in data analysis, report writing, and data presentation in STEM.

INCREASE KNOWLEDGE OF WORKING WITHIN DOD STEM LABS AND DOD STEM RESEARCH.

Increase knowledge of working within DoD STEM labs and DoD STEM research. During RSI participation, students engaged in original scientific research mentored by scientists and engineers around the globe. In the evening, students had the opportunity to attend distinguished guest lectures with DoD scientists, who discussed their careers in DoD STEM research and their work in DoD STEM labs. Through these experiences, CEE anticipated students making connections and receiving mentorship from career scientists and engineers, especially in DoD STEM labs and research.

Research Science Institute and USA Biology Olympiad alumni also provided an opportunity for current college students to conduct individual research with scientists and engineers in DoD labs throughout the United States. In summer 2021, 12 students conducted research with Air Force scientists in New York, Texas, Ohio, and New Mexico.

ACCOMPLISHMENTS AND CHALLENGES IN 2020-21

CEE's greatest accomplishment was providing students with research opportunities, including in DoD labs. Having a DoD scientist speak with the RSI group was an event that generated a lot of interest in the work being done at DoD. It helped students understand that they could be civilians in the DoD research space.

Recruiting students from military-connected schools remains a challenge. Attention will be focused in fall 2021 on working with Department of Defense Education Activity Schools.

PROGRAMS AND PARTICIPANT DATA

Center for Excellence in Education (CEE) implements two application-based programs for high school students and undergraduates that provide summer STEM research experiences.

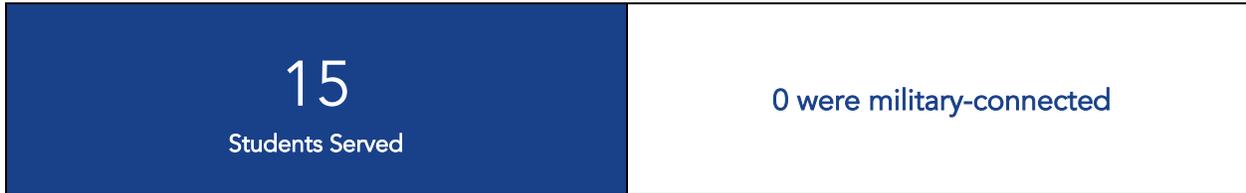
1

Research Science Institute (RSI) is a program that supports 15 high school students each summer to conduct original STEM research and gain hands-on experience working as a part of a research team in a corporate, academic, or government setting. These scholars also gain knowledge of STEM disciplines and areas of interest, as well as exposure to opportunities to pursue work in research.

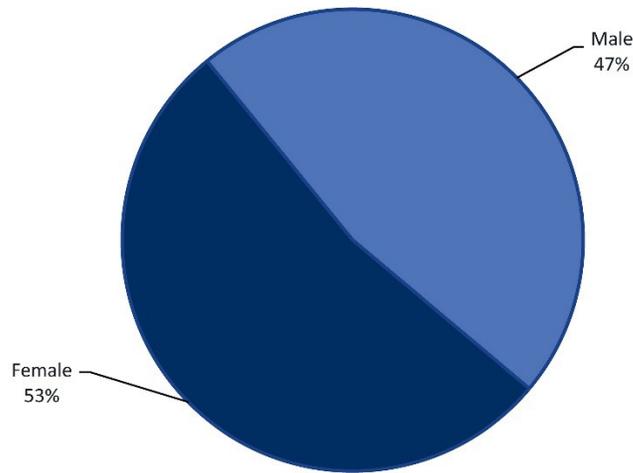
NOTE. DEMOGRAPHIC DATA WAS REPORTED AS HEADCOUNT.

Headcount. The partner inferred information based on what was seen during program implementation.

STUDENTS



STUDENT GENDER



NOTE. Demographic data was reported as headcount.

STUDENT RACE/ETHNICITY DATA NOT REPORTED.

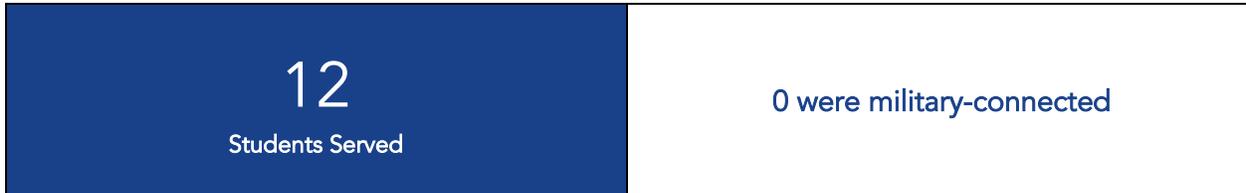
2

DoD STEM Research Internships are available for CEE alumni at the undergraduate level, providing them with the opportunity to complete an internship with DoD laboratories.

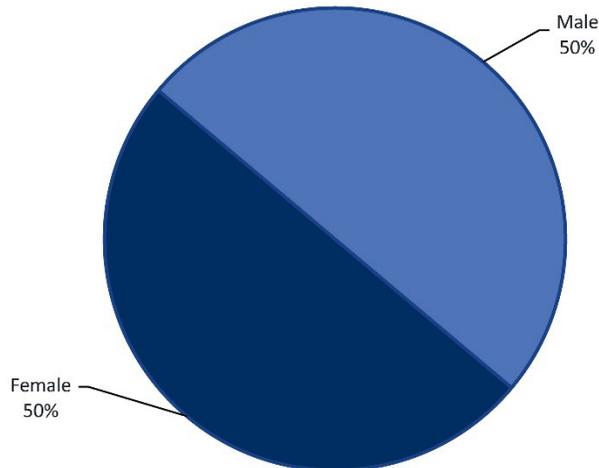
NOTE. DEMOGRAPHIC DATA WAS REPORTED AS HEADCOUNT.

Headcount. The partner inferred information based on what was seen during program implementation.

STUDENTS



STUDENT GENDER



NOTE. Demographic data was reported as headcount.

STUDENT RACE/ETHNICITY DATA NOT REPORTED.

GEOGRAPHIC REACH

School-level data were not available for CEE programs. Individual CEE participants came from 17 states across the United States, including Texas, Massachusetts, Illinois, Oregon, and Colorado.



NETWORK CONNECTIVITY

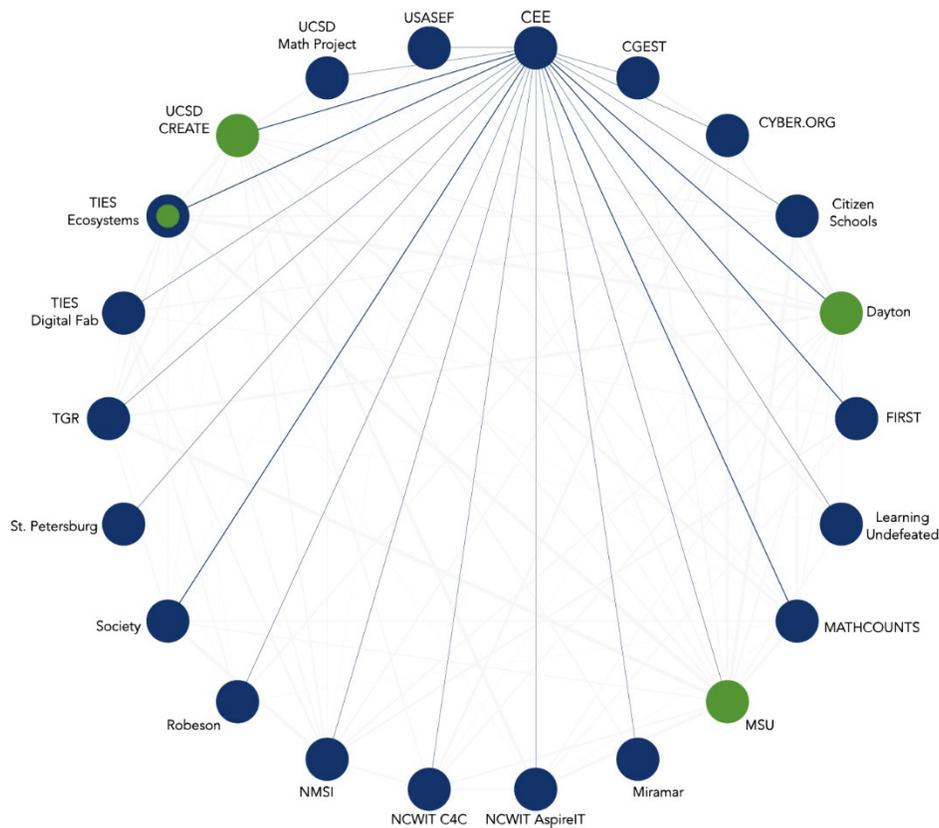
CEE is connected to 17 other STEM Outreach Partners, one Hub Support Partner, and two Hub Leads. In total, CGEST is connected to 21 other organizations within the network, which is greater than the average of nine.

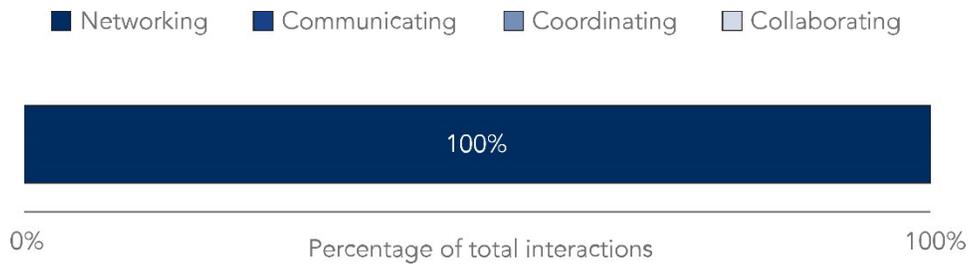
CEE's connections occurred at the networking level.

CEE reported receiving support from two organizations (DRSC and NMSI) with coordinating outreach or delivering programs to military-connected students. Two organizations (TIES Ecosystems and UCSD CREATE) reported receiving support from CEE related to this focal population.

CEE reported receiving support from 10 organizations (CYBER.ORG, DRSC, MATHCOUNTS, MSU, NCWIT AspireIT, NMSI, Society, TIES Ecosystems, UCSD CREATE, and UCSD Math Project) with coordinating outreach or delivering programs to schools that serve students who are underrepresented in STEM.

Five organizations (MSU, NCWIT AspireIT, TIES Ecosystems, UCSD CREATE, and UCSD Math Project) reported receiving support from CEE related to this focal population.





- **Networking:** exchanging information
- **Communicating:** building a shared understanding
- **Coordinating:** creating complementary programming
- **Collaborating:** jointly designing or delivering programming

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CITIZEN SCHOOLS



PROGRESS TOWARD LOGIC MODEL OUTCOMES

INCREASE UNDERSTANDING OF CAREER PATHWAYS IN SCIENCE.

Increase understanding of career pathways in science for both teachers and students. In a post-program survey following their Catalyst work, most teachers stated that their Catalyst project helped students develop an interest in STEM careers. All participating teachers agreed or strongly agreed that STEM volunteers in their classrooms helped expose students to new ideas, experiences, and careers and inspired them to see possibilities for their future. Teachers also reported that participating in Catalyst helped increase their awareness of STEM opportunities for students (e.g., STEM programs, courses, degrees, and careers). Teachers felt that student participation in Catalyst inspired an interest in STEM topics for students traditionally underrepresented in STEM.

INCREASE STUDENTS' INTEREST IN PURSUING STEM CAREERS.

Increase students' interest in pursuing STEM careers and understanding career pathways. As part of their work, Maker Fellows led STEM workshops at five Cincinnati public schools and established and ran Wired Wednesdays, an opportunity for students to be introduced to the world of coding through fun-filled monthly activities using MicroBits and TinkerCAD. In a post-program survey, all host site supervisors agreed that the Maker Fellows' work helped increase students' interest in pursuing a career in STEM and supported students' understanding of future career pathways. Maker Fellows who could work directly with students agreed that their work helped inspire students' interest in earning a STEM degree.

MAKE CONNECTIONS WITH COMMUNITY-LEVEL STAKEHOLDERS.

Make connections with community-level stakeholders. Through the STEM coalition framework, Citizen Schools' partners leveraged Maker Fellows across the Greater Cincinnati STEM Coalition (GCSC) and Dayton STEM Ecosystem (DO STEM) to create 1,000 STEM kits for students in the Dayton region. Approximately 700 kits were distributed to 11 afterschool programs, and the remaining 300 kits were given to students attending Dayton Public Schools

or charter schools in the area. Ninety-five percent of the kits were distributed to students and families. GCSC and DRSC Maker Fellows in both Dayton and Cincinnati hosted weekly Zoom sessions for a month with students at the Boys and Girls Club of Dayton. These sessions offered students additional support and enabled them to further engage in STEM learning activities. Maker Fellows also created an industry advisory board composed of a wide range of members of the sewn product manufacturing industry to support the creation of a new curriculum. Overall, Maker Fellows established or expanded 40 partnerships with other organizations through their work at their host sites.

ACCOMPLISHMENTS AND CHALLENGES IN 2020-21

Despite the pandemic and its lingering effects, Citizen Schools was most proud to successfully launch both the Maker Fellow and Catalyst programs in Dayton. The Maker Fellows Institute kicked off the year, with Maker Fellows citing it as one of the most beneficial and impactful components of the learning pathway and their overall year of national service. Citizen Schools also engaged the DRSC within the national community of practice and will continue to support their network and partnerships during the 2021–22 year. The STEM kit project was their greatest programmatic accomplishment with respect to facilitating collaboration and impact via the DO STEM and the GCSC.

COVID-19 was the primary obstacle to providing programming this year. It affected teachers' ability to complete the full Catalyst course and forced planned in-person activities for Maker Fellows to a virtual environment. Despite not being able to engage the Dayton community in-person, Maker Fellows began building strong local relationships that will continue to grow across time.

PROGRAMS AND PARTICIPANT DATA

Citizen Schools' work with DSEC has three intertwining components that foster positive change in student interest and achievement in STEM pathways.

STEM Catalyst Partnerships with Dayton Public Schools supports teachers and volunteers in working with students on standards-aligned STEM projects.

Maker Fellows are trained and placed in the Dayton and DMV hub areas to support teachers and build community relations.

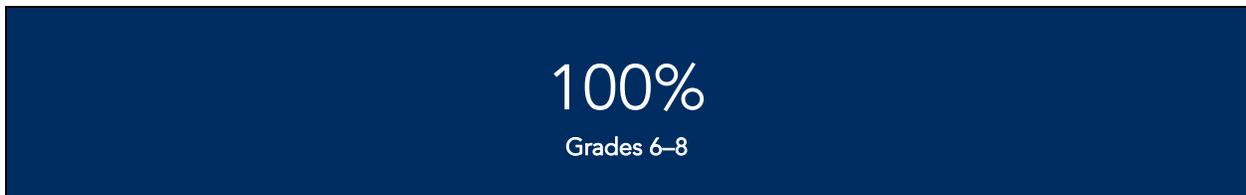
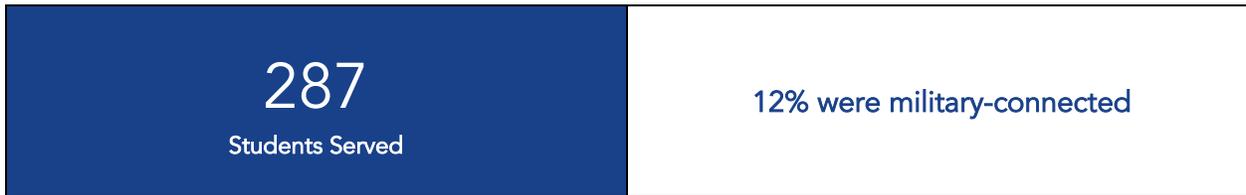
Bringing Dayton into the **expanded Cincinnati-based STEM ecosystem** to create a vision for STEM learning in the community.



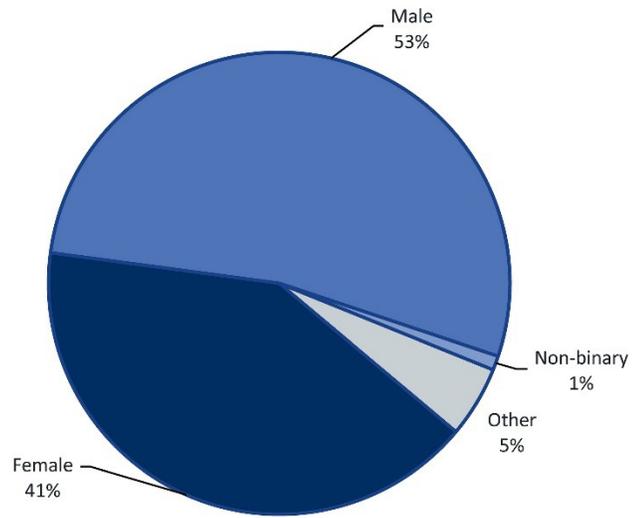
STEM CATALYST PARTNERSHIPS: STUDENTS

NOTE. DEMOGRAPHIC DATA WAS REPORTED AS AN ESTIMATION.

Estimation. The partner estimated information based on their knowledge of participants. Estimation varied considerably across partners. Some partners chose to report data as estimation because they were lacking specificity for a small number of participants, while others broadly estimated the makeup of participants.

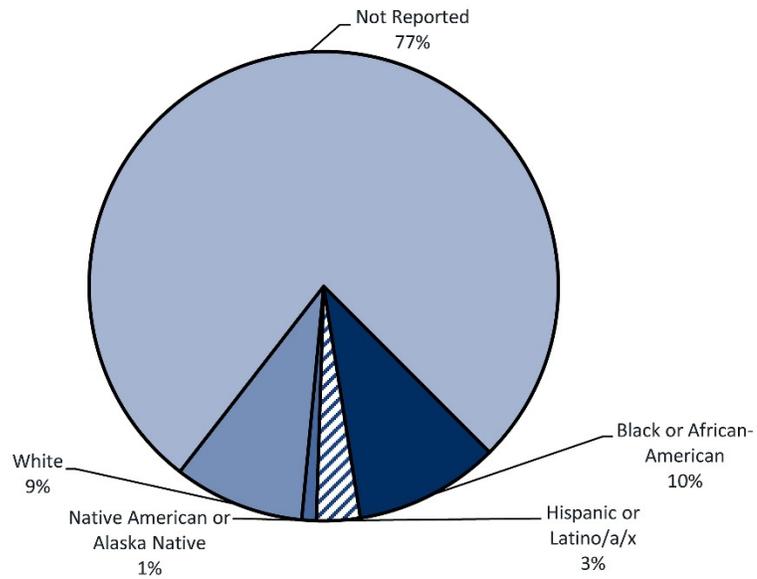


STUDENT GENDER



NOTE. Demographic data was reported as an estimation.

STUDENT RACE/ETHNICITY



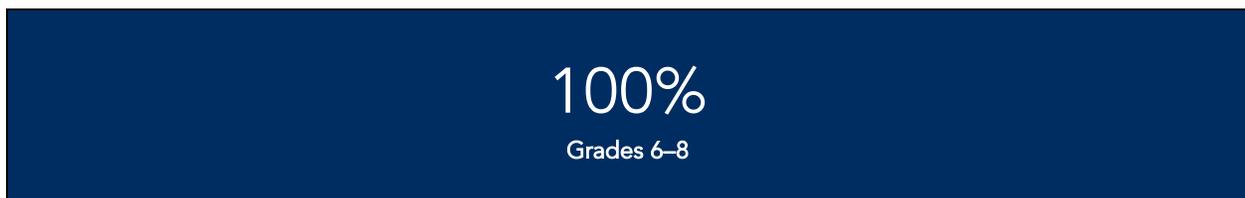
Asian is < 0.5% and not visible in the graph.

NOTE. Demographic data was reported as an estimation.

STEM CATALYST PARTNERSHIPS: TEACHERS

NOTE. DEMOGRAPHIC DATA WAS REPORTED AS AN ESTIMATION.

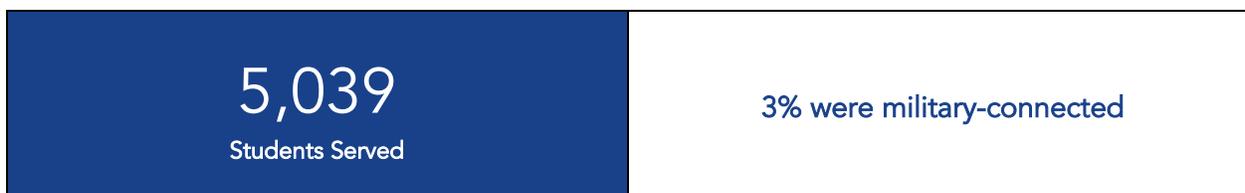
Estimation. The partner estimated information based on their knowledge of participants. Estimation varied considerably across partners. Some partners chose to report data as estimation because they were lacking specificity for a small number of participants, while others broadly estimated the makeup of participants.



TEACHERS FROM UNDERREPRESENTED POPULATIONS: 17%

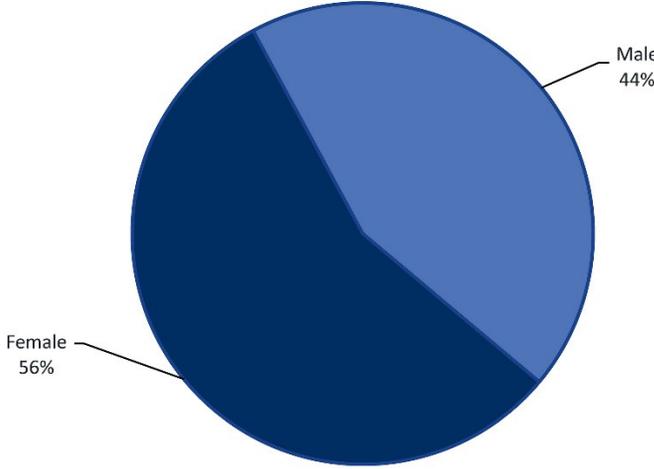
TEACHER TITLE I DATA NOT REPORTED.

MAKER FELLOWS: STUDENTS





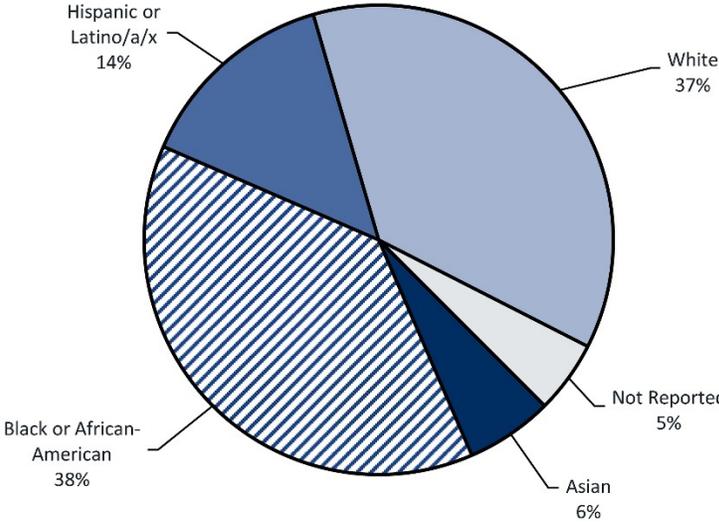
STUDENT GENDER



Other gender is < 0.5% and not visible in the graph.

NOTE. Demographic data was reported as an estimation.

STUDENT RACE/ETHNICITY



Native American or Alaska Native is < 0.5% and not visible in the graph.

NOTE. Demographic data was reported as an estimation.

GEOGRAPHIC REACH

Citizen Schools' programs involved participants from schools in the San Diego, Dayton, and DMV areas.



NETWORK CONNECTIVITY

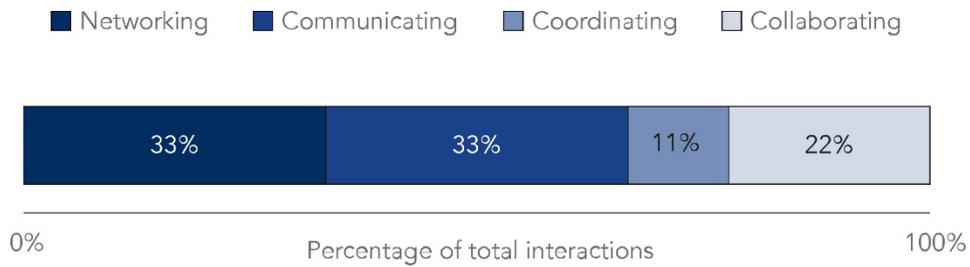
Citizen Schools is connected to five other DSEC Partners, one Hub Lead Support Partner, and three Hub Leads. In total, Citizen Schools is connected to nine other organizations within the network, which equals the average of nine.

Citizen Schools' connections occurred primarily at the networking and communicating levels but also included connections at the coordinating and collaborating levels.

Citizens Schools reported receiving support from four organizations (DRSC, Society, TIES Digital Fab, and TIES Ecosystems) with coordinating outreach or delivering programs to military-connected students. Four organizations (DRSC, MSU, TIES Ecosystems, and UCSD CREATE) reported receiving support from Citizens Schools related to this focal population.

Citizen Schools reported receiving support from 10 organizations (DRSC, MATHCOUNTS, Miramar, MSU, NCWIT C4C, Society, TIES Digital Fab, TIES Ecosystems, UCSD CREATE, and UCSD Math Project) with coordinating outreach or delivering programs to schools that serve students who are underrepresented in STEM. Seven organizations (DRSC, MATHCOUNTS, MSU, NCWIT C4C, TIES Digital Fab, TIES Ecosystems, and UCSD CREATE) reported receiving support from Citizen Schools related to this focal population.





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CYBER.ORG



PROGRESS TOWARD LOGIC MODEL OUTCOMES

INCREASE STUDENT KNOWLEDGE OF CYBERSECURITY AT AN AGE-APPROPRIATE LEVEL.

Increase student knowledge of cybersecurity at an age-appropriate level. CYBER.ORG provided students with opportunities to learn basic programming skills through block-based coding while featuring cybersecurity issues as a way to ground the coding activities at an age-appropriate level. These conversations included best practices for protecting your identity while online.

ACQUIRE 21ST CENTURY SKILLS AND SOFT SKILLS RELATED TO CYBERSECURITY.

Acquire 21st century skills and soft skills related to cybersecurity. CYBER.ORG focused on basic programming skills through block-based programming languages at the elementary and middle school levels. The activities included conversations about cybersecurity and recognizing the influence technology has on society. At the high school level, students engaged in deeper conversations and debates about cyber-related topics, including ethics, law, business, and artificial intelligence. Learning activities were designed to help students understand connections between the physical world and cyberspace and to identify the influences technology has on privacy and individual rights.

INCREASE INTEREST IN CYBERSECURITY CAREERS.

Increase interest in cybersecurity careers. To build interest in cybersecurity careers, the curriculum included topics that helped students see connections between cyber technology and careers.

ACCOMPLISHMENTS AND CHALLENGES IN 2020-21

CYBER.ORG identified its greatest accomplishment this year as beginning to develop support for Ellsworth Air Force Base (AFB). Ellsworth AFB needed curriculum and hardware to begin a strong STEM and cyber education program, and CYBER.ORG could provide training, materials, and advice for them. Through DSEC, Ellsworth AFB is starting a K–12 cyber pathway program that will not only serve the nearly 100 elementary students in the area but also build and support programs and opportunities for middle and high school students. CYBER.ORG is planning trainings and support for Douglas Middle School to act as the catalyst for expansion to the elementary and high schools as well as serve to build a stronger partnership between the schools and base.

Outreach was a challenge this year, with the only programming occurring in the Houghton school district near Barksdale AFB. Although CYBER.ORG wanted to reach additional bases and schools, communication was one sided. The need for a completely virtual curriculum was a major issue that teachers faced. CYBER.ORG began to modify its curriculum to be more virtual learning friendly but also was actively developing a completely virtual and paperless curriculum.

PROGRAMS AND PARTICIPANT DATA

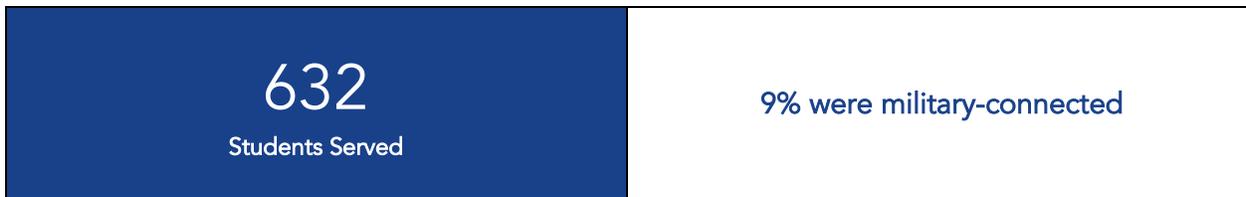
CYBER.ORG focuses on teacher professional development and the classroom curriculum to help teachers integrate cybersecurity content into their teaching. Their work with DSEC includes providing professional development for teachers to implement this curriculum into schools and base community centers.

During Option Year 1, CYBER.ORG worked with a single school district in Louisiana, **Houghton School District**.

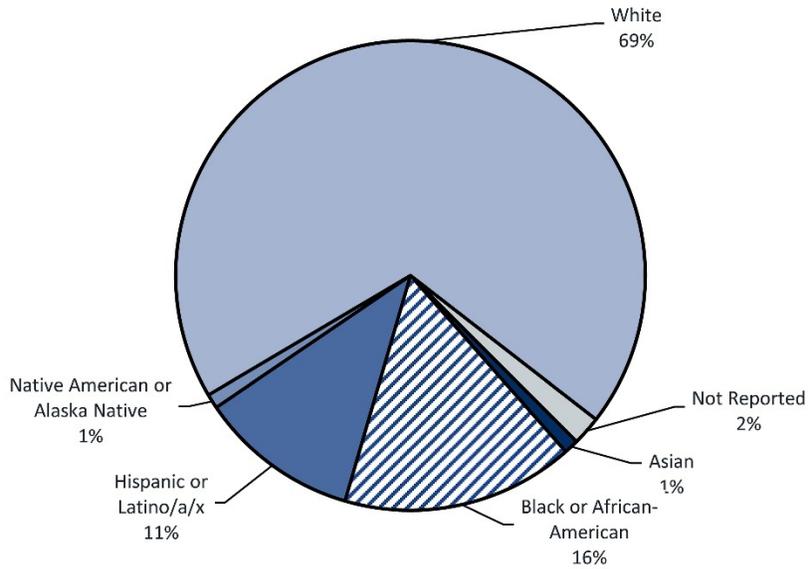
NOTE. DEMOGRAPHIC DATA WAS REPORTED AS ESTIMATION.

Estimation. The partner estimated information based on their knowledge of participants. Estimation varied considerably across partners. Some partners chose to report data as estimation because they were lacking specificity for a small number of participants, while others broadly estimated the makeup of participants.

STUDENTS



STUDENT RACE/ETHNICITY

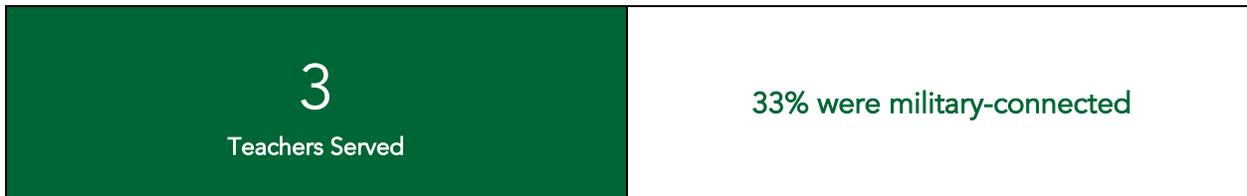


Native Hawaiian or Other Pacific Islander is < 0.5% and not visible in the graph.

NOTE. Demographic data was reported as estimation.

STUDENT GENDER DATA NOT REPORTED.

TEACHERS



TEACHERS FROM UNDERREPRESENTED POPULATIONS NOT REPORTED.

TEACHER TITLE I: 33%

GEOGRAPHIC REACH

All schools involved in CYBER.ORG programming were in Louisiana.



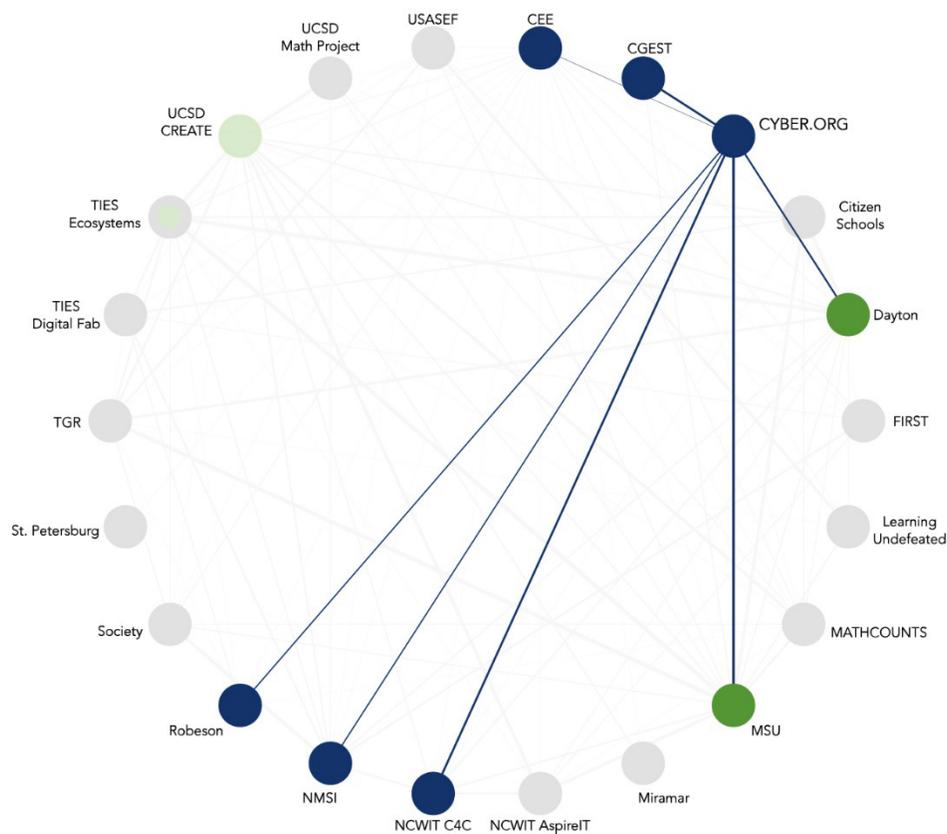
NETWORK CONNECTIVITY

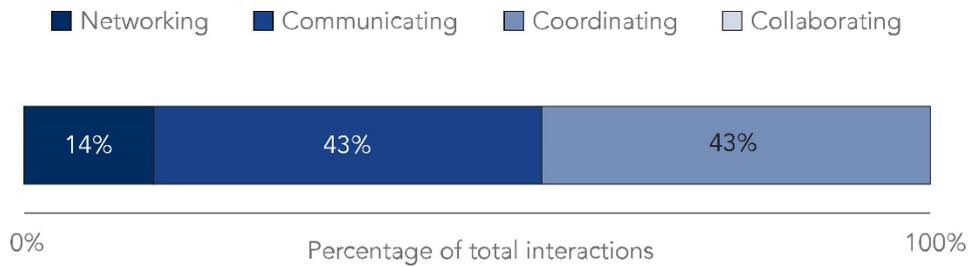
CYBER.ORG is connected to five other STEM Outreach Partners and two Hub Leads. In total, CYBER.ORG is connected to seven other organizations within the network, which is slightly lower than the average of nine.

CYBER.ORG's connections occurred primarily at the communicating and coordinating levels.

CYBER.ORG reported receiving support from seven organizations (CGEST, DRSC, MSU, NCWIT AspireIT, NCWIT C4C, NMSI, and Robeson) with coordinating outreach or delivering programs to military-connected students. Seven organizations (CGEST, DRSC, MSU, NCWIT AspireIT, NCWIT C4C, NMSI, and TIES Ecosystems) reported receiving support from CYBER.ORG related to this focal population.

CYBER.ORG reported receiving support from eight organizations (CGEST, DRSC, MATHCOUNTS, MSU, NCWIT AspireIT, NCWIT C4C, NMSI, and Robeson) with coordinating outreach or delivering programs to schools that serve students who are underrepresented in STEM. Nine organizations (CGEST, CEE, DRSC, MSU, NCWIT C4C, NMSI, Robeson, TGR, and TIES Ecosystems) reported receiving support from CYBER.ORG related to this focal population.





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- **Communicating:** building a shared understanding
- **Coordinating:** creating complementary programming
- **Collaborating:** jointly designing or delivering programming

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MATHCOUNTS



PROGRESS TOWARD LOGIC MODEL OUTCOMES

INCREASE STUDENT CONFIDENCE IN MATH.

Increase student confidence in math. Educators received resources to improve their students' problem-solving skills, such as the School Handbook with problems/solutions, the Problem of the Week, and video practice plans focusing on a particular math topic or skill. For educators participating in the Competition Series, 98% agreed that after participating in the program, their students could successfully tackle and answer math problems they had never seen before. In addition, 80% of Competition Series students said practices and time spent preparing for MATHCOUNTS competitions helped enhance their confidence in math. On National Math Club surveys, 95% of the club leaders said that, after participating in the program, their students had more confidence in their math and problem-solving skills. In addition, 88% of the club leaders agreed that their own confidence in teaching math/STEM grew since leading a math club.

INCREASE PARTICIPATION IN MATH PROGRAMMING, PARTICULARLY FROM UNDERREPRESENTED GROUPS.

Increase participation in math programming, particularly from underrepresented groups. Knowing a learning curve exists to participating in MATHCOUNTS competitions and turnover at Title I schools tends to be higher, MATHCOUNTS targeted recruitment, worked with STEM Outreach Partners, and gave extra supports to teachers in Title I schools and those with 40% or more students eligible for free or reduced-price lunch. Participation in the National Math Club remained free, and eligible schools received a 50% discount on the Competition Series. In the San Diego area, MATHCOUNTS worked with the DSEC STEM ambassador to recruit schools for the National Math Club. DoDEA schools overseas also participated in both the Competition Series and the National Math Club. Comparison data to show participation increase was not provided.

INCREASED POSITIVE ATTITUDES TOWARD STEM.

Increased positive attitudes toward STEM. MATHCOUNTS identified increasing positive attitudes toward STEM as an outcome of the Math Video Challenge. On this year's Math Video Club surveys, 87% of the advisors said holding Math Club meetings helped enhance their students' perception of their own math/STEM abilities, and 94% of the team advisors said that after participating in the Math Video Challenge, their students enjoyed math more.

ACCOMPLISHMENTS AND CHALLENGES IN 2020-21

MATHCOUNTS considers continuing all three programs during a pandemic as its greatest accomplishment. For end-of-season events, their priority was to come as close as possible to replicating the energy, excitement, and connection of a typical in-person event to ensure that every student felt celebrated and included. Students in final competitions received special event boxes by mail to honor their achievement. Throughout the online competition events, MATHCOUNTS provided guided events, such as a Cryptography Challenge, Virtual Escape Room, and Online Scavenger Hunt. Students were featured either live on camera or in photos/prerecorded videos. After the event concluded, MATHCOUNTS received numerous emails, cards, telephone calls, and online comments from students, parents, and teachers thanking the organization for making the event feel special and important for the students.

The participant numbers for Competition Series schools and National Math Club schools were consistent with previous years, which was amazing because of the concern that a greater share of these schools would be unable to participate because of pandemic-related challenges. Still, schools from earlier seasons (2018–19 and 2019–20) did not participate, and MATHCOUNTS could not fully engage coaches and advisors in-person. MATHCOUNTS began partnering with Hub Leads (DMV and San Diego) virtually to bring in area schools.

PROGRAMS AND PARTICIPANT DATA

MATHCOUNTS did not separate DSEC participation reporting from its overall participation reporting. MATHCOUNTS received DSEC funding, which amounts to approximately 11% of its overall operating budget in Option Year 1, so we adjusted the overall numbers reported to reflect this percentage.

MATHCOUNTS provides extracurricular programming in math for Grades 6–8 students of all skill levels to build confidence and improve attitudes about math and problem solving. Students join teams to compete in the MATHCOUNTS Competition Series where they have the chance to compete with students across the country. The National Math Club and the Math Video Challenge seek to inspire students to become life-long math learners.

1

MATHCOUNTS Competition Series is a national program providing middle school students with the opportunity to participate as team members in a national math competition. The Competition Series seeks to build confidence, expand student interest in math, and improve attitudes about math and problem solving.

NOTE. DEMOGRAPHIC DATA WAS REPORTED AS REGISTRATION.

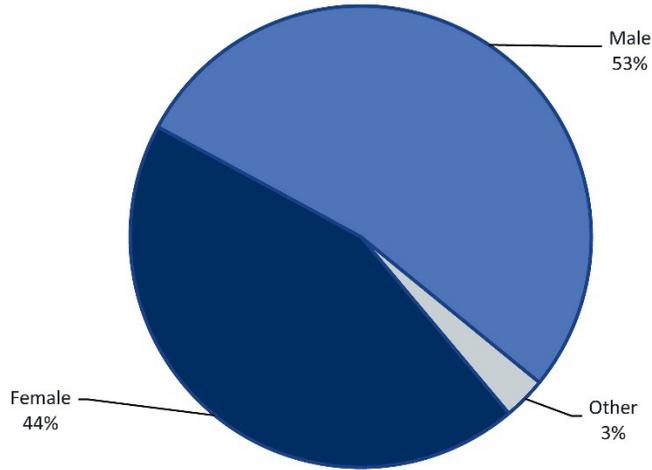
Registration. The partner used a registration form to collect data. In some cases, this was provided directly by the participant, while in others a teacher or coach registered a class or team.

9,463
Students Served

1% were military-connected

100%
Grades 6–8

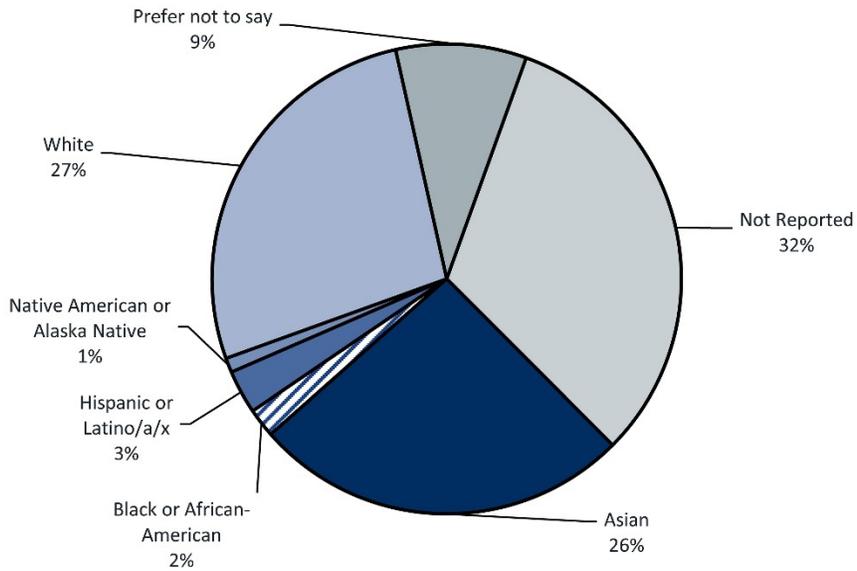
STUDENT GENDER



Non-binary is < 0.5% and not visible in the graph.

NOTE. Demographic data was reported as registration.

STUDENT RACE/ETHNICITY



Native Hawaiian or Other Pacific Islander is < 0.5% and not visible in the graph.

NOTE. Demographic data was reported as registration

2

MATHCOUNTS National Math Club is a national program that gives middle school students the opportunity to engage in math games in a non-competitive, social environment for students of all skill levels.

NOTE. DEMOGRAPHIC DATA WAS REPORTED AS ESTIMATION.

Estimation. The partner estimated information based on their knowledge of participants. Estimation varied considerably across partners. Some partners chose to report data as estimation because they were lacking specificity for a small number of participants, while others broadly estimated the makeup of participants.

13,882

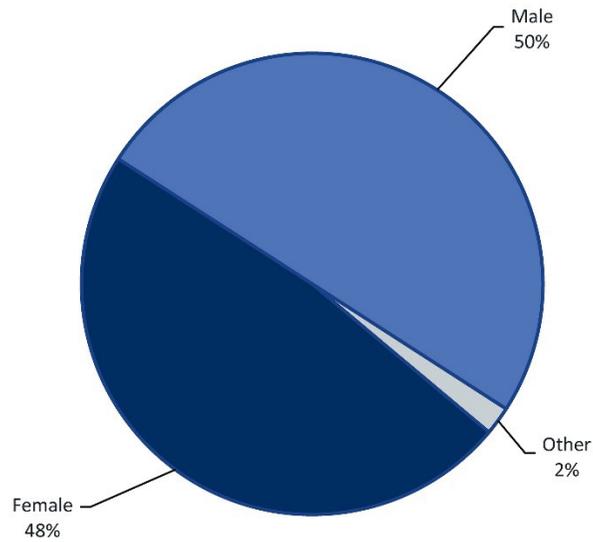
Students Served

<1% were military-connected

100%

Grades 6–8

STUDENT GENDER



Non-binary is < 0.5% and not visible in the graph.

NOTE. Demographic data was reported as estimation.

STUDENT RACE/ETHNICITY DATA NOT REPORTED.

3

MATHCOUNTS Math Video Challenge is a national program providing middle school students with the opportunity to create an original video showing math in a real-world setting.

NOTE. DEMOGRAPHIC DATA WAS REPORTED AS REGISTRATION.

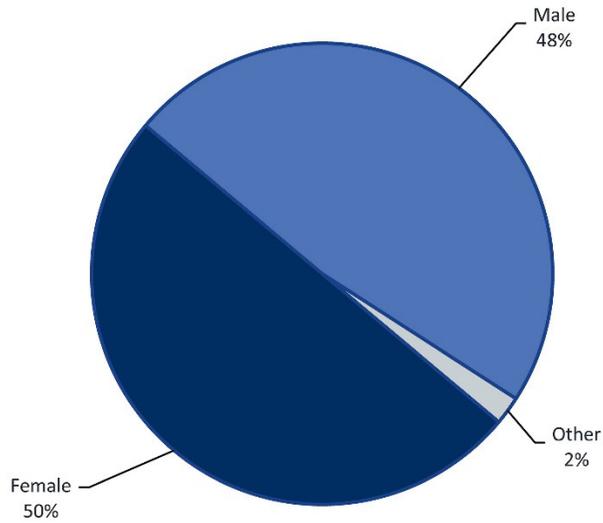
Registration. The partner used a registration form to collect data. In some cases, this was provided directly by the participant, while in others a teacher or coach registered a class or team.

165
Students Served

0 were military-connected

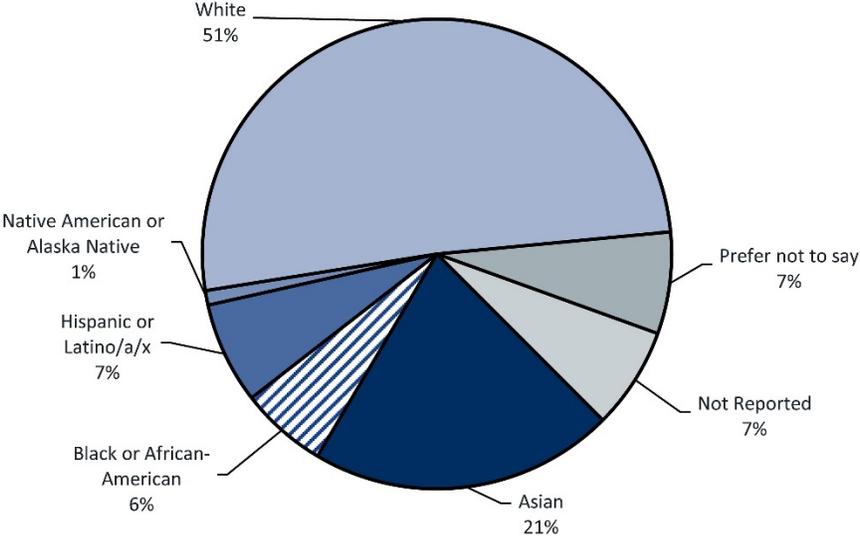
100%
Grades 6–8

STUDENT GENDER



NOTE. Demographic data was reported as registration.

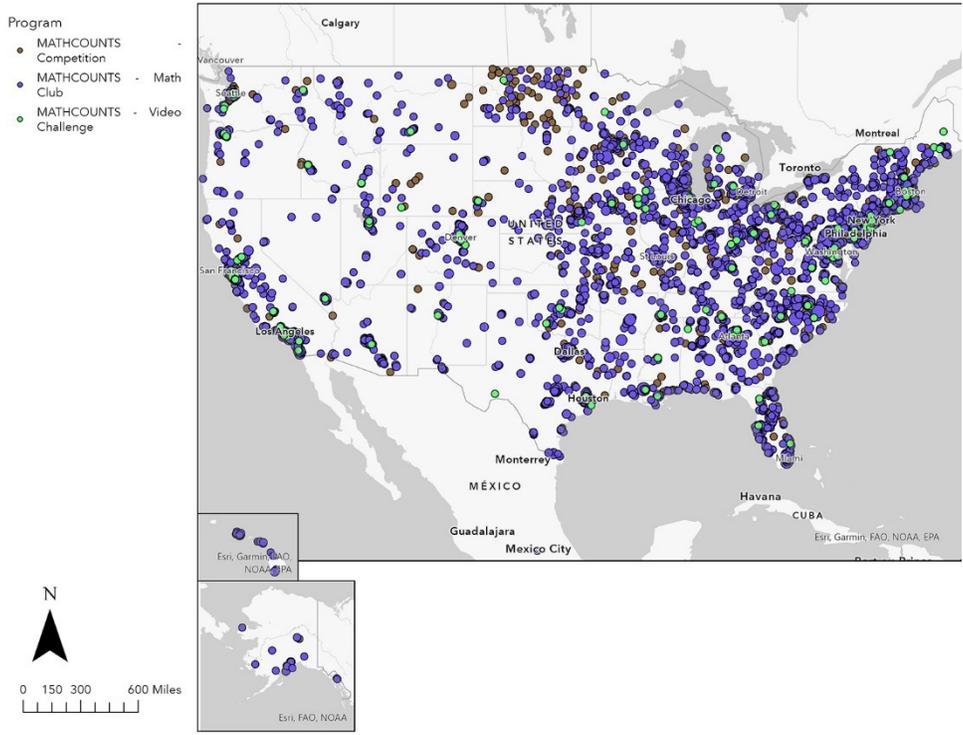
STUDENT RACE/ETHNICITY



NOTE. Demographic data was reported as registration.

GEOGRAPHIC REACH

Schools of MATHCOUNTS participants were located across the United States, with the largest clusters on the East Coast. Not all activities associated with the plotted participant schools involved DSEC funding.



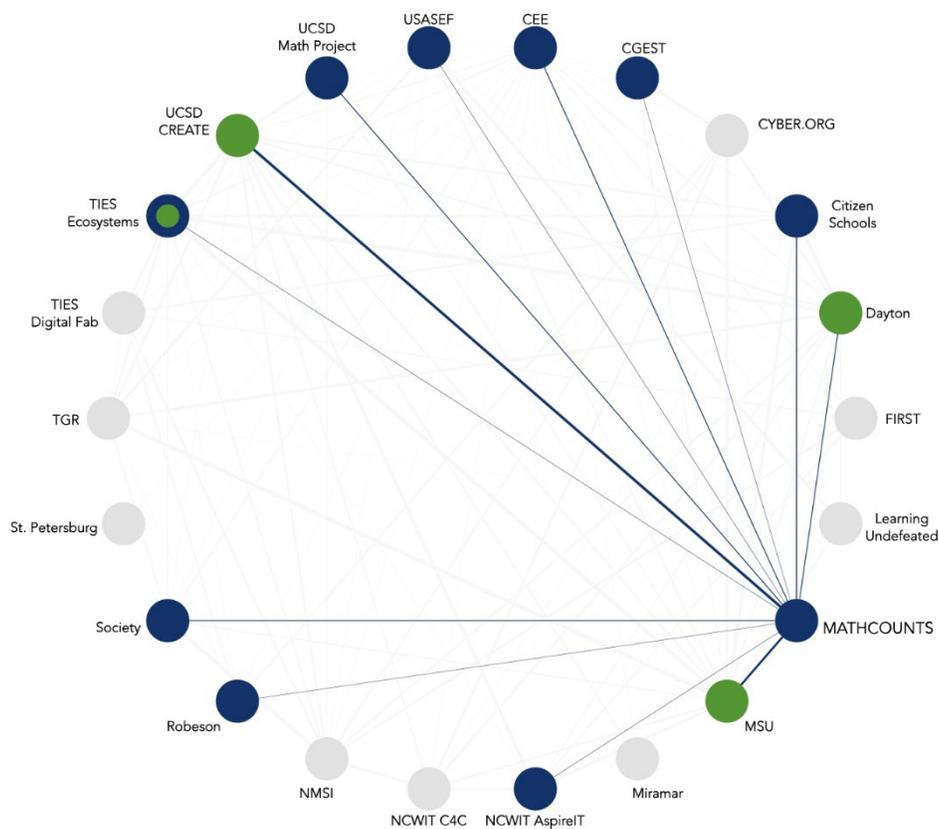
NETWORK CONNECTIVITY

MATHCOUNTS is connected to eight other DSEC Partners, one Hub Lead Support Partner, and three Hub Leads. In total, MATHCOUNTS is connected to 12 other organizations within the network, which is slightly greater than the average of nine.

MATHCOUNTS' connections occurred primarily at the networking level, with a few connections at the communicating and collaborating levels.

MATHCOUNTS reported receiving support from five organizations (MSU, NMSI, TIES Ecosystems, UCSD CREATE, and USASEF) with coordinating outreach or delivering programs to military-connected students. Three organizations (TIES Ecosystems, UCSD CREATE, and UCSD Math Project) reported receiving support from MATHCOUNTS related to this focal population.

MATHCOUNTS reported receiving support from 10 organizations (CGEST, Citizen Schools, DRSC, MSU, NCWIT AspireIT, Society, TIES Ecosystems, UCSD CREATE, UCSD Math Project, and USASEF) coordinating outreach or delivering programs to schools that serve students underrepresented in STEM. Nine organizations (CEE, Citizen Schools, CYBER.ORG, DRSC, MSU, TIES Ecosystems, UCSD CREATE, UCSD Math Project, and USASEF) reported receiving support from MATHCOUNTS related to this focal population.



■ Networking
 ■ Communicating
 ■ Coordinating
 ■ Collaborating



- **Networking:** exchanging information
- **Communicating:** building a shared understanding
- **Coordinating:** creating complementary programming
- **Collaborating:** jointly designing or delivering programming

To calculate the level of interaction between any two partners over Option Year 1, AIR used an average of the reported levels of interaction across survey administrations, taking into account that some partners joined DSEC midway through the year. For analyses related to the focal populations (military-connected students, underrepresented students, DoD facilities and personnel, and DoD STEM alumni) AIR summed reported interactions across the survey administrations rather than taking an average.

NATIONAL CENTER FOR WOMEN AND INFORMATION TECHNOLOGY (NCWIT)



PROGRESS TOWARD LOGIC MODEL OUTCOMES

INCREASE POSITIVE ATTITUDES TOWARD STEM CAREERS.

Increase positive attitudes toward STEM careers. One program leader described how the career component was included in the program: “Students were provided with three, 2-hour sessions to speak to STEM professionals from U.S. NRL [United States Naval Research Laboratory] and Amazon Web Services through online discussions; asking questions via Google Classroom; and engaging in lectures surrounding internships, college majors, and employment in technology fields.” Students in 13 of the 16 programs completed surveys, with 95% of the survey respondents agreeing that they gained a greater understanding of career possibilities after attending the camps and workshops. In addition, 58% said they plan to seek a STEM-focused job in the future.

INCREASE COMPETENCE RELATED TO FUNDAMENTAL PROGRAMMING CONCEPTS.

Increase competence related to fundamental programming concepts. On a postsurvey of the K–12 girls participating in the programming camps and workshops, 68% of the participants agreed that they hoped to come back to the Aspire IT program next year, and 85% of the participants agreed that they hope to take any computer class or workshop in the future.

INCREASE PARTICIPANT EXPOSURE TO COMPUTING AS APPLIED TO ADDRESSING SOCIAL ISSUES.

Increase participant exposure to computing as applied to addressing social issues. Aspire IT programs are designed to address a social issue, and all 12 responding program leaders rated this component as excellent or good. In response to a postsurvey, 89% of the 151 students agreed or strongly agreed that they can use what they learned in the program to solve real-world problems. In addition, 96% agreed or strongly agreed that they understand how the

computing and/or technology activities they learned are used in the real world. One program leader stated,

“The issue we addressed was about the environment. We had a component where students could brainstorm about ways they could help the environment and related that to technology.”

Another program leader stated,

We addressed biases in machine learning and the explosion of internet users that led to the countless security breaches that occur every day. We talked about how businesses and companies use your data to make predictions against you, how facial recognition technology is racially flawed, and how to manage personal passwords to reduce the risk of having your identity stolen.

INCREASE PROGRAM LEADERS’ EXPERTISE AND CONFIDENCE.

Increase program leaders’ expertise and confidence in planning and presenting their knowledge in computational thinking. Program leaders reported an impact on participant interest in computing activities and interest in pursuing computing as a field of study from leading their AspireIT program. Of the 12 leaders who responded to the survey, 92% agreed that leading the program impacted their overall interest in computing activities, and 83% agreed that being a leader strengthened their interest in pursuing computing as a field of study. All 12 leaders rated the career component of their program as excellent or good. In a post-program survey, the program leaders were asked how leading the program impacted their perception of self. Fifty percent of the participants responded that being a leader increased their confidence in themselves and 33% reported learning valuable leadership skills.

ACCOMPLISHMENTS AND CHALLENGES IN 2020-21

Despite the challenges with COVID-19, NCWIT increased the overall number of camps and workshops held in DSEC hub regions and target communities this year. NCWIT continued to engage girls in STEM opportunities even though many other activities for the year were cancelled. Program leaders engaged speakers from across the country to share their career journeys and provide insight into the field of computational thinking, ensuring that the content was more relevant to the concepts taught in their programs.

NCWIT found data collection to be more difficult with virtual camps and workshops, and the organization has not yet found a reliable way to track the extent to which they are engaging students who are military connected.

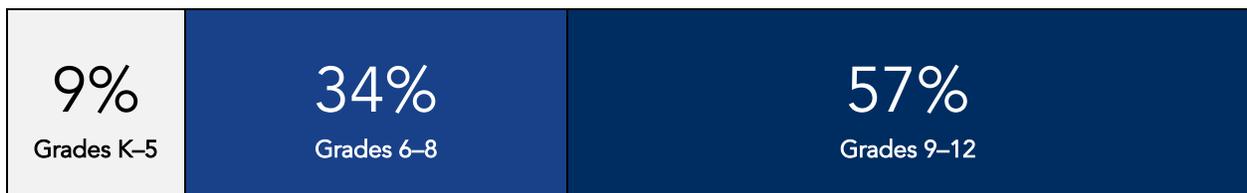
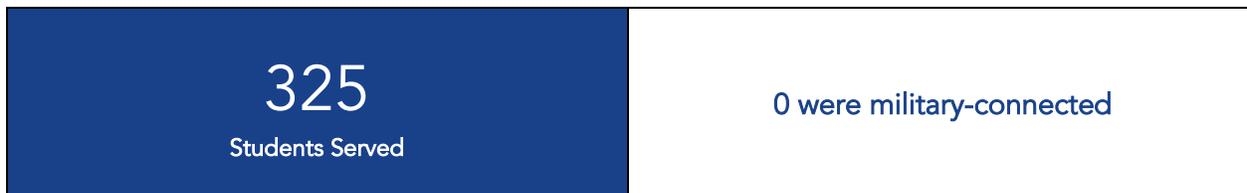
PROGRAMS AND PARTICIPANT DATA

DSEC supports NCWIT's **AspireIT** program which inspires girls to engage in coding and computational thinking using the context of exploring a social issue.

NCWIT's **AspireIT program** is a peer-led computing education program designed to teach K–12 girls fundamentals in programming and computational thinking. Participants attend workshops and camps that vary in length from being a single event to a developing process in multiple sessions. NCWIT's camps and workshops are led by high school and college women, who create these opportunities alongside NCWIT's partner organizations, working to help girls learn in fun, creative, and hands-on environments. K–12 girls benefit from learning about careers in technology and gaining coding skills; meanwhile, the women leading the sessions gain valuable training and skills in leadership and expertise in communicating their knowledge and skills to others.

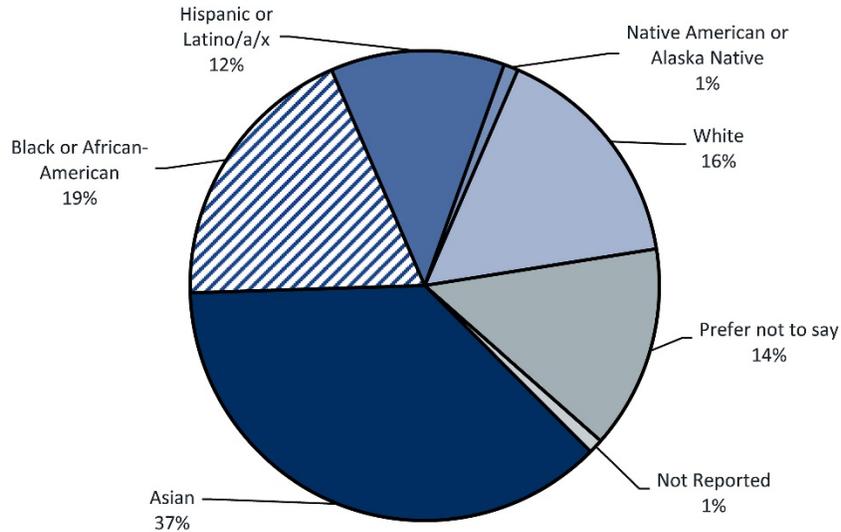
NOTE. DEMOGRAPHIC DATA WAS REPORTED AS AN ESTIMATION.

Estimation. The partner estimated information based on their knowledge of participants. Estimation varied considerably across partners. Some partners chose to report data as estimation because they were lacking specificity for a small number of participants, while others broadly estimated the makeup of participants.



STUDENT GENDER IS 100% FEMALE.

STUDENT RACE/ETHNICITY

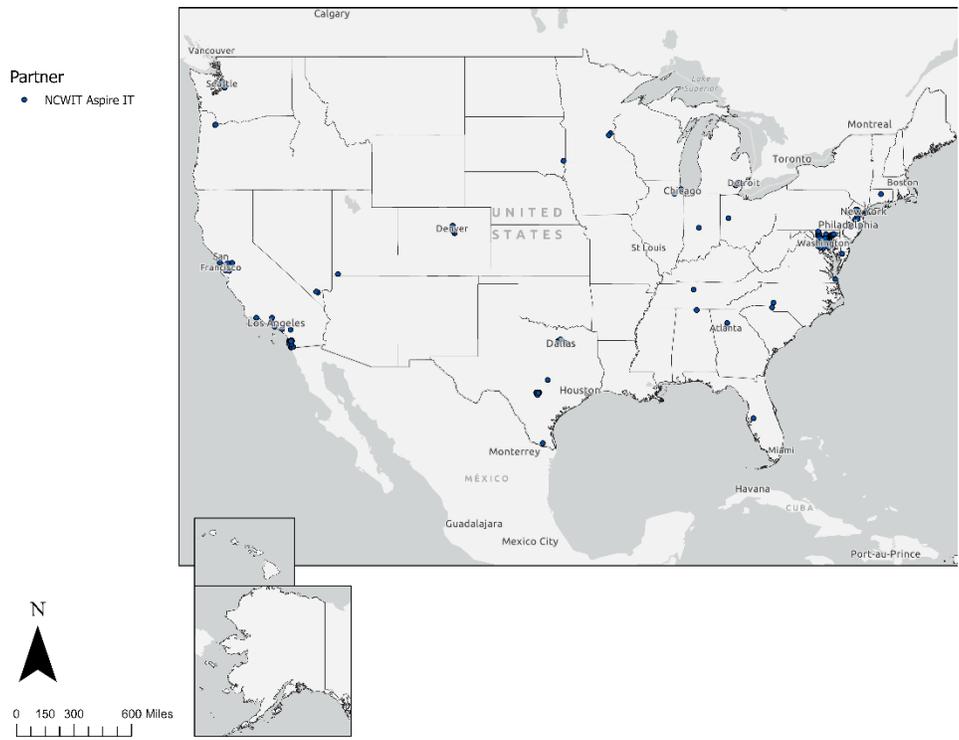


Native Hawaiian or **Other Pacific Islander** is < 0.5% and not visible in the graph.

NOTE. Demographic data was reported as an estimation.

GEOGRAPHIC REACH

School-level data were not available for NCWIT AspireIT participants. Individual NCWIT Aspire IT participants came from 25 states, with concentrations in California, Maryland, New Jersey, and Texas.



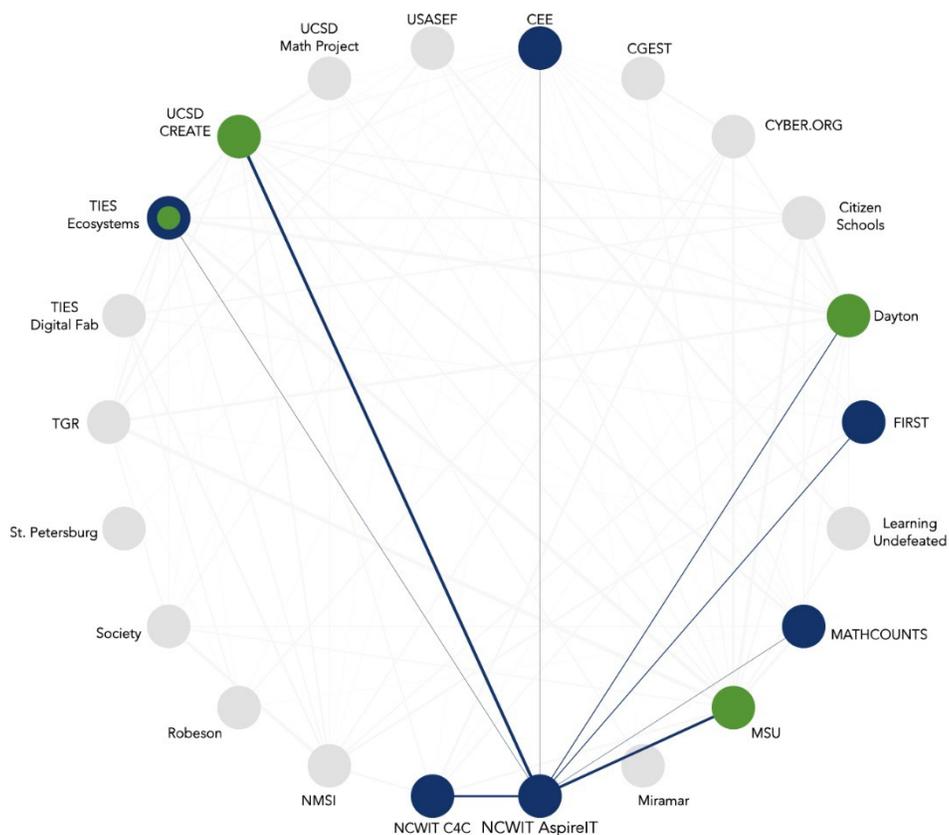
NETWORK CONNECTIVITY

NCWIT AspireIT is connected to four other STEM Outreach Partners, one Hub Lead Support Partner, and three Hub Leads. In total, NCWIT Aspire IT is connected to eight other organizations within the network, which is slightly lower than the average of nine.

NCWIT AspireIT’s connections occurred primarily at the networking level, with a few connections at the coordinating and collaborating levels.

NCWIT AspireIT reported receiving support from six organizations (CYBER.ORG, DRSC, MSU, NMSI, TIES Ecosystems, and UCSD CREATE) with coordinating outreach or delivering programs to military-connected students. Four organizations (CYBER.ORG, MSU, TIES Ecosystems, and UCSD CREATE) reported receiving support from NCWIT Aspire IT related to this focal population.

NCWIT AspireIT reported receiving support from six organizations (CEE, DRSC, *FIRST*, MSU, NCWIT C4C, and UCSD CREATE) with coordinating outreach or delivering programs to schools that serve students who are underrepresented in STEM. Nine organizations (CEE, CYBER.ORG, DRSC, *FIRST*, MATHCOUNTS, MSU, NCWIT C4C, TIES Ecosystems, and UCSD CREATE) reported receiving support from NCWIT Aspire IT related to this focal population.



■ Networking ■ Communicating ■ Coordinating ■ Collaborating



0% Percentage of total interactions 100%

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NCWIT COUNSELORS FOR COMPUTING



PROGRESS TOWARD LOGIC MODEL OUTCOMES

INCREASE COUNSELOR ADVOCACY OF COMPUTER SCIENCE (CS) FOR STUDENTS.

Increase counselor advocacy of computer science (CS) for students. A C4C webinar series served as an entry point for educators to learn about careers in STEM. By providing virtual workshops in all three hub regions (DMV, Dayton, and San Diego) as well as other regions, C4C sought to increase counselor advocacy of CS for students.

INCREASE COUNSELORS' ABILITY TO TALK KNOWLEDGABLY ABOUT CODING.

Increase counselors' ability to talk knowledgably about coding. Counselors participating in the C4C Professional Development Program participated in hands-on activities in an active learning environment to become more informed and equipped to speak about CS learning opportunities in and out of school.

CHANGE COUNSELOR ATTITUDES AND ADOPTION OF INCLUSIVE LANGUAGE WHEN COUNSELING STUDENTS.

Change counselor attitudes and adoption of inclusive language when counseling students. The C4C team recruited diverse speakers, program facilitators, and participants and integrated inclusive language practices to support a culturally grounded approach to programming. In working through the online modules, C4C asked participants to make professional and personal connections to the content tied to the professional standards, goals, and mindsets of school counselors. C4C reported positive anecdotal feedback from participants.

INCREASE COUNSELOR PROMOTION OF DOD STEM OPPORTUNITIES.

Increase counselor promotion of DoD STEM opportunities. C4C included a tour of the DoD STEM site to spread awareness of possible opportunities and scholarships. C4C reported anecdotally that many participants stated that they were not aware of this information prior to the program and were eager to learn more.

ACCOMPLISHMENTS AND CHALLENGES IN 2020-21

Despite the challenges with COVID-19, NCWIT increased the overall number of camps and workshops held in DSEC hub regions and target communities this year. NCWIT continued to engage girls in STEM opportunities even though many other activities for the year were cancelled. Program leaders engaged speakers from across the country to share their career journeys and provide insight into the field of computational thinking, ensuring that the content was more relevant to the concepts taught in their programs.

NCWIT found data collection to be more difficult with virtual camps and workshops, and the organization has not yet found a reliable way to track the extent to which they are engaging students who are military connected.

PROGRAMS AND PARTICIPANT DATA

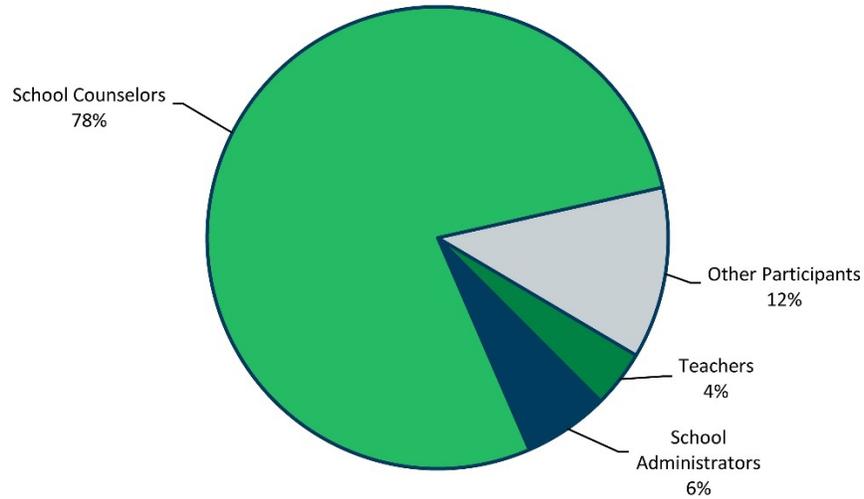
The **NCWIT Counselors for Computing (C4C)** program provides information and resources that help counselors join the front line of the computing conversation. Counselors engage in a professional development program that includes short webinars, one to two day workshops, and multi-day institutes that help counselors become advocates for supporting all students as they explore computer science education and careers.

NOTE. DEMOGRAPHIC DATA WAS REPORTED AS AN ESTIMATION.

Estimation. The partner estimated information based on their knowledge of participants. Estimation varied considerably across partners. Some partners chose to report data as estimation because they were lacking specificity for a small number of participants, while others broadly estimated the makeup of participants.

923 EDUCATORS SERVED

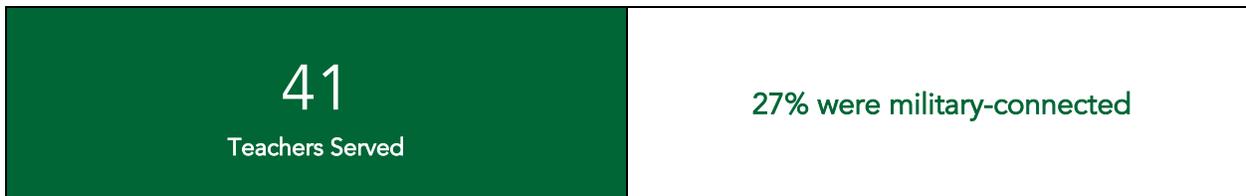
EDUCATORS SERVED



University personnel is < 0.5% and not visible in the graph.

DEMOGRAPHIC, MILITARY-CONNECTED, AND TITLE I DATA WERE NOT REQUESTED ABOUT OTHER PARTICIPANTS.

TEACHERS

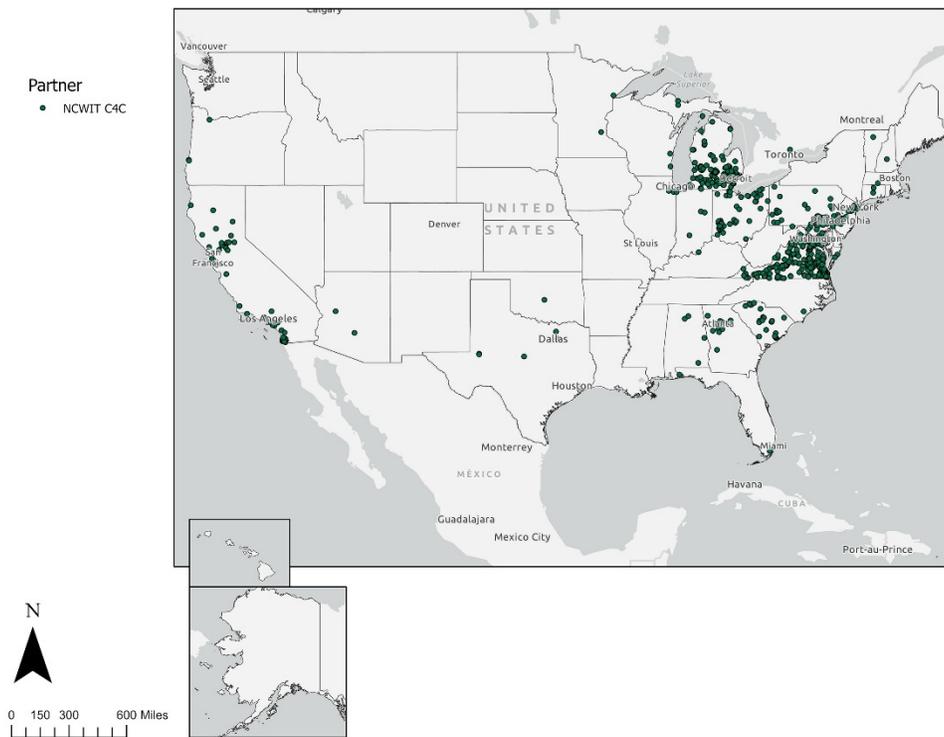


TEACHERS FROM UNDERREPRESENTED POPULATIONS: 80%

TEACHERS FROM TITLE I SCHOOLS: 29%

GEOGRAPHIC REACH

NCWIT C4C participants came from 749 locations throughout the US, with most coming from Virginia, Michigan, and Ohio. Other concentrations were in Pennsylvania, California, Maryland, and South Carolina.



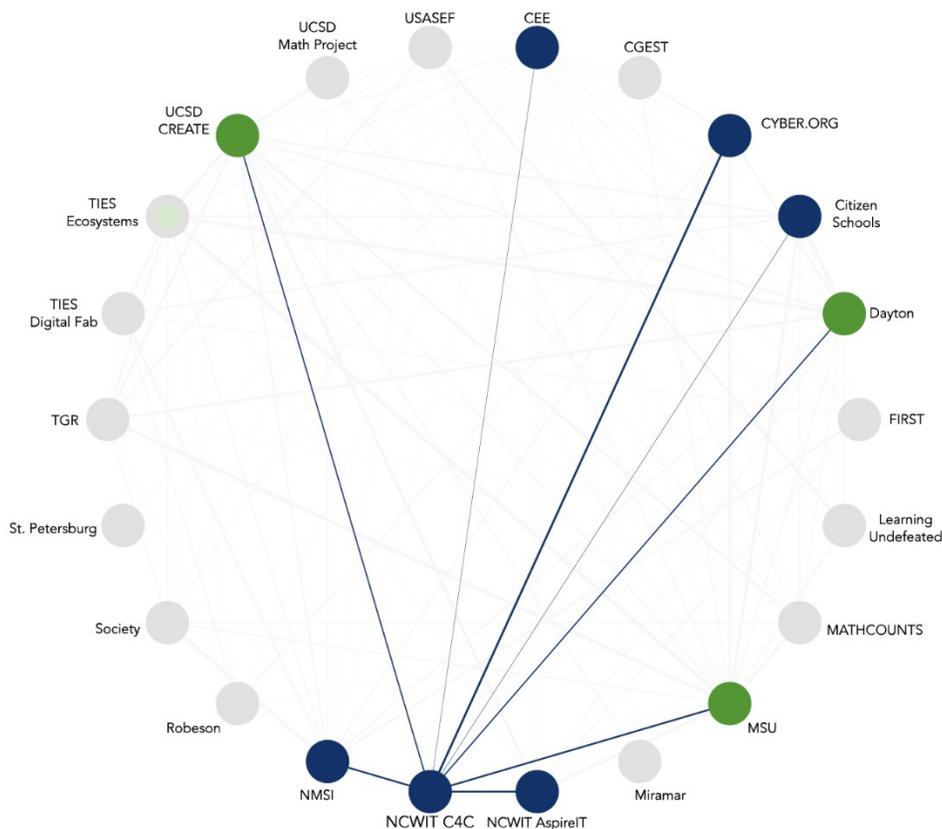
NETWORK CONNECTIVITY

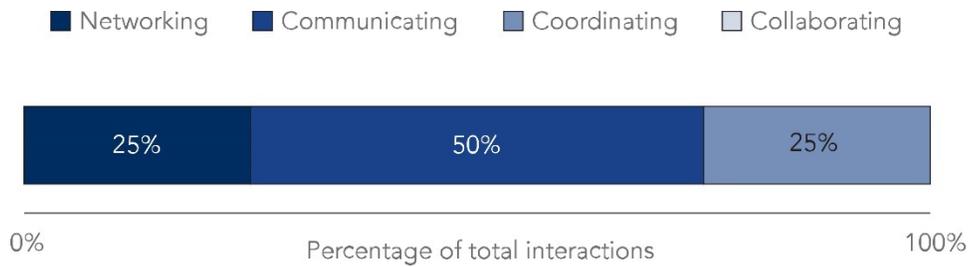
NCWIT C4C is connected to five other STEM Outreach Partners and three Hub Leads. In total, NCWIT C4C is connected to 8 other organizations within the network, which is slightly lower than the average of nine.

NCWIT C4C's connections occurred primarily at the communicating level, with a few connections at the networking and coordinating levels.

NCWIT C4C reported receiving support from five organizations (Dayton, CYBER.ORG, MSU, NMSI, and UCSD CREATE) with coordinating outreach or delivering programs to military-connected students. Three organizations (CYBER.ORG, TIES Ecosystems, and UCSD CREATE) reported receiving support from NCWIT C4C related to this focal population.

NCWIT C4C reported receiving support from eight organizations (Citizen Schools, CYBER.ORG, Dayton, FIRST, MSU, NCWIT AspireIT, NMSI, and UCSD CREATE) with coordinating outreach or delivering programs to schools that serve underrepresented students. Seven organizations (Citizen Schools, CYBER.ORG, DRSC, MSU, NCWIT AspireIT, TIES Ecosystems, and UCSD CREATE) reported receiving support from NCWIT C4C related to this focal population.





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SOCIETY FOR SCIENCE (SOCIETY)



PROGRESS TOWARD LOGIC MODEL OUTCOMES

INCREASE INTEREST, CONFIDENCE, AND PERSISTENCE IN STEM.

Increase interest, confidence, and persistence in STEM. During the 2020–21 school year, Society named 30 affiliated fairs in military-impacted areas (serving areas that included military bases, research labs, or military-impacted schools/school districts) to give out the DoD STEM Leadership Prize to a sixth-to eighth-grade student. Despite the ongoing effects of the pandemic that limited the capacity of some fairs, 26 students won the Leadership Prize. Of the prize winners, 85% said they gained confidence in their STEM knowledge and/or skills since winning this prize. When asked how likely they were to conduct a research project in the future, 16 students agreed that they will definitely conduct research. Student participants provided the following quotes:

"This prize has given me confidence in my STEM ability and knowledge and had removed the doubts I have had in my ability."

"Having my research recognized by such a prestigious organization as the Department of Defense felt incredible."

"I have gained confidence in my STEM knowledge and skills since winning this prize because I know a lot more about STEM now and have gained a lot of new information about it."

ENSURE THAT TEACHERS SEE THEMSELVES AS LEADERS IN SCIENCE EDUCATION.

Ensure that teachers see themselves as leaders in science education. In a year without pandemic restrictions, teachers have the opportunity to visit their elected officials in Washington, D.C., to discuss their views on STEM education. Unfortunately, because of the pandemic, these visits could not take place. With lower teacher engagement at the end of last school year and during the summer, Society delayed its usual survey until September 2021 and will add questions to this survey to try to assess this outcome.

LEARN ABOUT STEM MILITARY CAREERS THAT STUDENTS CAN PURSUE.

Learn about STEM military careers that students can pursue. The 2020 Middle School Science Research Teacher’s Conference (MSRTC) featured DoD speakers, including the director of DoD STEM and the program manager for the DoD SMART Scholarship for Service Program. The SMART scholarship program provides support to college students in exchange for entering DoD labs upon graduation. DoD careers also were highlighted via the DoD STEM virtual booth at both MSRTC conferences (2020 and 2021). 93% of survey respondents said that they developed more awareness of STEM research careers, 89% of respondents believed that the conference inspired interest in STEM careers in the DoD, and 86% of respondents said that the conference exposed them to DoD STEM opportunities.

ACCOMPLISHMENTS AND CHALLENGES IN 2020-21

Society served more teachers in Option Year 1 through the virtual MSRTCs than in person previously. Although this opportunity did not have the depth of an in-person gathering, teachers experienced meaningful, quality programming and opportunities for connecting with peers across the country to share about the challenges they were facing. For Broadcom MASTERS, the biggest accomplishment was pivoting to a virtual competition, where the winner of the DoD STEM Talent Award was selected. Also, despite the challenges the affiliated fairs faced this past year, Society selected and awarded 26 students with the DoD STEM Leadership Prize.

One of Society’s biggest challenges was selecting winners for the DoD STEM Leadership Prize. Although 30 affiliated fairs occurred, four events could not choose a winner for reasons including not having the capacity for special awards this year and not finding a winner who met the criteria, likely because of a lower number of middle school students at their fair. Society plans to work with DoD STEM to identify additional fairs if this situation continues to present itself in the future.

PROGRAMS AND PARTICIPANT DATA

Society uses DSEC funding to support three programs.

1

Broadcom MASTERS Science Fair Awards are given annually to middle school student participants in Society-affiliated science fairs that are related to the Broadcom MASTERS, a national middle school science fair competition.

NOTE. DEMOGRAPHIC DATA WAS REPORTED AS HEADCOUNT.

Headcount. The partner inferred information based on what was seen during program implementation.

STUDENTS

326

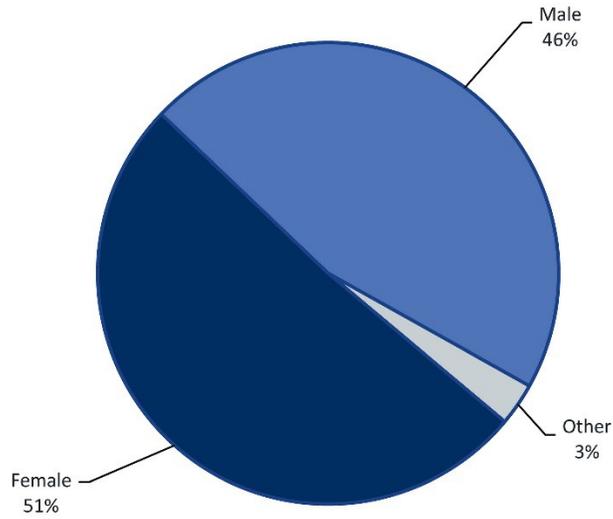
Students Served

15% were military-connected

100%

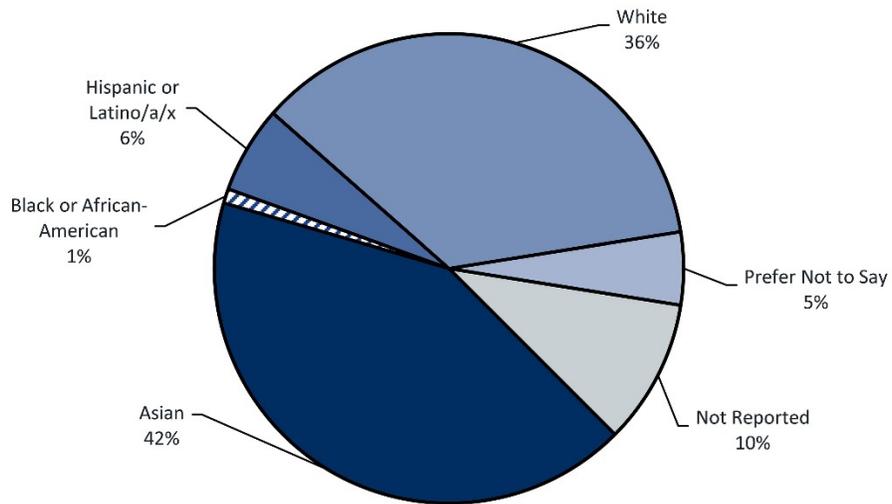
Grades 6–8

STUDENT GENDER



NOTE. Demographic data was reported as headcount.

STUDENT RACE/ETHNICITY



Native American or Alaska Native is < 0.5% and not visible in the graph.

NOTE. Demographic data was reported as headcount.

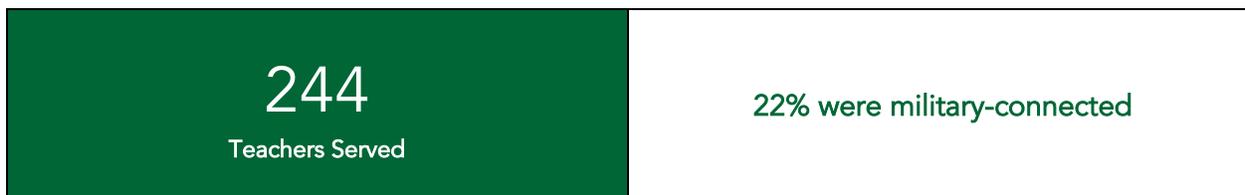
2

Middle School Research Teachers Conference (MSRTC) is an annual event that brings together middle school research teachers to share best practices and troubleshoot challenges. Because of pandemic delays, Society hosted two MSRTCs during Option Year 1 (fall 2020, summer 2021). High school teachers and administrators participated only in the 2021 occurrence.

NOTE: DEMOGRAPHIC DATA WAS REPORTED AS REGISTRATION.

Registration. The partner used a registration form to collect data. In some cases, this was provided directly by the participant, while in others a teacher or coach registered a class or team.

TEACHERS



TEACHERS FROM UNDERREPRESENTED POPULATIONS: 29%

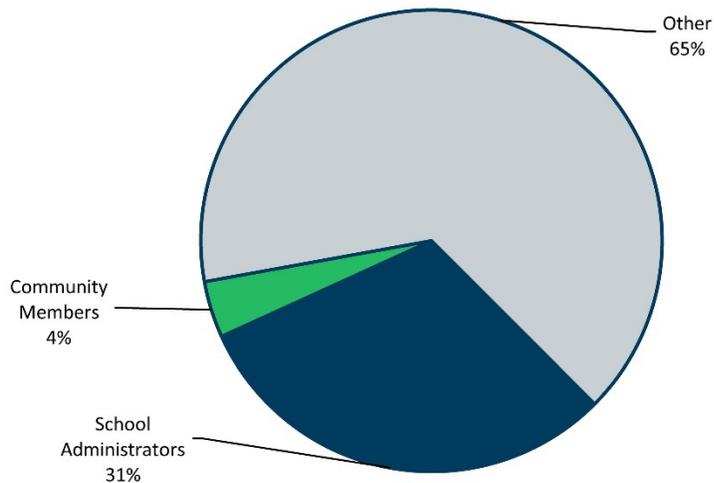
TEACHERS FROM TITLE I SCHOOLS: 55%

OTHER PARTICIPANTS

23

Other Participants Served

OTHER PARTICIPANT TYPES



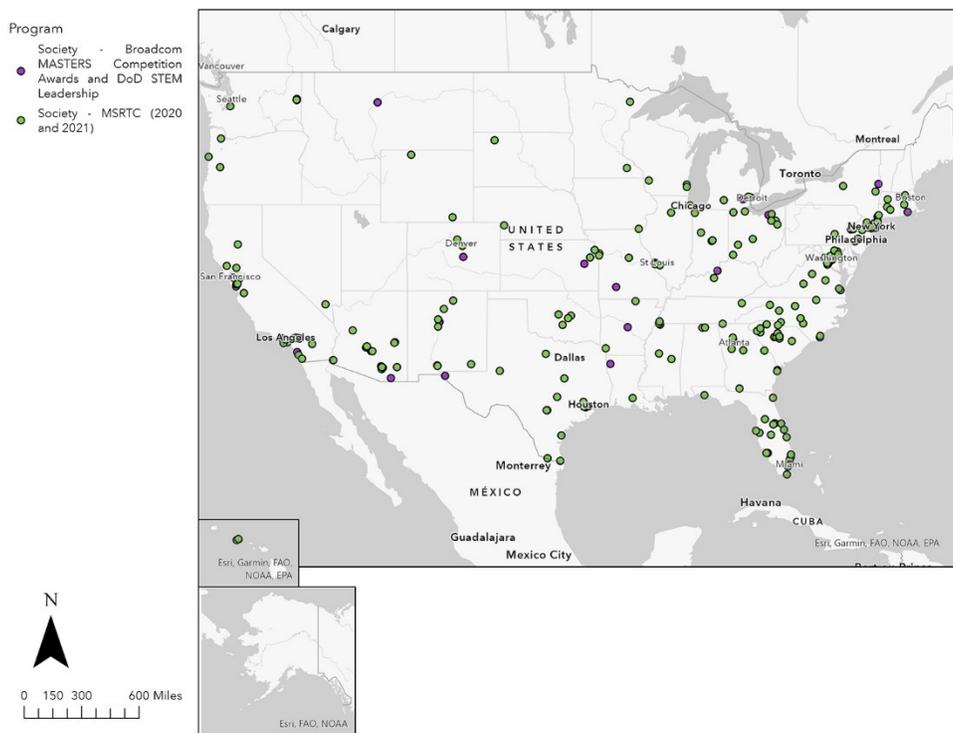
DEMOGRAPHIC, MILITARY-CONNECTED, AND TITLE I DATA WERE NOT REQUESTED ABOUT OTHER PARTICIPANTS.

3

Science News for Students is a free, online resource that covers science, health, and technology for students, parents, and teachers. During the 2019–20 period, Society completed a planning study to expand the reach of this resource to military-connected students. Readership continued to grow during Option Year 1.

GEOGRAPHIC REACH

Participants in Society's programming came from schools in 42 states in the United States, with concentrations in Florida, California, Texas, and Arizona, and along the East Coast.



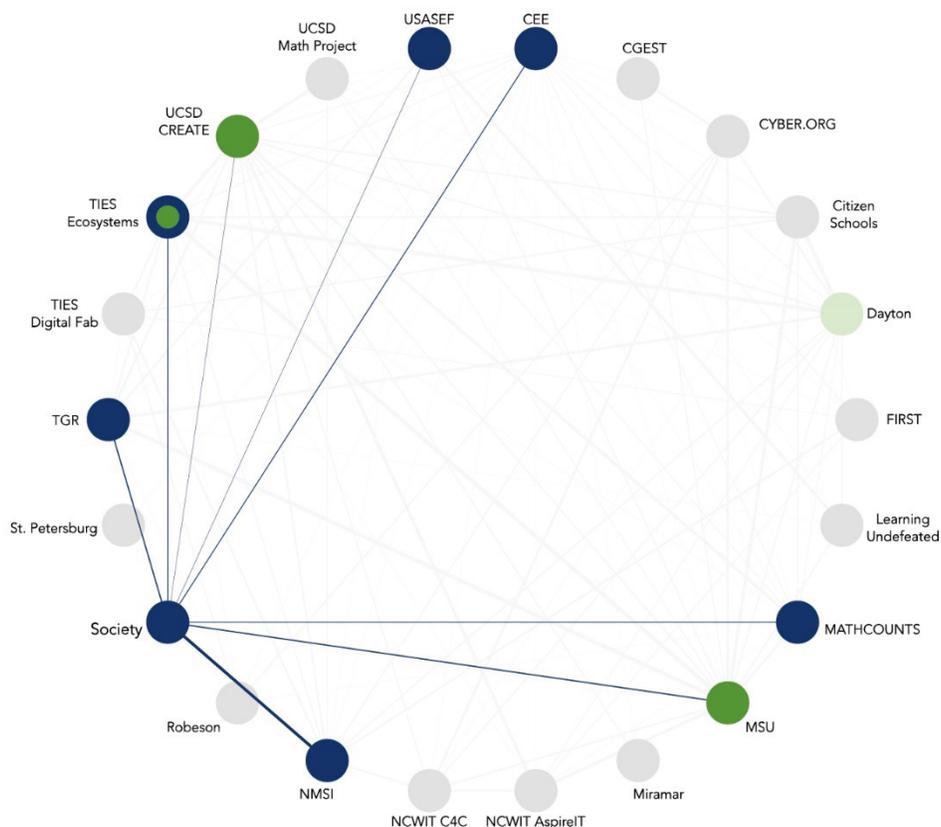
NETWORK CONNECTIVITY

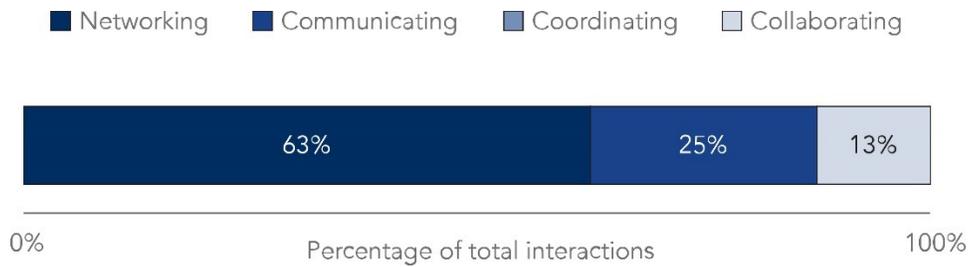
Society is connected to five other STEM Outreach Partners, one Hub Lead Support Partner, and two Hub Leads. In total, Society is connected to eight other organizations within the network, which is slightly lower than the average of nine.

Society's connections occurred primarily at the networking level, with connections also occurring at the communicating and collaborating levels.

Society reported receiving support from four organizations (MSU, NMSI, TGR, and USASEF) with coordinating outreach or delivering programs to military-connected students. Five organizations (CYBER.ORG, MSU, NMSI, TIES Ecosystems, UCSD CREATE) reported receiving support from Society related to this focal population.

Society reported receiving support from six organizations (DRSC, MSU, NMSI, TGR, TIES Ecosystems, and USASEF) with coordinating outreach or delivering programs to schools that serve students who are underrepresented in STEM. Nine organizations (CEE, Citizen Schools, MATHCOUNTS, MSU, NMSI, TGR, TIES Ecosystems, UCSD CREATE, and USASEF) reported receiving support from Society related to this focal population.





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TGR FOUNDATION (TGR)



PROGRESS TOWARD LOGIC MODEL OUTCOMES

RECOGNIZE AND IMPLEMENT STEM PROGRAMMING IN THE CLASSROOM.

Recognize and implement high-quality, integrated STEM programming in the classroom.

Educators worked collaboratively, using a peer feedback protocol, to design their own activities that incorporated inquiry practices. Throughout the multiday session, educators defined inquiry and gained models of inquiry instruction as a launching point for integrating inquiry in their classrooms. The learning objective for the STEM Studios' 3-day workshop was to enable participants to distinguish between traditional, instructional, and inquiry-based practices and received tools and resources that would aid them in creating inquiry-minded environments.

RAISE AWARENESS OF LINKING CLASSROOM ACTIVITIES TO STEM CAREERS.

Raise awareness of linking classroom activities to STEM careers. Each module in the Online Training Academy highlighted connections to careers and specified how building essential skills in students could lead to success in the future workforce. An example was the Making Connections series that highlighted an engineer who worked for the DoD, speaking of her work and how making specific interdisciplinary learning connections in the classroom could help prepare students from all backgrounds for lifelong success. Other modules highlighted the importance of skills over content and how students with critical skills could adapt and change to meet the ever-demanding needs in STEM-related fields. In STEM Studio, educators were presented with activities that highlighted skill building. The STEM Studio modeled how teachers could use high-quality, student-driven, inquiry-based practices to solve problems relevant for future career pathways.

INCREASE TEACHER CONFIDENCE IN IMPLEMENTING STEM STRATEGIES WITHIN THE CLASSROOM.

Increase teacher confidence in implementing STEM strategies within the classroom. The Online Training Academy and STEM Studio emphasized teachers' experience implementing STEM strategies in the classroom, with content meant to amplify teachers' strengths. TGR provided models, frameworks, and concrete examples designed to help teachers implement authentic, student-centered, inquiry-based learning practices in the classroom. The goal was for teachers to not only leave the session with an understanding of STEM strategies but also develop plans (via implementation plans developed during STEM Studio or takeaway items provided in the modules) for immediate implementation. Incorporated into the end-of-session surveys were questions specifically asking about increased confidence in STEM; overwhelmingly, teacher answers were "agree" or "strongly agree."

COLLABORATE AND ENGAGE WITHIN A COMMUNITY OF STEM EDUCATORS.

Collaborate and engage within a community of STEM educators. In STEM Studio, educators collaborated to complete hands-on STEM activities. Specifically, educators worked together to investigate models of inquiry and the 5E instructional framework (explore, explain, elaborate, engage, and evaluate). These experiences simulated what the inquiry-based activities would feel like for their students. Teachers also participated in a peer feedback protocol to get firsthand feedback from other educators about their STEM activities that incorporated inquiry practices. Using a cohort-based approach to professional development provided educators from across disciplines the opportunity to engage, share best practices, and elevate the work of entire schools/ecosystems.

ACCOMPLISHMENTS AND CHALLENGES IN 2020-21

TGR strengthened partnerships with the DMV and Dayton hub regions and hosting various professional development sessions with cohorts of educators hailing from those areas. This included working through various obstacles (postponements, rescheduling, and cancellations) to make the events happen. In working with MSU, TGR provided training for a group of preservice teachers in Baltimore. This was TGR's first time working with a cohort of preservice educators, and it confirmed their thinking that preservice educators were a group to impact change. TGR also established partnerships with other DSEC Partners, including NMSI, USASEF, and Society, by hosting virtual booths, workshops, and other events for groups of students and educators.

Dealing with pandemic challenges continued to be an issue in Option Year 1. A STEM Studio planned for Anaheim, California, teachers had to be canceled at the last minute because of a shortage of substitute teachers. An event with MSU also had to be canceled. In both cases, TGR is exploring alternate dates and times that might work for educators.

PROGRAMS AND PARTICIPANT DATA

TGR supports teacher development to create student-centered, hands-on learning experiences for students through two programs.

1

Online Training Academy for teachers in Grades 3–12 is a virtual experience for teachers, comprising a series of six professional development modules. Each module focused on a specific topic, included embedded videos that highlighted teachers and experts in the field, and was geared towards educators in Grades 3-12 for use in both formal and informal environments.

NOTE. DEMOGRAPHIC DATA WAS REPORTED AS ESTIMATION.

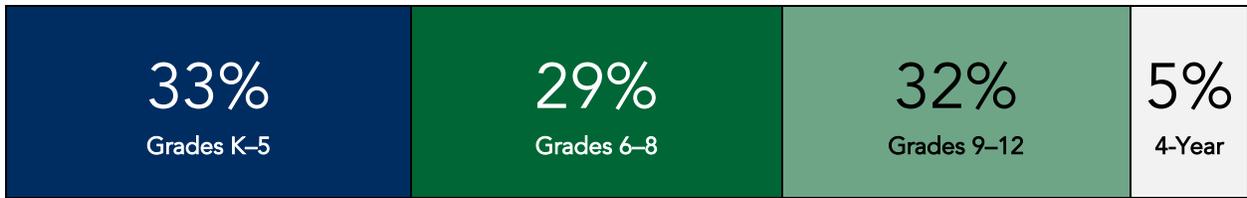
Estimation. The partner estimated information based on their knowledge of participants. Estimation varied considerably across partners. Some partners chose to report data as estimation because they were lacking specificity for a small number of participants, while others broadly estimated the makeup of participants.

TEACHERS

185

Teachers Served

5% were military-connected



TEACHERS FROM UNDERREPRESENTED POPULATIONS: 60%

TEACHER TITLE I DATA NOT REPORTED.

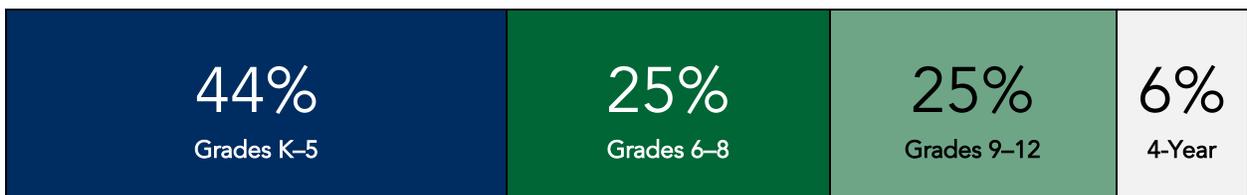
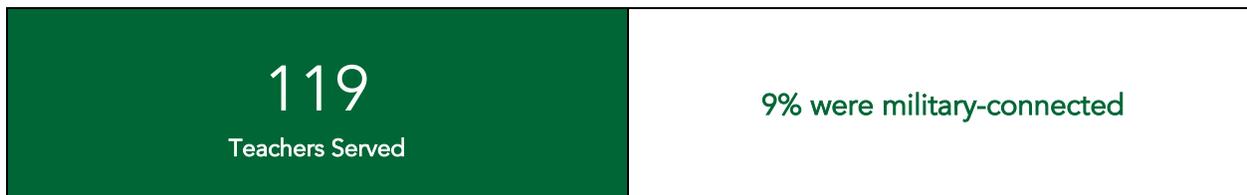
2

TGR STEM Studios bring teachers together for multiday in-person professional development sessions. During these multiday sessions, educators engage in hands-on instruction in inquiry-based learning practices that build students' essential skills.

NOTE. DEMOGRAPHIC DATA WAS REPORTED AS ESTIMATION.

Estimation. The partner estimated information based on their knowledge of participants. Estimation varied considerably across partners. Some partners chose to report data as estimation because they were lacking specificity for a small number of participants, while others broadly estimated the makeup of participants.

TEACHERS

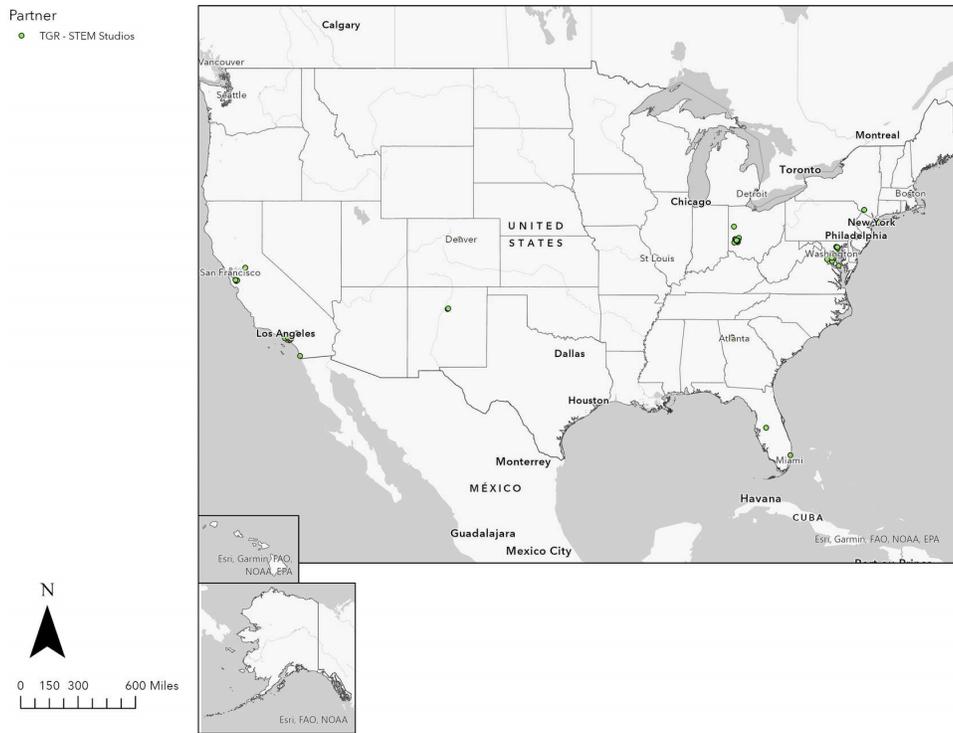


TEACHERS FROM UNDERREPRESENTED POPULATIONS: 53%

TEACHERS FROM TITLE I SCHOOLS: 48%

GEOGRAPHIC REACH

School-level data were not available for TGR participants. Individual participants in TGR's programming came from across the United States, with concentrations in Ohio, California, and the DMV area.



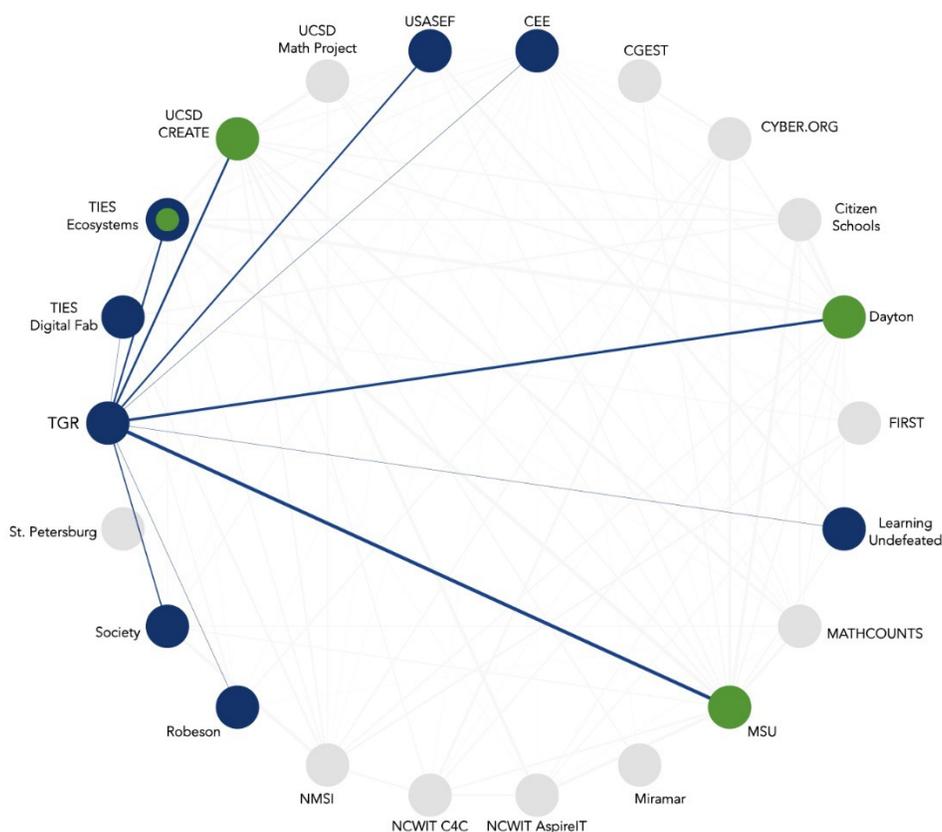
NETWORK CONNECTIVITY

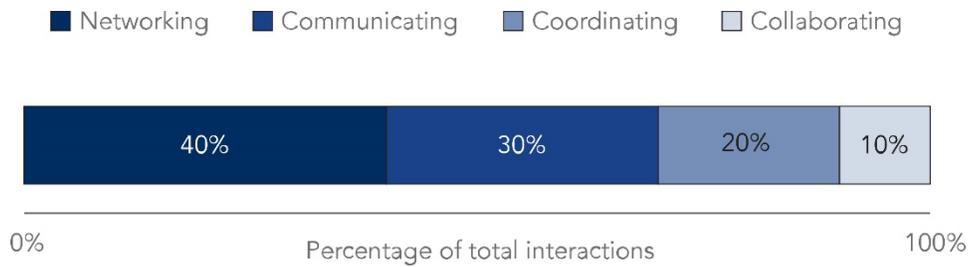
TGR is connected to six other STEM Outreach Partners, one Hub Lead Support Partner, and three Hub Leads. In total, TGR is connected to 10 other organizations within the network, which is slightly above the average of nine.

TGR's connections occurred primarily at the networking and communicating levels, with connections also occurring at the coordinating and collaborating levels.

TGR reported receiving support from seven organizations (DRSC, MSU, NMSI, TIES Ecosystems, TIES Digital Fab, UCSD CREATE, and USASEF) with coordinating outreach or delivering programs to military-connected students. Six organizations (DRSC, MSU, Society, TIES Ecosystems, UCSD CREATE, and USASEF) reported receiving support from TGR related to this focal population.

TGR reported receiving support from nine organizations (CYBER.ORG, DRSC, First, Society, MSU, TIES Digital Fab, TIES Ecosystems, UCSD CREATE, and USASEF) with coordinating outreach or delivering programs to schools that serve students who are underrepresented in STEM. Six organizations (DRSC, MSU, Society, TIES Ecosystems, UCSD CREATE, and USASEF) reported receiving support from TGR related to this focal population.





- **Networking:** exchanging information
- **Communicating:** building a shared understanding
- **Coordinating:** creating complementary programming
- **Collaborating:** jointly designing or delivering programming

To calculate the level of interaction between any two partners over Option Year 1, AIR used an average of the reported levels of interaction across survey administrations, taking into account that some partners joined DSEC midway through the year. For analyses related to the focal populations (military-connected students, underrepresented students, DoD facilities and personnel, and DoD STEM alumni) AIR summed reported interactions across the survey administrations rather than taking an average.

TEACHING INSTITUTE FOR EXCELLENCE IN STEM (TIES) DIGITAL FABRICATION LABS



PROGRESS TOWARD LOGIC MODEL OUTCOMES

INCREASE PARTICIPANT LIKELIHOOD OF PURSUING A STEM CAREER.

Increase participant likelihood of pursuing a STEM career by enhancing career and technical education (CTE) and engineering programs. The STEM-on-the-Go Van engaged with CTE students in automotive, woodworking, and Project Lead the Way programs at all three schools that it visited. As part of a partnership with America Makes, two students at Swansboro High School studied for and took the examination for the “Essentials of Additive Manufacturing” pilot high school credentialing program. The Mobile Fab Lab manager, a former U.S. Marine helicopter mechanic instructor, shared with all the students whom he interacted with the STEM jobs that connected to the digital fabrication and machining equipment they were using in the STEM-on-the-Go van.

INCREASE STUDENT CONSIDERATION OF MILITARY OR CIVILIAN CAREERS IN DOD STEM.

Increase student consideration of military or civilian careers in DoD STEM. Of the high school students who interacted with in the STEM-on-the-Go van, 58% were military connected and 14% had family members who were civilian contractors either at Fort Bragg or Camp LeJeune. These connections to DoD provided students with firsthand knowledge of military careers in the DoD. The interaction between the Marine Corps veteran Fab Lab manager and the students who visited and worked in the STEM-on-the-Go van presented an additional opportunity for students to learn more about military STEM careers with the DoD.

INCREASE POSITIVE ATTITUDES AND GREATER AWARENESS OF STEM CAREERS IN THE COMMUNITY.

Increase positive attitudes and greater awareness of STEM careers in the community. The TIES Digital Fabrication Lab originally planned to host some community events in the STEM-on-the-

Go van and invite STEM professionals in the community to interact with the students and share about their careers. However, because of COVID19, those community events did not take place but are being considered for the future.

ACCOMPLISHMENTS AND CHALLENGES IN 2020-21

The TIES Digital Fabrication Lab considered its greatest accomplishment as bringing the STEM-on-the-Go van to schools this year. The original plan for these Mobile Fab Labs was to begin operations in spring 2020, but the outbreak of COVID-19 and subsequent school closures upended that plan. With the resumption of in-person classes, the STEM-on-the-Go van could bring its digital fabrication and machining equipment, along with its K-12 STEM programming, back to schools once again.

The biggest challenge in Option Year 1 was the continued presence of COVID-19, which stalled plan implementation. Originally envisioned to operate in tandem with FIRST Robotics Regional Competitions, where students could fix their robots during the competition, these plans were suspended in 2020-21 with the cancelation of all in-person FIRST competitions. TIES Digital Fabrication Lab resumed discussions with a couple of FIRST program directors to explore supporting spring 2022 competitions.

PROGRAMS AND PARTICIPANT DATA

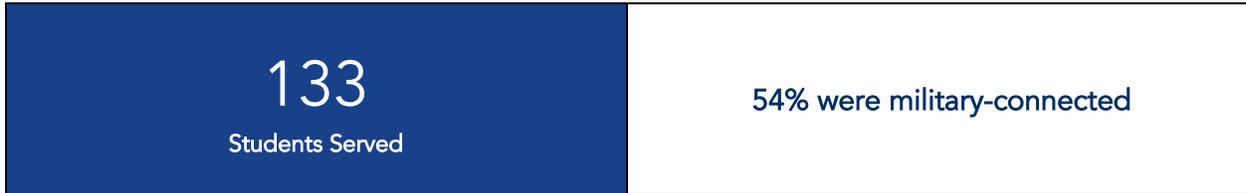
TIES Digital Fabrication Labs provide on-site, hands-on experiences for high school students to gain experience in machining and digital fabrication.

During Option Year 1, the TIES Digital Fabrication Lab program launched digital badging and micro-credentialing programs as part of their High School Fab Fellows Leadership Program. In this program, students learn digital fabrication skills as well as develop leadership skills in working with the community and managing labs. Once in-person events began to return, TIES Digital Fabrication Lab began providing the services of a STEM-on-the-Go van, which serves as a mobile lab for machining and digital fabrication.

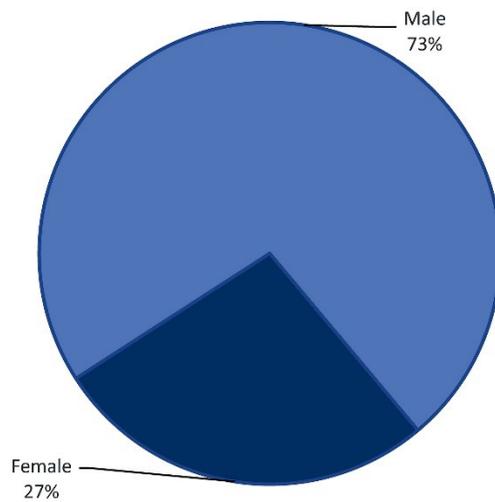
NOTE. DEMOGRAPHIC DATA WAS REPORTED AS HEADCOUNT.

Headcount. The partner inferred information based on what was seen during program implementation.

STUDENTS

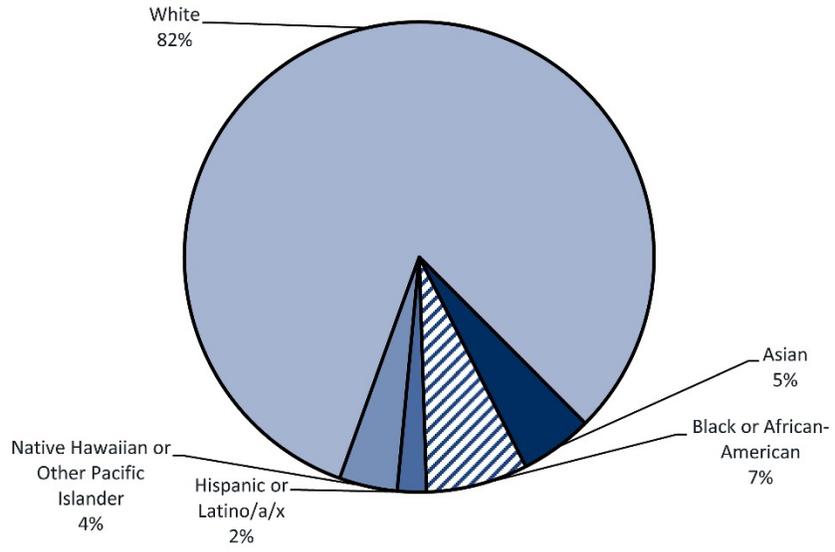


STUDENT GENDER



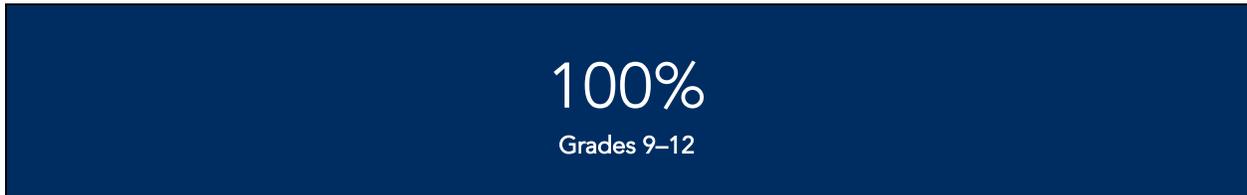
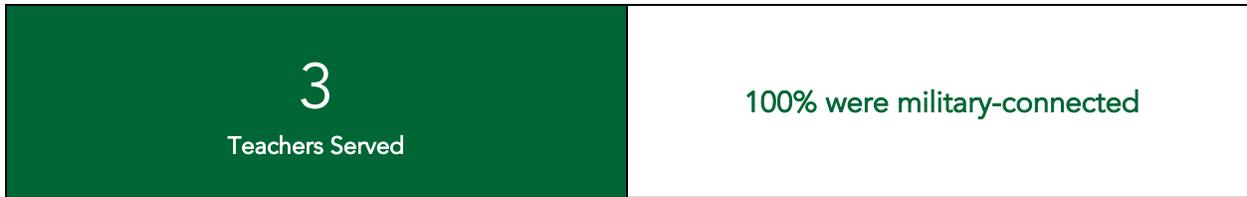
NOTE. Demographic data was reported as headcount.

STUDENT RACE/ETHNICITY



NOTE. Demographic data was reported as headcount.

TEACHERS



TEACHERS FROM UNDERREPRESENTED POPULATIONS: 33%

TEACHER TITLE I DATA NOT REPORTED.

GEOGRAPHIC REACH

Participants in the TIES Digital Fabrication Lab program came from four schools in North Carolina.



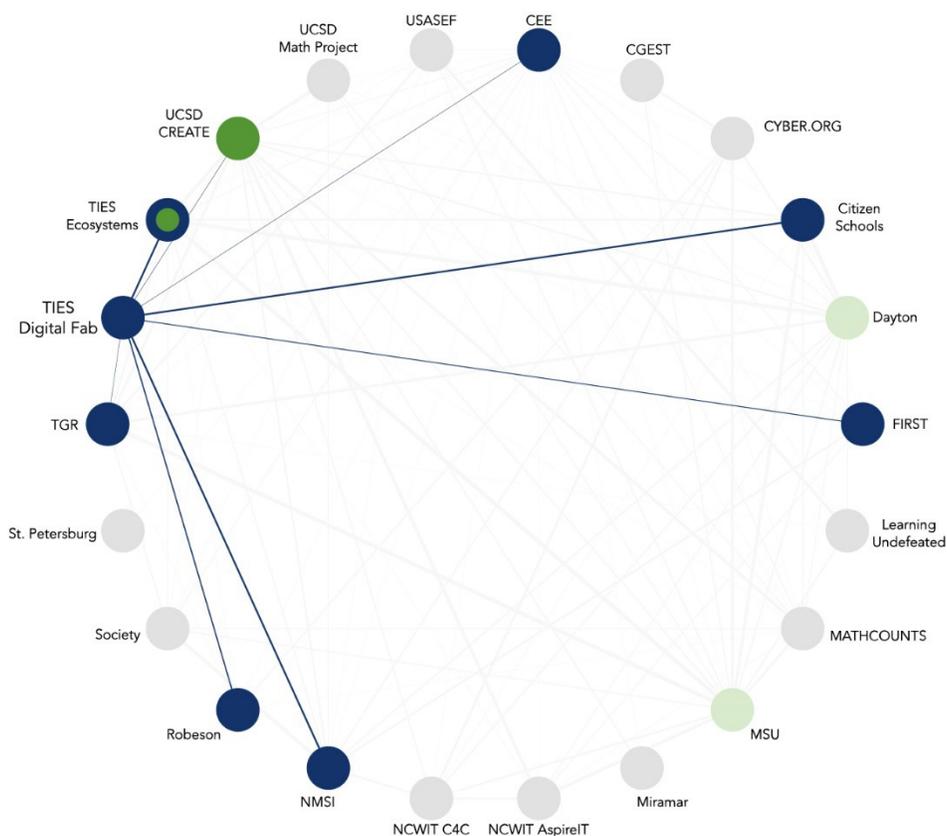
NETWORK CONNECTIVITY

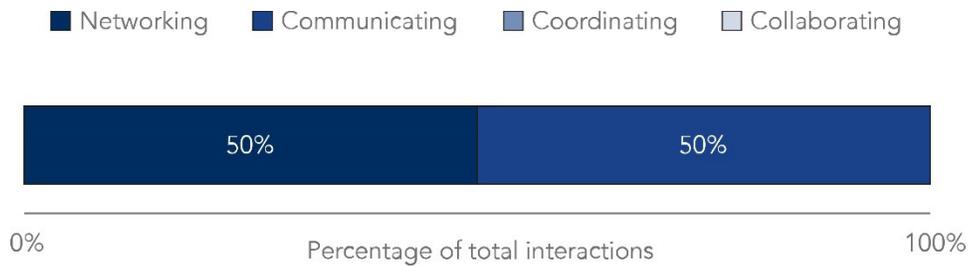
TIES Digital Fabrication Lab is connected to six other STEM Outreach Partners, one Hub Lead Support Partner, and one Hub Lead. In total, TIES Digital Fabrication Lab is connected to eight other organizations within the network, which is slightly lower than the average of nine.

TIES Digital Fabrication Lab's connections occurred at the networking or communicating levels.

TIES Digital Fabrication Lab reported receiving support from three organizations (*FIRST*, NMSI, and TIES Ecosystems) with coordinating outreach or delivering programs to military-connected students. Six organizations (Citizen Schools, *FIRST*, MSU, NMSI, TGR, and TIES Ecosystems) reported receiving support from TIES Digital Fabrication Lab related to this focal population.

TIES Digital Fabrication Lab reported receiving support from five organizations (Citizen Schools, *FIRST*, NMSI, Robeson, and TIES Ecosystems) with coordinating outreach or delivering programs to schools that serve students who are underrepresented in STEM. Six organizations (Citizen Schools, *FIRST*, NMSI, TGR, TIES Ecosystems, and USASEF) reported receiving support from TIES Digital Fabrication Lab related to this focal population.





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To calculate the level of interaction between any two partners over Option Year 1, AIR used an average of the reported levels of interaction across survey administrations, taking into account that some partners joined DSEC midway through the year. For analyses related to the focal populations (military-connected students, underrepresented students, DoD facilities and personnel, and DoD STEM alumni) AIR summed reported interactions across the survey administrations rather than taking an average.

UC SAN DIEGO (UCSD) MATH PROJECT



PROGRESS TOWARD LOGIC MODEL OUTCOMES

INTRODUCE COMPUTER SCIENCE PRINCIPLES.

Introduce computer science principles in the context of a real-world, highly used programming language (Python). Students participating in the summer academy studied Two-Player Impartial Combinatorial Games. In the post-program survey, all students reported becoming more confident with content (Games and Python), problem-solving approaches (e.g., building up from smaller cases), justification, communication, and explanation. One student summarized their experience by saying, "I always learned something new, and I was able to gain new knowledges from all of the games. I enjoyed the challenges and grew thinking skills." All respondents agreed that they would recommend this summer academy to a friend. One student added, "I'm really grateful for the experience; it was definitely worth waking up at 9 a.m. during summer. I learned a lot and changed my views of math and coding, and I will definitely pursue coding after taking this course."

DEVELOP TEACHERS' MATHEMATICAL PEDAGOGICAL CONTENT KNOWLEDGE FOR DISCRETE MATH.

Develop teacher's mathematical pedagogical content knowledge for discrete math. The primary goal of the teacher follow-up sessions was to help math teachers advance students' understandings of the connection between math and computational reasoning, particularly for discrete math. These sessions were designed as a way for teachers to work collaboratively to plan, implement, and debrief a class project with their students. Although teachers reported that the program was challenging because they were teaching remotely, 65% of responding teachers appreciated that the program was project-oriented. One teacher wrote, "It was interesting to push my mathematical thinking into computational thinking."

GAIN KNOWLEDGE OF TEACHING METHODS TO USE COMPUTER TOOLS IN CLASSROOMS.

Gain knowledge of teaching methods to use computer tools in classrooms to connect math with computer science. Teachers continued to hone skills learned in the previous summer's workshop in using the Python programming language with Jupyter notebooks. Because math teachers are not necessarily the computer science teachers at their schools, bringing this language to the classroom requires coordination and collaboration with others. All participants reported positive experiences with both math and computer science content areas as well as influences on their pedagogy and the strength of their professional network. As one teacher stated, "I am excited to join forces with the CS teacher at my school to collaborate on a project with our classes once we go back in person."

ACCOMPLISHMENTS AND CHALLENGES IN 2020-21

UCSD Math Project stated that inspiring teachers and students to find deeper connection between mathematics and computer science was their greatest accomplishment in Option Year 1. The 2020 ICAT Teacher Summer Institute led participants to learn math more deeply and shift their pedagogical approaches based on feedback from teachers. Students also gave positive feedback, with participants considering ICAT Summer Academy for Students a worthwhile experience.

UCSD Math Project considered its biggest challenge to be not securing funding through the National Defense Education Program grant to continue the ICAT summer program next year. The organization is making contingencies and searching for other sources of funding.

PROGRAMS AND PARTICIPANT DATA

With the goal of advancing the Common Core's "Use appropriate tools strategically" practice standard, the UCSD Math Project and the San Diego Supercomputer Center created a curriculum to help teachers and students learn about the Python programming language while leveraging concepts from discrete math. During their initial year of Innovation Bloc funding in 2019-2020, UCSD ran a Summer Academy for Teachers, with follow-up sessions continuing into Option Year 1. In addition, the Summer Academy for Students was held again this year.

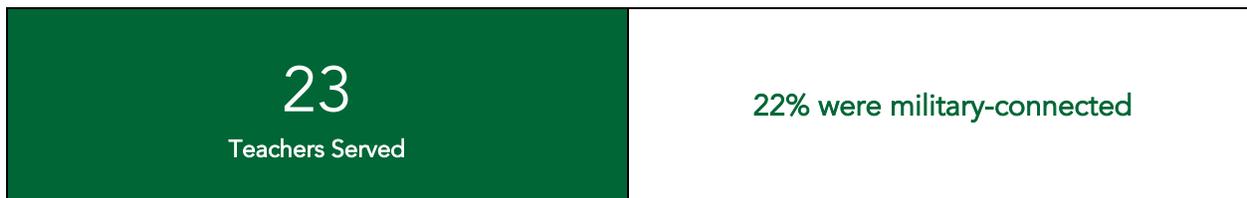
1

Follow-up sessions with participants in the ICAT Summer Academy for Teachers participants to continue planning lessons and classroom projects.

NOTE. DEMOGRAPHIC DATA WAS REPORTED AS HEADCOUNT.

Headcount. The partner inferred information based on what was seen during program implementation.

TEACHERS



TEACHERS FROM UNDERREPRESENTED POPULATIONS: 44%.

TEACHERS FROM TITLE I SCHOOLS: 57%.

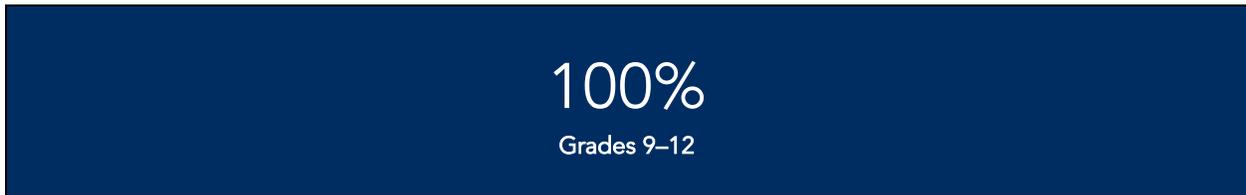
2

Summer Academy for Students is a 1-week academy for high school students that follows the same content-focused format as the teacher institute.

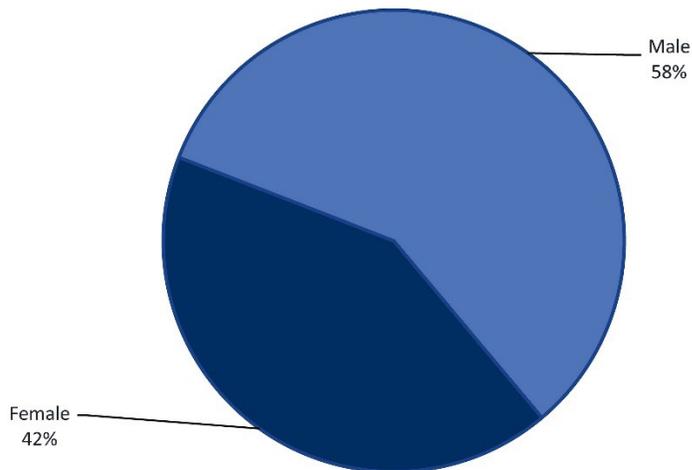
STUDENTS

NOTE. STUDENT DEMOGRAPHIC DATA WAS REPORTED AS REGISTRATION.

Registration. The partner used a registration form to collect data. In some cases, this was provided directly by the participant, while in others a teacher or coach registered a class or team.

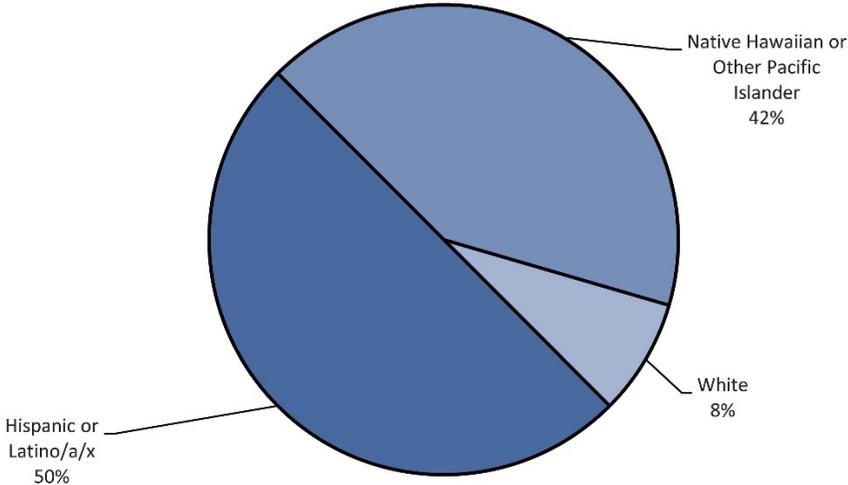


STUDENT GENDER



NOTE. Demographic data was reported as registration.

STUDENT RACE/ETHNICITY



NOTE. Demographic data was reported as registration.

TEACHERS

NOTE. TEACHER DEMOGRAPHIC DATA WAS REPORTED AS HEADCOUNT.

Headcount. The partner inferred information based on what was seen during program implementation.

2
Teachers Served

100%
Grades 9-12

TEACHERS FROM UNDERREPRESENTED POPULATIONS: 50%

TEACHERS FROM TITLE I SCHOOLS: 50%

GEOGRAPHIC REACH

Participants in the UCSD Math Project programs came from schools in the San Diego, California region.



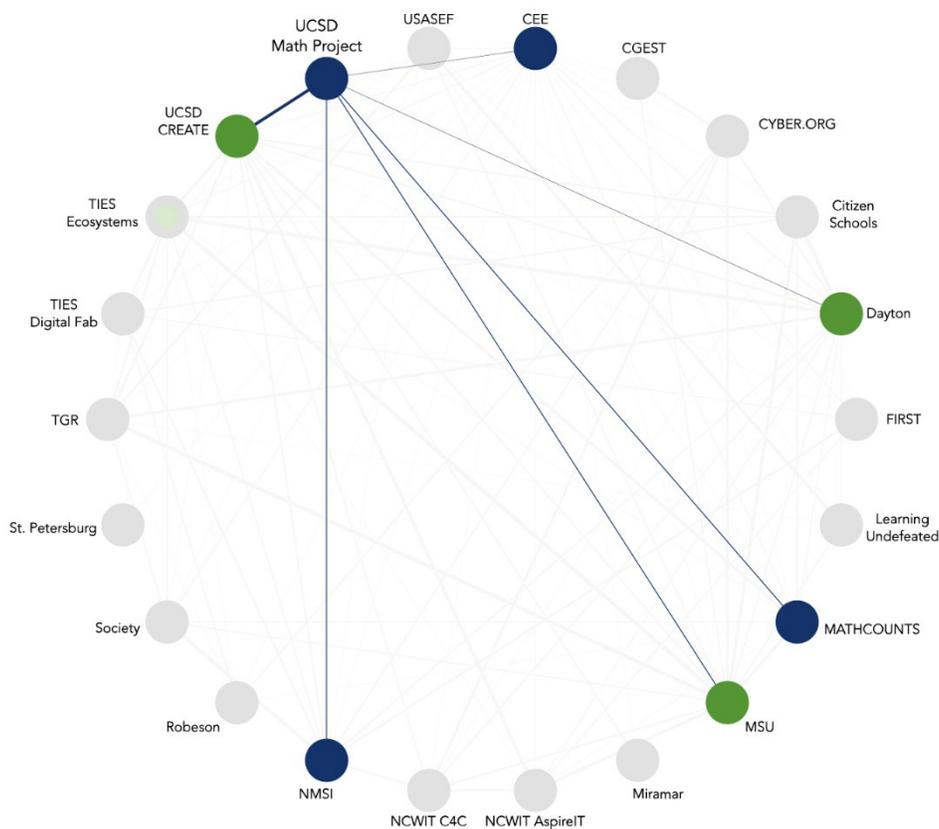
NETWORK CONNECTIVITY

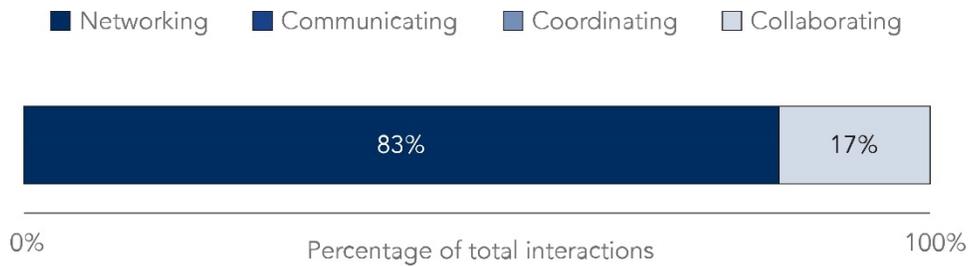
UCSD Math Project is connected to three other STEM Outreach Partners and three Hub Leads. In total, UCSD Math Project is connected to six other organizations within the network, which is lower than the average of nine.

UCSD Math Project's connections occurred primarily at the networking level, with a single connection with UCSD CREATE at the collaborating level.

UCSD Math Project reported receiving support from five organizations (DRSC, MATHCOUNTS, MSU, TIES Ecosystems, and UCSD CREATE) with coordinating outreach or delivering programs to military-connected students. Three organizations (MSU, NMSI, and UCSD CREATE) reported receiving support from UCSD Math Project related to this focal population.

UCSD Math Project reported receiving support from six organizations (DRSC, CEE, MATHCOUNTS, MSU, TIES Ecosystems, and UCSD CREATE) with coordinating outreach or delivering programs to schools that serve students who are underrepresented in STEM. Six organizations (CEE, Citizen Schools, MATHCOUNTS, MSU, NMSI, and UCSD CREATE) reported receiving support from UCSD Math Project related to this focal population.





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USA SCIENCE AND ENGINEERING FESTIVAL (USASEF)



PROGRESS TOWARD LOGIC MODEL OUTCOMES

INCREASE STUDENT AWARENESS AND INTEREST IN STEM CAREER PATHWAYS AND MILITARY PATHWAYS.

Increase student awareness and interest in STEM career pathways and military pathways. The virtual festival enabled USASEF to reach students across the United States and in 99 countries, including rural areas where students do not have as many STEM engagement opportunities. In a postprogram survey, 69% of the participants responded that SciFest was an effective way to get them and their students interested in STEM. One student attendee stated,

I've learned so much about STEM because of SciFest! It greatly broadened my knowledge about career options and showed many new and incredibly useful applications of STEM. It also introduced great resources that I can use in the future! I've learned a lot!

An educator attendee responded,

I like that the students had a choice of what they see. They seemed to enjoy the live performances, and for those "nonscience" kids, they did greatly enjoy the military site to see what sort of jobs were available to them. They were surprised they were considered STEM jobs.

INCREASE TEACHERS' ABILITY TO ENGAGE STUDENTS IN STEM LEARNING.

Increase teachers' ability to engage students in STEM learning. By using the virtual platform, USASEF engaged teachers across the United States and in 39 countries. Through targeted outreach, 41% of attending public-school teachers were from Title I schools. The workshop presenters represented a diverse group of educators and communicators all presenting "outside the box" tools for presenting STEM concepts to their students. In a post-program

survey, 97% of the respondents agreed that they plan to incorporate resources from the workshops into their lesson plans. One participant stated,

Yes, I love it. I always wanted to know how to incorporate music to my classes, and I actually got what I needed to start trying this method with my students. I really enjoyed this workshop and gained lots of ideas to use in my home classroom.

ACCOMPLISHMENTS AND CHALLENGES IN 2020-21

USASEF reported its greatest accomplishment this year was engaging with DSEC and other DSEC Partners. They enlisted several partners to serve as expert presenters during their programming activities and highlighted DSEC Partners in their newsletters. USASEF made intentional efforts during Option Year 1 to promote the DSEC brand among students, parents, and educators with the goal of increasing name recognition. One example was creating a DoD STEM/DSEC hero slider on their homepage that linked to more information about DSEC.

USASEF stated that not being able to successfully connect with DoDEA schools was their biggest challenge. The organization was attempting a different approach, such as making connections with those in districts where there were highly DoDEA-funded public schools.

PROGRAMS AND PARTICIPANT DATA

USASEF did not separate DSEC participation reporting from its overall participation reporting. To determine the number of participants, a multiplier equal to the percentage of funding provided by DSEC for the program in Option Year 1 was used to adjust the overall numbers. These were the DSEC percentages of funding for USASEF's programming: SciFEST ALL Access, 22%; X-STEM All Access, 30%, Inspire Educators Workshop: 27%.

DSEC funded the following USASEF activities during 2020-21.

USASEF focuses on a broad spectrum of STEM topics designed to inspire students, families, and the community to pursue STEM knowledge.

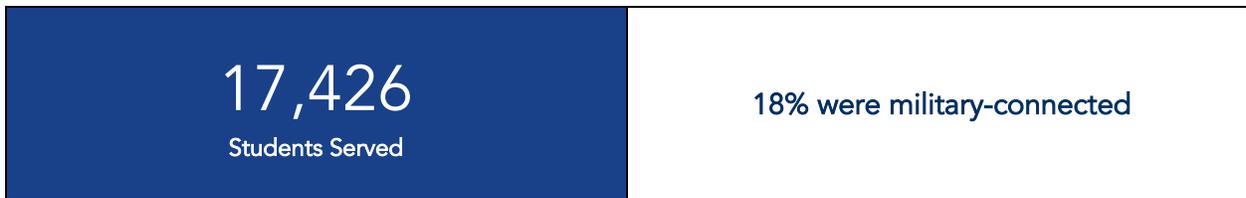
1

SciFEST ALL Access engaged the general public in a virtual expo following the cancelation of the 2020 in-person USASEF because of COVID-19. Expo exhibitors included DoD STEM and other DSEC partners.

NOTE. DEMOGRAPHIC DATA WAS REPORTED AS REGISTRATION.

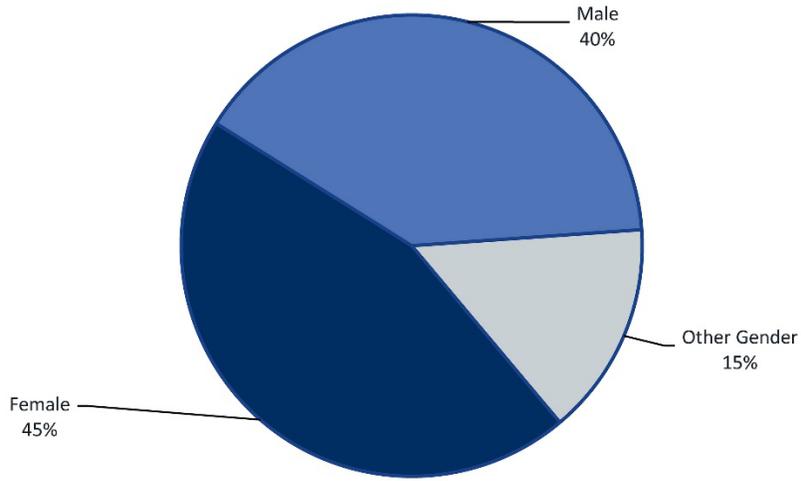
Registration. The partner used a registration form to collect data. In some cases, this was provided directly by the participant, while in others a teacher or coach registered a class or team.

STUDENTS



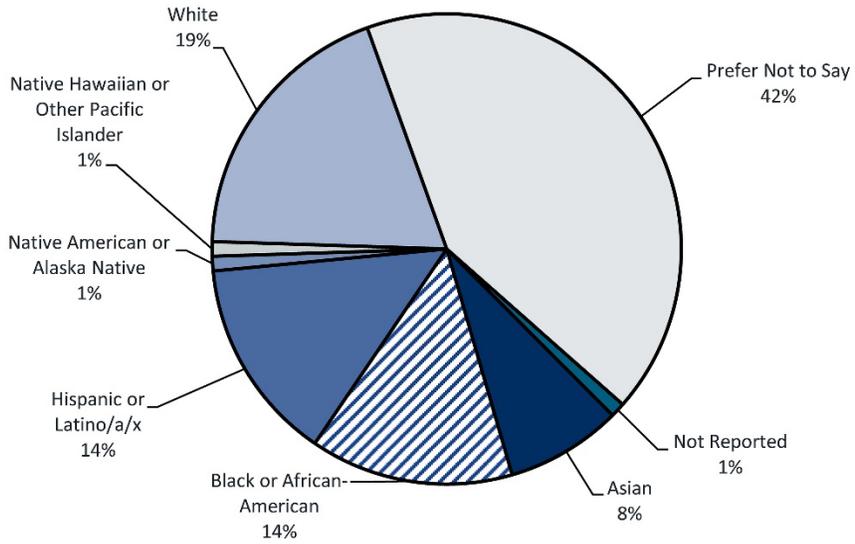
Grades K-5	Grades 6-8	Grades 9-12	2-Year	4-Year	Graduate	Not in School
28%	38%	26%	2%	2%	2%	1%

STUDENT GENDER



NOTE. Demographic data was reported as registration.

STUDENT RACE/ETHNICITY



NOTE. Demographic data was reported as registration.

2

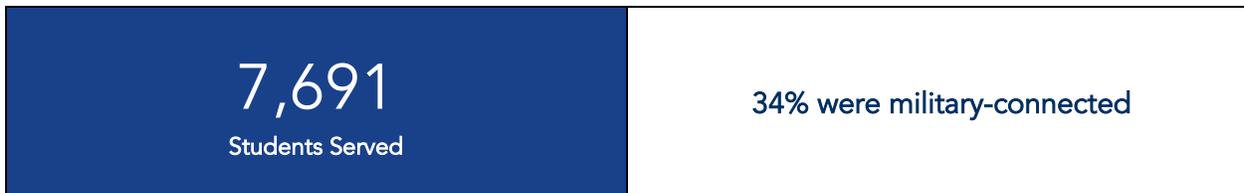
X-STEM All Access, sponsored in part by DoD STEM, was held virtually in April 2021. Middle and high school students attended this event, which featured live-streamed presentations by STEM professionals who engaged students in presentations on STEM topics and careers.

NOTE. DEMOGRAPHIC DATA WAS REPORTED AS REGISTRATION.

Registration. The partner used a registration form to collect data. In some cases, this was provided directly by the participant, while in others a teacher or coach registered a class or team.

USASEF encountered issues with its online registration platform. As such, military connected may be undercounted.

STUDENTS



STUDENT GENDER DATA NOT REPORTED.

STUDENT RACE/ETHNICITY DATA NOT REPORTED.

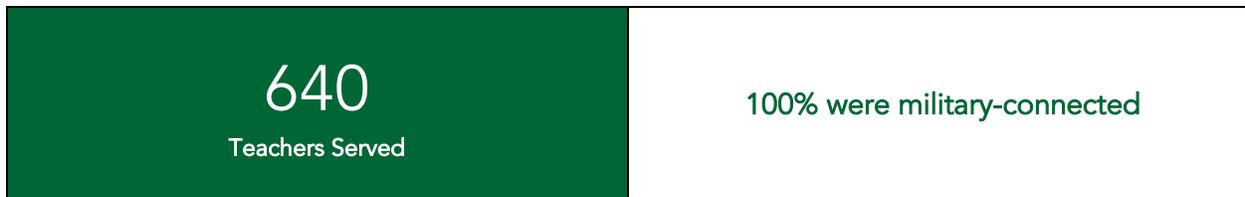
3

Inspire Educators Workshop Series, held virtually in May 2021, was to equip teachers with STEM learning tools for the classroom.

NOTE. DEMOGRAPHIC DATA WAS REPORTED AS REGISTRATION.

Registration. The partner used a registration form to collect data. In some cases, this was provided directly by the participant, while in others a teacher or coach registered a class or team.

TEACHERS



TEACHERS FROM UNDERREPRESENTED POPULATIONS: 45%

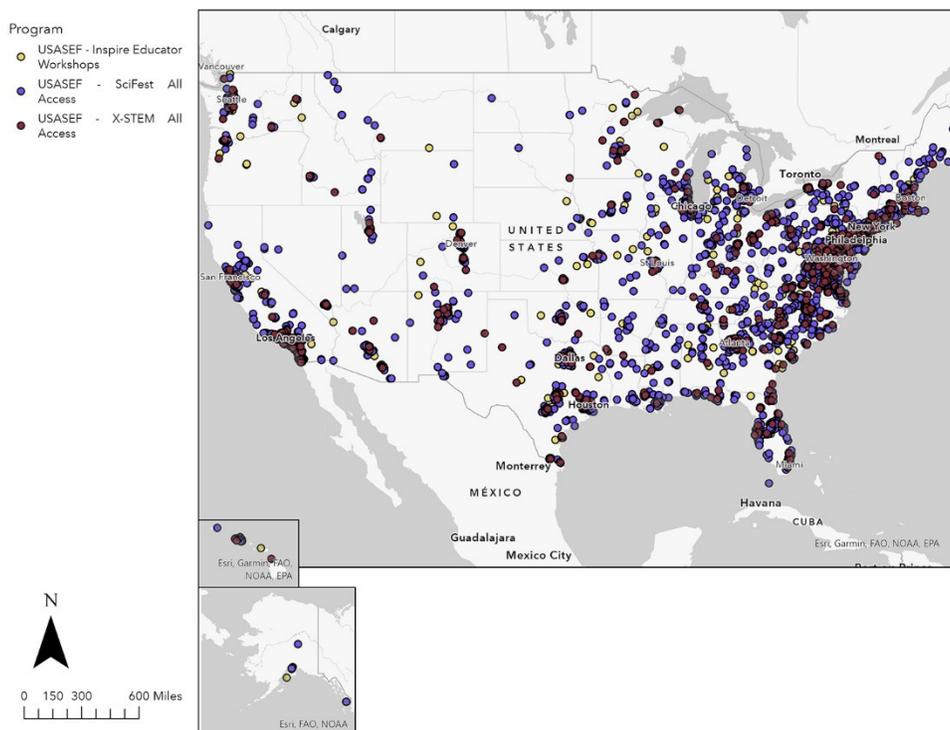
TEACHERS FROM TITLE I SCHOOLS: 30%

PARENTS



GEOGRAPHIC REACH

Participants in the USASEF SciFest event came from schools in states across the United States, with concentrations in California and the DMV region. Inspire Education Workshops and X-STEM programming participants came from multiple schools, with the largest concentrations along the East Coast and in Southern California (school locations' dots are scaled by the number of participants from that school).



NETWORK CONNECTIVITY

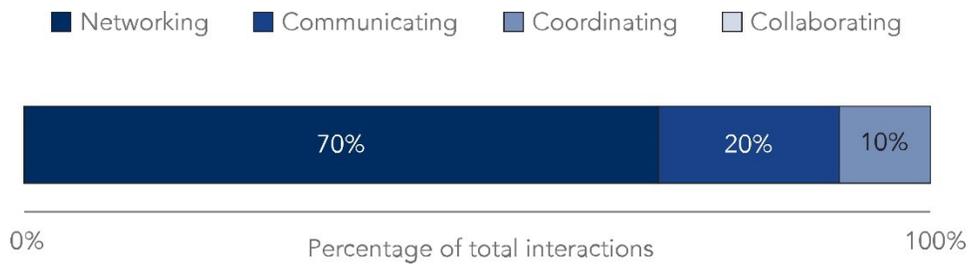
USASEF is connected to seven other STEM Outreach Partners, one Hub Lead Support Partner, and two Hub Leads. In total, USASEF is connected to 10 other organizations within the network, which is slightly above the average of nine.

USASEF's connections occurred primarily at the networking level, with fewer ties occurring at the communicating and coordinating levels.

USASEF reported receiving support from three organizations (FIRST, TGR, and UCSD CREATE) with coordinating outreach or delivering programs to military-connected students. Five organizations (MATHCOUNTS, NMSI, Society, TGR, and UCSD CREATE) reported receiving support from USASEF related to this focal population.

USASEF reported receiving support from nine organizations (FIRST, Learning Undeclared, MATHCOUNTS, MSU, NMSI, Society, TGR, TIES Digital Fab, and TIES Ecosystems) with coordinating outreach or delivering programs to schools that serve students who are underrepresented in STEM. Eight organizations (Learning Undeclared, MATHCOUNTS, MSU, NMSI, Society, TGR, TIES Ecosystems, and UCSD CREATE) reported receiving support from USASEF related to this focal population.





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DOD STEM AMBASSADORS

ACCOMPLISHMENTS AND CHALLENGES IN 2020-21

Among the achievements of the DoD STEM Ambassador program, participants learned new content, gained a broader view of STEM education, and increased their professional networks. DoD STEM Ambassadors presented at conferences and also created virtual and blended resources that could aid others in the design of STEM lessons. Participants spread the word about DoD STEM and opportunities for students and teachers.

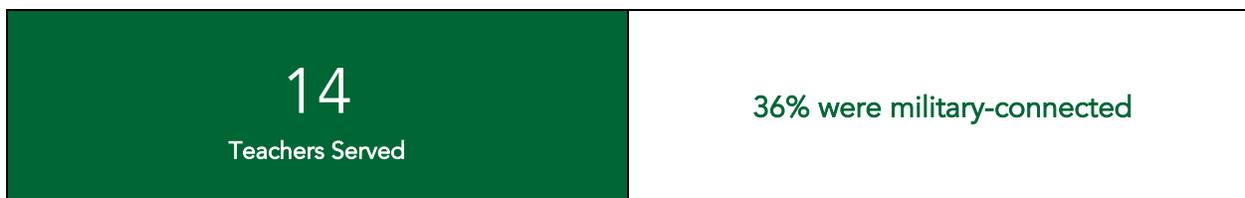
Because the DoD STEM Ambassador program was intentionally planned for virtual engagement, no challenges were cited.

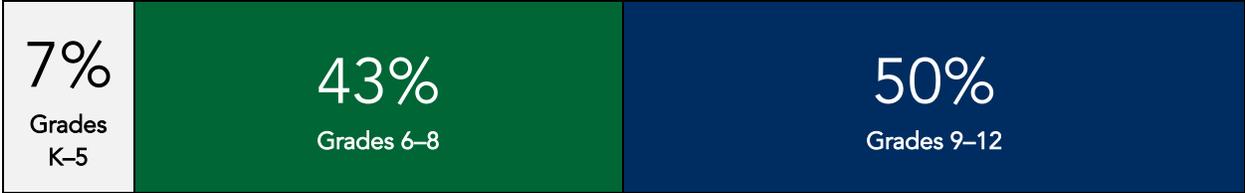
The **DoD STEM Ambassadors program** recognizes outstanding educators in the field who could partner with DSEC to collaborate and curate resources to support STEM educators across the nation in implementing high-quality STEM learning for all students. RTI facilitated the program's inaugural year in Option Year 1. Educators convened as a virtual learning community throughout the year and supported DSEC Partners and Hub Leads in their programming efforts.

NOTE. TEACHER DEMOGRAPHIC DATA WAS REPORTED AS HEADCOUNT.

Headcount. The partner inferred information based on what was seen during program implementation.

TEACHERS



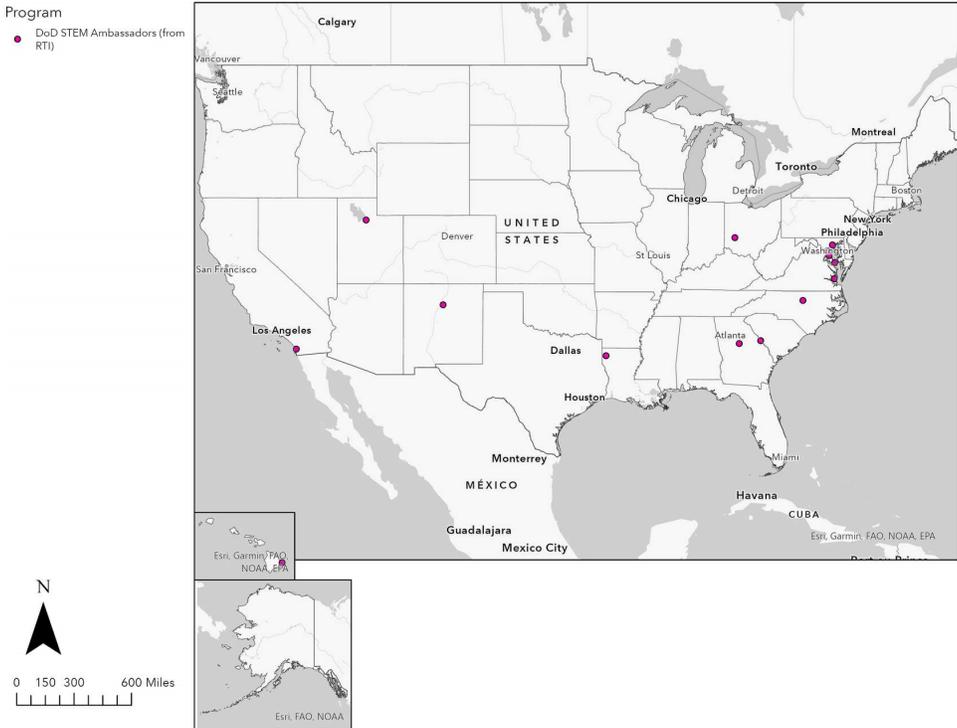


TEACHERS FROM UNDERREPRESENTED POPULATIONS: 64%

TEACHER TITLE I DATA NOT REPORTED.

GEOGRAPHIC REACH

School-level data were unavailable for DoD STEM Ambassadors activities. Individual DoD STEM Ambassadors participants came from 11 U.S. states.



NETWORK CONNECTIVITY

No network connectivity data was gathered.

2020-21 INNOVATION BLOC PARTNERS

INNOVATION BLOC INTRODUCTION

As part of its efforts to strengthen DoD STEM priority areas and address gaps in programming, DSEC selected four new organizations with its 2021 Innovation Bloc Funding. The awarded programs support DoD STEM's efforts to strengthen career pathways among military-connected students and groups traditionally underrepresented in STEM, as well as one of its modernization priorities: biotechnology. Award amounts ranged from \$150,000 to \$275,000 for one year, with the possibility of a continuance into the next funding year.

Most Base Year (2019–20) Innovation Bloc Partners (ASU CGEST, Citizen Schools, CYBER.ORG, NCWIT Counselors for Computing, TIES Digital Fabrication Lab, and the UCSD Math Project) could not commence programming because of the pandemic. All these partners continued their work in Option Year 1 (2020–21) and are now considered part of the overall STEM Outreach Partner family.

For Option Year 1, DSEC decided to focus on supporting student learning at community colleges as a way to promote career path opportunities in STEM through internships and certifications. Option Year 1's recipients were Learning Undefeated (working with Montgomery College in Maryland), Robeson Community College, San Diego Miramar College, and St. Petersburg College.

LEARNING UNDEFEATED



PROGRESS TOWARD LOGIC MODEL OUTCOMES

INCREASE STUDENT INTEREST IN BIOTECHNOLOGY AND STEM.

Increase student interest in biotechnology and STEM. With a program of 10 virtual workshops and an in-person laboratory workshop lasting six days, the program paired college women as mentors to lead high school women through biotech and career activities. Of the 55 participants completing the entire program, 89% were from populations that are underrepresented in STEM. Many participants had a high interest in STEM coming into the program. Pre/post surveys showed a 12% increase in interest in biotechnology (pre, 71%; post, 83%) and a 12% increase in DoD STEM specifically (pre, 57%; post, 67%). For mentors as a subgroup, interest in DoD STEM rose 23% (pre, 56%; post, 79%), likely related to preparing to make career decisions as they finish their college degrees.

INCREASE STUDENT EFFICACY, CONFIDENCE, AND KNOWLEDGE.

Increase student efficacy, confidence, and knowledge with STEM concepts and biotechnology techniques. Based on surveys, changes in self-efficacy and confidence were not large compared with percentages before the program, primarily because the participants had high levels coming into the program (86% of the participants in the presurvey agreed with the statement "I will be able to achieve most of the goals I set for myself in STEM"). Specific laboratory skills, such as using a micropipette and working with gel electrophoresis, were not part of the pre-post survey, although exit ticket data suggest that knowledge of concepts and techniques increased.

INCREASE STUDENTS' AWARENESS OF AND INTEREST IN LEARNING ABOUT STEM CAREERS.

Increase students' awareness of and interest in learning about high-demand STEM and DoD biotechnology-related careers. Participants showed a 56% increase in awareness in biotechnology industry sectors and products (pre, 14%; post, 70%). In addition, participants increased their knowledge of biotechnology careers by 24% (pre, 54%; post, 88%). Learning

Undeclared believes that these increases relate to having speakers from diverse organizations as well as tying all laboratory activities to specific DoD STEM careers.

ACCOMPLISHMENTS AND CHALLENGES IN 2020-21

Learning Undeclared designed a hybrid program that was both engaging and impactful. Despite the changing environment affected by COVID-19 transmission and policies, Learning Undeclared provided participants with a virtual program that retained 81% of the participants in a 5-month period. Of 68 total participants, 55 (81%), joined all sessions and completed the entire program. Learning Undeclared attributed this accomplishment to leveraging the collaboration and interaction among teens and their near-peer mentors. Students felt connected and in touch with each other, even if they could not be in the same room. In addition, by having college women lead high school women in activities, they built long-lasting, deep relationships that might have a stronger impact than traditional STEM programs.

Although the program was successful, Learning Undeclared desired to involve more participants from different communities. The very short timeline for participant recruitment limited marketing to partners and participants who were already in the organization's network. In the future, Learning Undeclared plans to allow more time for recruitment and expects to market the program more widely. In addition, the organization hopes to work with other interested members of the DSEC community to scale programming and establish similar types of programming within their networks.

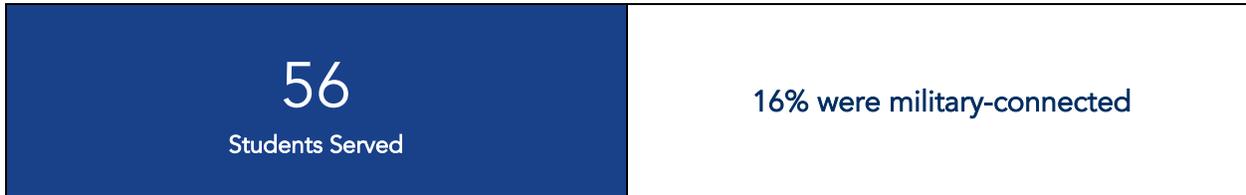
PROGRAMS AND PARTICIPANT DATA

In addition, Learning Undeclared provided a second hybrid program model to spark interest and provide experiential programs in biotechnology. The program comprises an in-person laboratory workshop and a virtual workshop that highlighted female professionals in various biotechnology roles and their experiences in STEM. In addition, Learning Undeclared provided a second hybrid program model that allowed participants to explore and learn laboratory skills through custom-designed science kits.

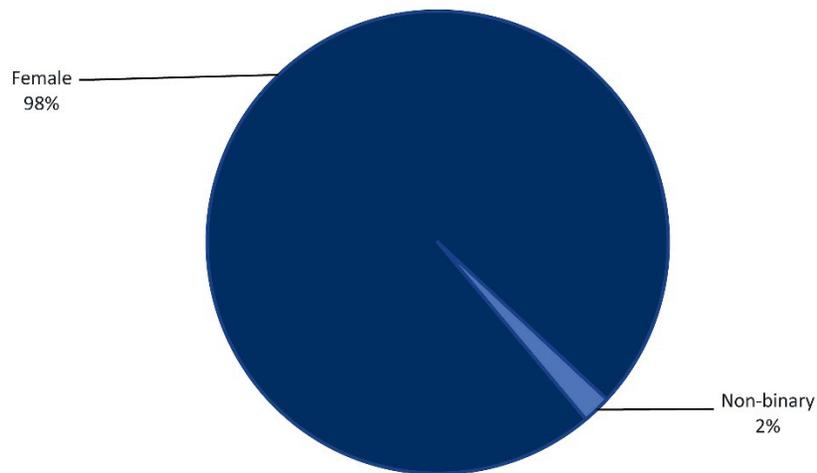
NOTE. DEMOGRAPHIC DATA WAS REPORTED AS HEADCOUNT.

Headcount. The partner inferred information based on what was seen during program implementation.

STUDENTS

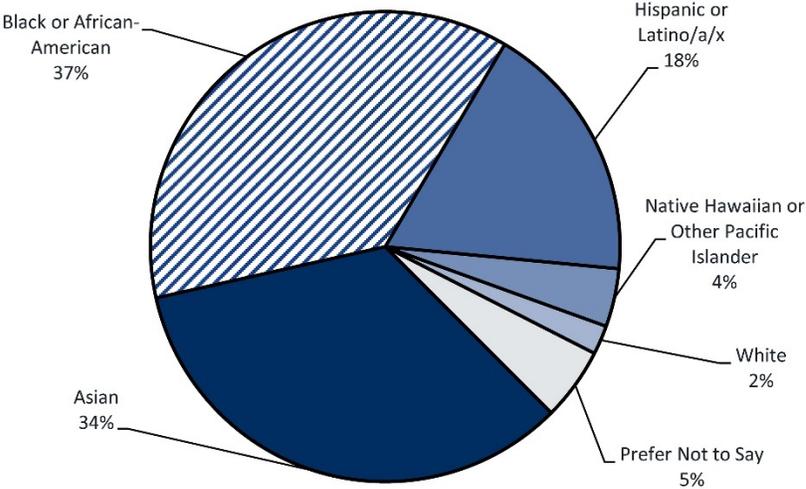


STUDENT GENDER



NOTE. Demographic data was reported as headcount.

STUDENT RACE/ETHNICITY



NOTE. Demographic data was reported as headcount.

GEOGRAPHIC REACH

School-level data were unavailable for the Learning Undefeated virtual workshop participants. Individual Learning Undefeated virtual workshop participants came almost entirely from Maryland and Virginia, with one participant joining from New York.



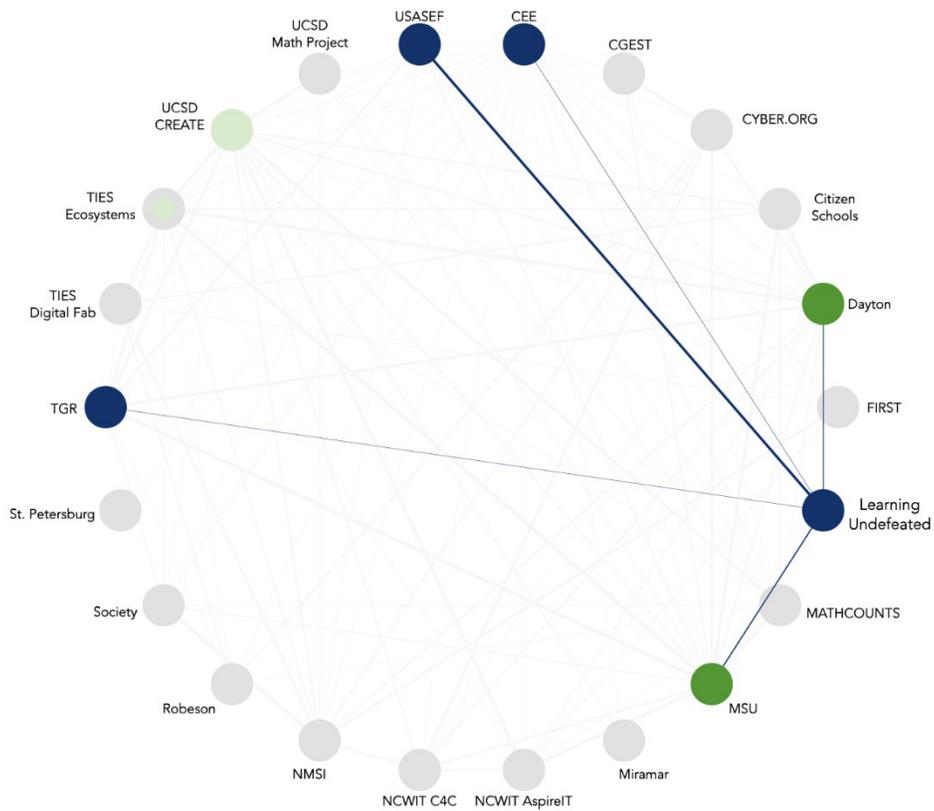
NETWORK CONNECTIVITY

Learning Undeclared is connected to three other DSEC Partners and two Hub Leads. In total, Learning Undeclared is connected to five other organizations within the network, which is lower than the average of nine.

Learning Undeclared's connections occurred primarily at the networking level, with a few connections at the communicating and coordinating levels.

Learning Undeclared did not report receiving support from any organization with coordinating outreach or delivering programs to military-connected students. One organization (MSU) reported receiving support from Learning Undeclared related to this focal population.

Learning Undeclared reported receiving support from two organizations (MSU and USASEF) with coordinating outreach or delivering programs to schools that serve students who are underrepresented in STEM. Three organizations (DRSC, MSU, and USASEF) reported receiving support from Learning Undeclared related to this focal population.



■ Networking
 ■ Communicating
 ■ Coordinating
 ■ Collaborating



- **Networking:** exchanging information
- **Communicating:** building a shared understanding
- **Coordinating:** creating complementary programming
- **Collaborating:** jointly designing or delivering programming

To calculate the level of interaction between any two partners over Option Year 1, AIR used an average of the reported levels of interaction across survey administrations, taking into account that some partners joined DSEC midway through the year. For analyses related to the focal

populations (military-connected students, underrepresented students, DoD facilities and personnel, and DoD STEM alumni) AIR summed reported interactions across the survey administrations rather than taking an average.

SAN DIEGO MIRAMAR COLLEGE (MIRAMAR)



PROGRESS TOWARD LOGIC MODEL OUTCOMES

INCREASE PARTICIPANT JOB READINESS.

Increase participant job readiness. Restriction in class sizes to 50% of capacity during the pandemic resulted in a clogged pipeline of students moving into industry jobs, which formed the premise in providing additional summer learning opportunities so that students could more readily move onto these jobs. Students completed a survey at the end of their coursework asking if they felt the courses had increased their job readiness; 96% of respondents said that their participation increased or extremely increased job readiness. One student stated,

I did not expect the course to include so much focus on career readiness and résumé/interview preparation. It also helped me to focus my career goals and be able to decide what I was most passionate about and in what areas I would like to work.

PREPARE PARTICIPANTS TO TAKE A THIRD-PARTY CERTIFICATION EXAMINATION

Prepare participants to take the Certified Quality Improvement Associate (CQIA) certification examination. In summer 2021, 26 students completed Biology 136 Quality and Regulatory Practices in Biotechnology, and 81% felt ready to sit for the examination with the expected additional preparation. Twenty students from the summer and previous semesters sat for the examination in August 2021.

GIVE LABORATORY EXPERIENCES THROUGH SUBSIDIZED INDUSTRY INTERNSHIPS

Give real-world, hands-on laboratory experiences through subsidized industry internships. The nine interns who completed their internship stated that their job readiness greatly increased based on what they learned and experienced during their internship. One intern summed up the importance of his "real-world" experience and chance to learn from failure this way:

I was allowed to work independently on a buffer comparison project, running and collecting data to provide a summary for the company for their molecular biology kits. Because I was working independently with guidance from the lab manager, I had to decide how I was going to organize my notes and data. I also learned the value of failure; I produced a lot of bad gels along the way, but they were still useful. I could figure out what caused the error and then report on it on my summary. The summary will be used by the company as a guide for students to use.

ACCOMPLISHMENTS AND CHALLENGES IN 2020-21

To help students understand what a DoD STEM career path might look like, Miramar invited four military personnel from DoD facilities to talk to the morning Biology 132 class about their careers, what their typical day looks like, their educational path, and the most rewarding part of their career. The panelists critically discussed the DoD's need for workers at all educational levels, from community college certification to doctorate. The presentations inspired students to learn that workers with their education level were needed at DoD facilities. Throughout the semester, students also received DoD STEM career resources to help them further their career exploration. Students who attended the career panel session reported that their DoD STEM career awareness increased from an average of 2.2 to 4.2 on a 5-point scale.

Working within a tight program schedule prevented some students from finishing the internship program. Some students exceeded their required hours before the end of August, and others did not complete the full hours. In the future, with more time to set up and provide internships for a longer grant period, Miramar expects student completion rates to increase. The college has already generated a list of employers interested in working with interns during Option Year 2.

PROGRAMS, ACTIVITIES, AND PARTICIPANT DATA

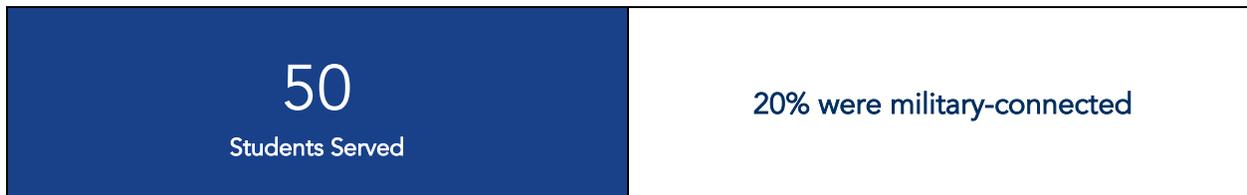
Miramar provided for-credit summer session classes, not part of the college's normal offerings, at no cost to 32 prioritized students, leading to a Certificate of Achievement in Biotechnology and industry-recognized credentials. The college also offered 10 subsidized internships in partnership with Biocom Institute, the life sciences industry association. Enhanced career

development services were offered to all 32 students in the pipeline, including résumé workshops, one-on-one résumé and interview preparation sessions, and counseling to ensure that students had an updated education plan that fit their stated career goals.

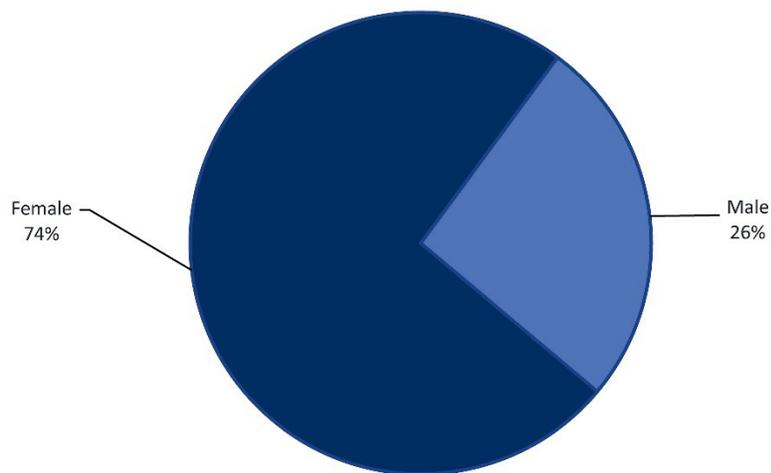
NOTE. DEMOGRAPHIC DATA WAS REPORTED AS HEADCOUNT.

Headcount. The partner inferred information based on what was seen during program implementation.

SUMMER COURSES: STUDENTS

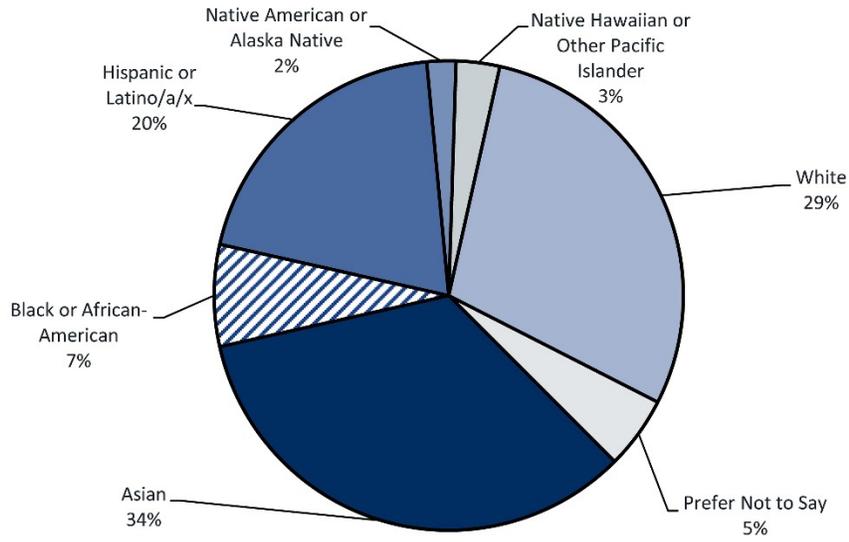


GENDER



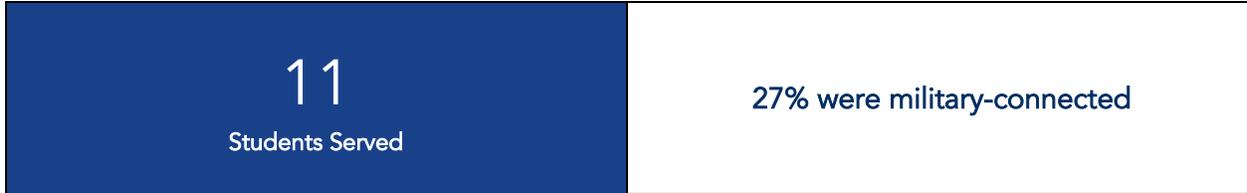
NOTE. Demographic data was reported as headcount.

RACE/ETHNICITY

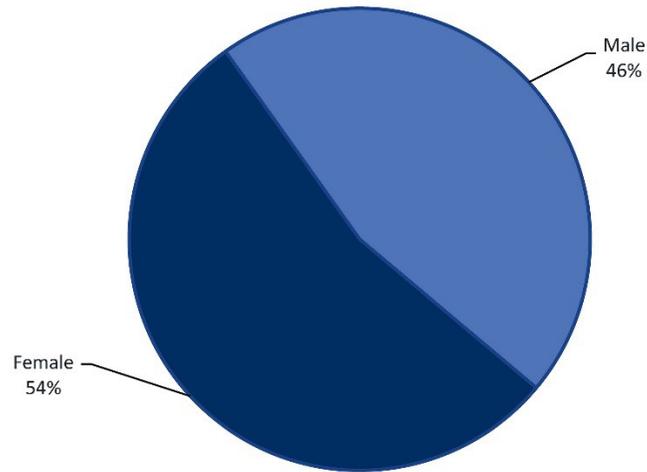


NOTE: Demographic data was reported as headcount.

INTERNSHIPS: STUDENTS

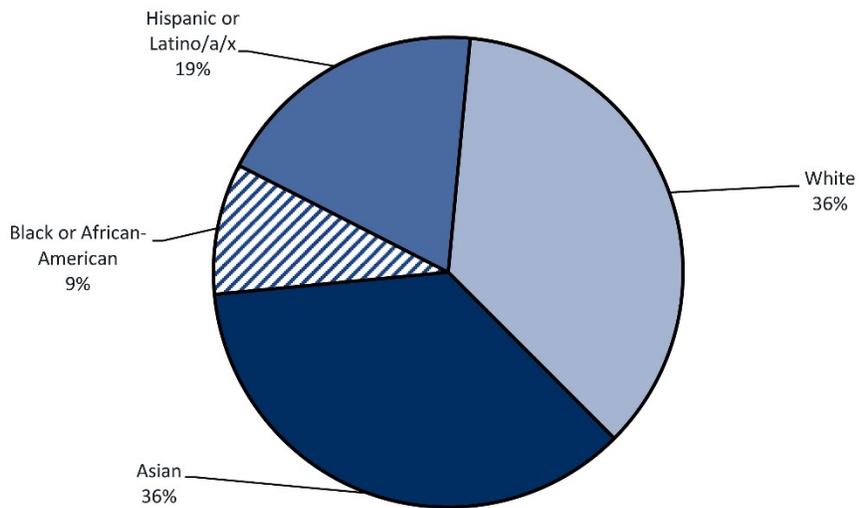


GENDER



NOTE. Demographic data was reported as headcount.

RACE/ETHNICITY



NOTE. Demographic data was reported as headcount.

GEOGRAPHIC REACH

All schools with Miramar participants were in southern California.



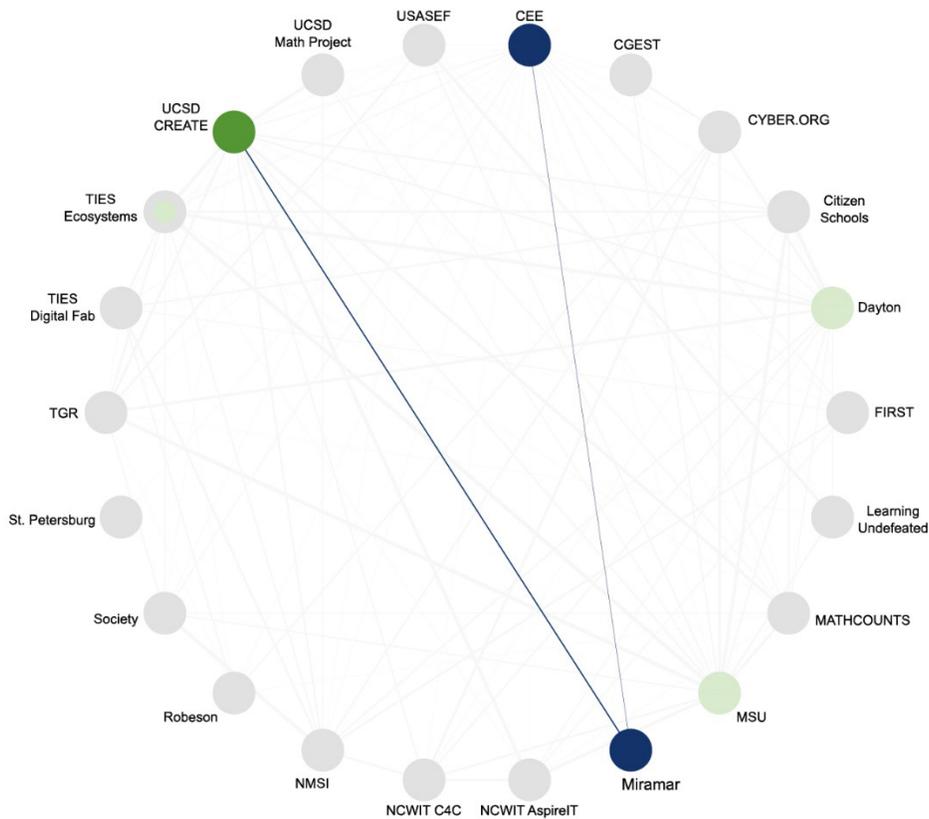
NETWORK CONNECTIVITY

Miramar College is connected to one other STEM Outreach Partner and one Hub Lead. In total, Miramar College is connected to two other organizations within the network, which is lower than the average of nine.

Miramar College’s connections occurred at the networking or communicating level.

Miramar College did not report receiving support from any organization with coordinating outreach or delivering programs to military-connected students. Two organizations (TIES Ecosystems and UCSD CREATE) reported receiving support from Miramar College related to this focal population.

Miramar College reported receiving support from one organization (UCSD CREATE) with coordinating outreach or delivering programs to schools that serve students who are underrepresented in STEM. Three organizations (Citizen Schools, TIES Ecosystems, and UCSD CREATE) reported receiving support from Miramar College related to this focal population.



■ Networking
 ■ Communicating
 ■ Coordinating
 ■ Collaborating



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that some partners joined DSEC midway through the year. For analyses related to the focal populations (military-connected students, underrepresented students, DoD facilities and personnel, and DoD STEM alumni) AIR summed reported interactions across the survey administrations rather than taking an average.

ST. PETERSBURG COLLEGE (SPC)



PROGRESS TOWARD LOGIC MODEL OUTCOMES

PROVIDE PARTICIPANTS KNOWLEDGE OF CAREER SKILLS.

Provide participants knowledge of career skills such as workplace communication, resumé development, job search skills, interviewing skills, and personal branding. SPC concentrated its efforts on providing opportunities for underserved and military-connected students, particularly veterans and female students. The Career Readiness Workshops provided the 42 enrolled students with knowledge of these career skills to aid them in their internship experiences.

STRENGTHEN RELATIONSHIPS WITH STEM INDUSTRY PARTNERS.

Strengthen relationships with STEM industry partners. Faculty, staff, and students engaged or reengaged with 34 industry partners to coordinate work-based learning experiences for students. For many employers, the internship served as a long-term interview of the student as a potential employee. Based on survey results (12 of 42 responding), six students received offers of employment from their internship site hosts/employers. Consistent with prior surveys, it demonstrated the college's continued strong partnership with STEM industry employers to provide an ongoing talent pipeline to meet their workforce needs.

PROVIDE PARTICIPANTS WITH REAL-WORLD EXPERIENCE IN A STEM CAREER.

Provide participants with real-world experience in a STEM career. All 42 participants completed work-based experiences with 34 companies. During their internship experience, students completed a minimum of 60 hours of work with their internship site host, with a majority of students completing closer to 180 hours. All internships were associated with credit-bearing courses aligned with the students' degree requirements or electives.

ACCOMPLISHMENTS AND CHALLENGES IN 2020-21

Successfully identifying and supporting 42 STEM interns during the rapid implementation of the DSEC grant award for the summer semester was SPC's greatest accomplishment in Option Year 1. This process also was a challenge because the STEM internship participation rate increased from previous years. Enrollment in the targeted STEM internship courses increased 25.6%, from 82 students in summer 2019 to 103 students in summer 2021.

SPC planned to serve 45 students in the program but actually served 42 students. The program was implemented rapidly with a narrow time frame, focusing only on the summer semester. With an expansion into spring and summer semesters in Option Year 2, SPC is confident that it will meet all student participation goals.

PROGRAMS, ACTIVITIES, AND PARTICIPANT DATA

The SPC STEM Internship Expansion Initiative provides underrepresented minorities and military-connected students with professional development and career training in STEM-related industries through a **Career Readiness Workshop series** as well as the opportunity to gain valuable experience in STEM industry sectors through paid internships. STEM-related fields included information technology, biotechnology, engineering/advanced manufacturing, healthcare, biology, and environmental science.

NOTE. DEMOGRAPHIC DATA WAS REPORTED AS HEADCOUNT.

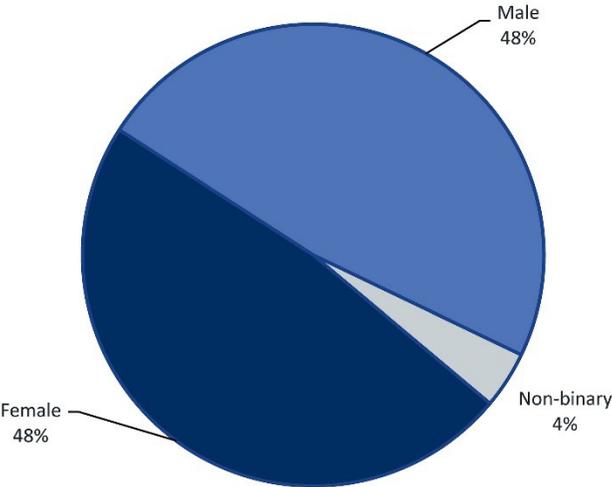
Headcount. The partner inferred information based on what was seen during program implementation.

STUDENTS

42 Students Served	19% were military-connected
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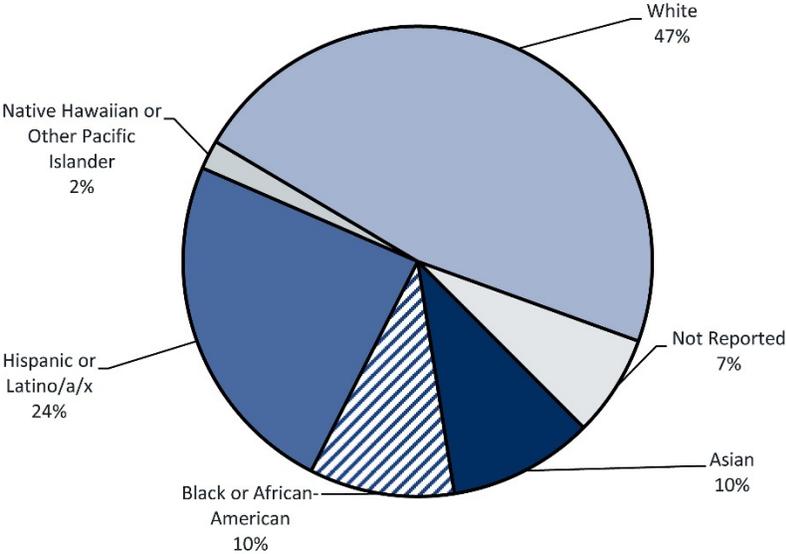


GENDER



NOTE. Demographic data was reported as headcount.

RACE/ETHNICITY



NOTE. Demographic data was reported as headcount.

GEOGRAPHIC REACH

School-level data were not available for SPC programming. All individual SPC programming participants came from the greater Tampa Bay – St. Petersburg area of Florida.



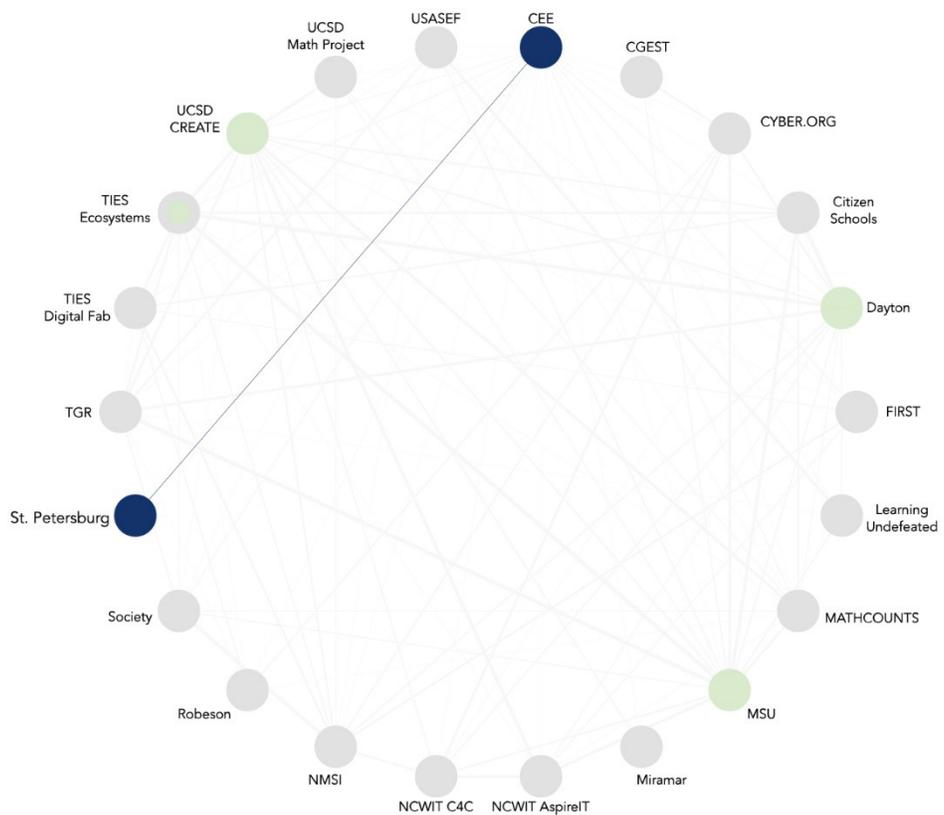
NETWORK CONNECTIVITY

SPC is connected to one other STEM Outreach Partner, which is lower than the average of nine. It should be noted that SPC does not have any DSEC Outreach Partners located in its geographic vicinity of Florida and has programming that is locally-focused.

SPC's connection with CEE is at the networking level.

SPC did not report receiving support from any organization with coordinating outreach or delivering programs to military-connected students. Zero organizations reported receiving support from SPC related to this focal population.

SPC did not report receiving support from any organization with coordinating outreach or delivering programs to schools that serve students who are underrepresented in STEM. Zero organizations reported receiving support from SPC related to this focal population.



■ Networking ■ Communicating ■ Coordinating ■ Collaborating



0% Percentage of total interactions 100%

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ROBESON COMMUNITY COLLEGE (RCC)



PROGRESS TOWARD LOGIC MODEL OUTCOMES

PROVIDE PARTICIPANTS REAL-WORLD (WORK-BASED) EXPERIENCE IN A STEM CAREER.

Provide participants real-world (work-based) experience in a STEM career. Two RCC students and five PSRC students completed internships in summer 2021 at ETI, working under the guidance of a DoD contractor. Students received hands-on experience and also participated with other DoD contractors at an ETI event to showcase current technology in DoD work.

CREATE PATHWAYS FOR PARTICIPANTS TO EARN CYBERSECURITY CERTIFICATION.

Create pathways for participants to earn cybersecurity certification. RCC PSRC worked to develop a CTE pathway so that students can transition from participating in CTE in a K-12 setting to RCC's cybersecurity and networking program. CTE students now have access to cybersecurity materials they can use to gain industry certifications in that area.

OBTAIN TRAINING AND CREDENTIALS FOR FACULTY TO TEACH ADDITIONAL CYBERSECURITY COURSES.

Obtain training and credentials for faculty to teach additional cybersecurity courses. Two RCC instructors engaged in additional cybersecurity training in spring and summer 2021, receiving instructor privileges to teach using Cisco content.

ACCOMPLISHMENTS AND CHALLENGES IN 2020-21

RCC developed partnerships with DoD STEM and DSEC Partners that will help strengthen RCC's programming in the future. The grant allowed RCC to consider how to engage with industry and other partners in the region.

Because of COVID-19 restrictions, RCC could not allow students to visit live events. There is hope that in the future, restrictions will ease to afford students this opportunity.

PROGRAMS AND PARTICIPANT DATA

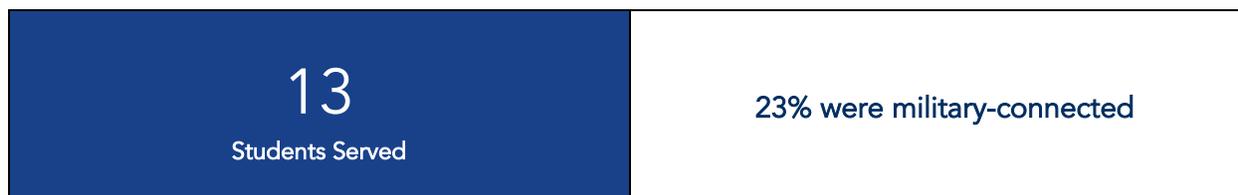
RCC focused its DSEC work in these areas:

- Creating career and technical education (CTE) pathways that provide a through line from K–12 education to study and certification at the postsecondary level.
- Providing internships in partnership with Public Schools of Robeson County (PSRC) and Emerging Technology Institute (ETI), a DoD contractor.
- Enabling RCC instructors to obtain additional training and certifications to teach cybersecurity courses.

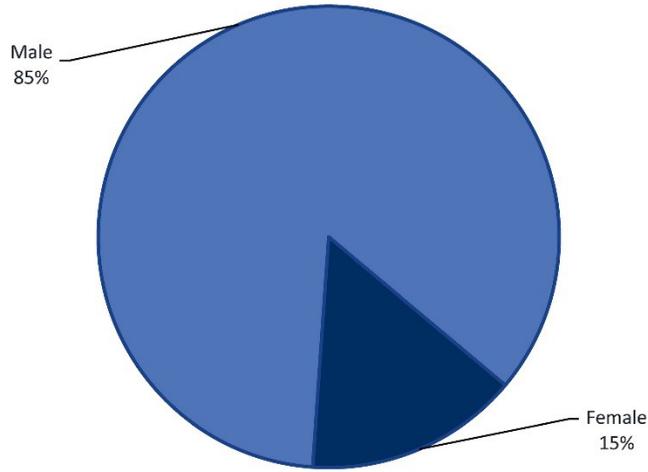
NOTE. DEMOGRAPHIC DATA WAS REPORTED AS REGISTRATION.

Registration. The partner used a registration form to collect data. In some cases, this was provided directly by the participant, while in others a teacher or coach registered a class or team.

CTE PATHWAYS: STUDENTS

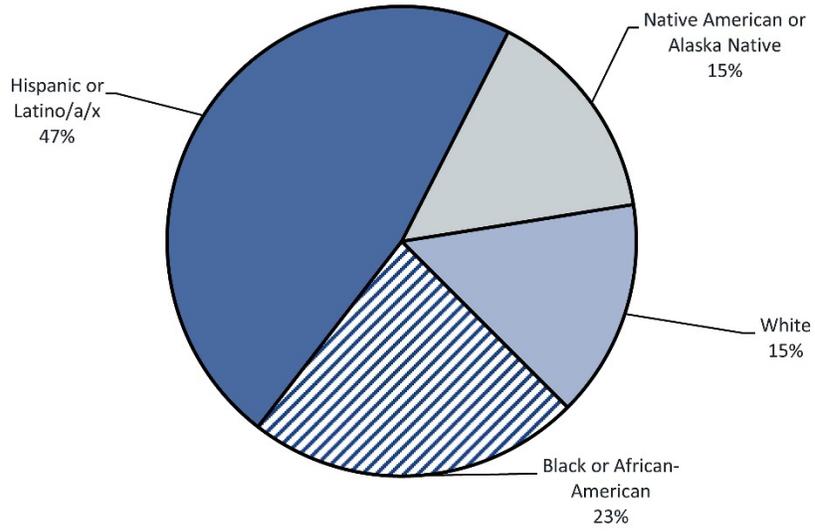


GENDER



NOTE. Demographic data was reported as registration.

RACE/ETHNICITY



NOTE. Demographic data was reported as registration.

INTERNSHIP: STUDENTS

<p>7 Students Served</p>	<p>Military-connected data not reported.</p>
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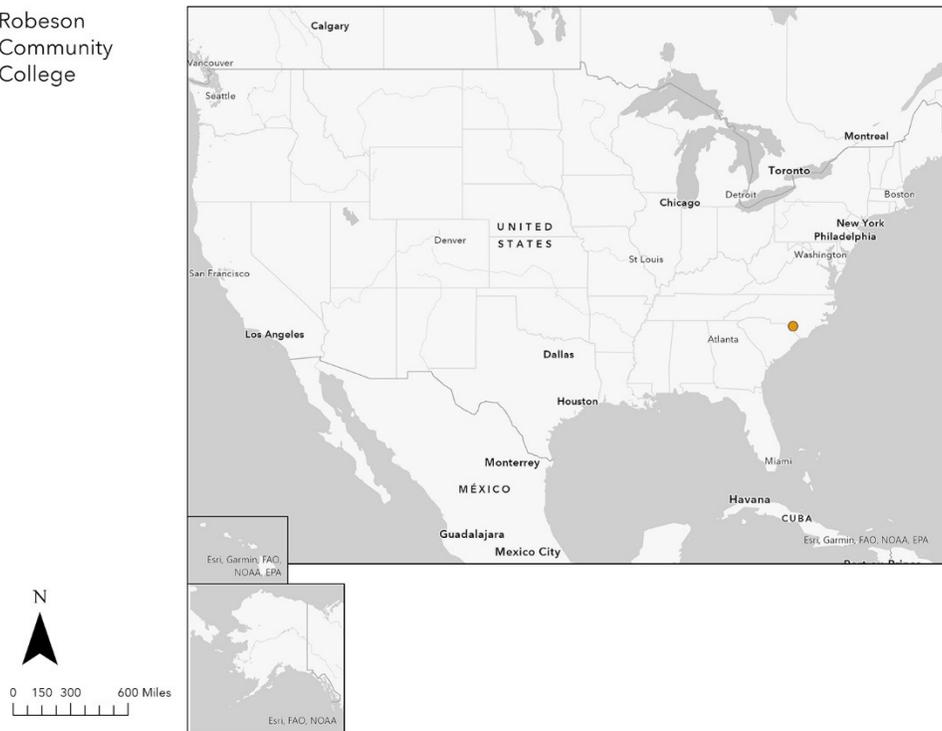
STUDENT GENDER DATA NOT REPORTED.

STUDENT RACE/ETHNICITY DATA NOT REPORTED.

GEOGRAPHIC REACH

School-level data were not available for the RCC participants. All individual participants came from the immediate Robeson County, North Carolina, area.

Robeson
Community
College



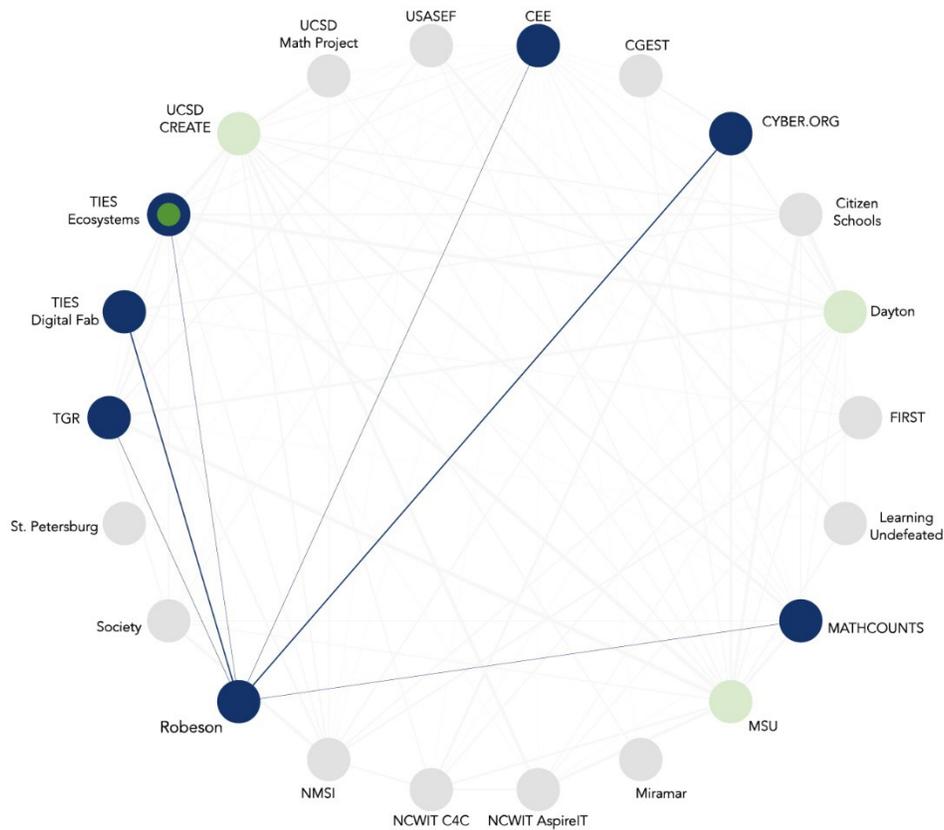
NETWORK CONNECTIVITY

RCC is connected to five other STEM Outreach Partners, one Hub Support Partner, and zero Hub Leads. In total, RCC is connected to six other organizations within the network, which is lower than the average of nine.

RCC's connections occurred primarily at the networking level, with fewer connections occurring at the communicating level.

RCC did not report receiving support from any organization with coordinating outreach or delivering programs to military-connected students. One organization (CYBER.ORG) reported receiving support from RCC related to this focal population.

RCC reported receiving support from one organization (CYBER.ORG) with coordinating outreach or delivering programs to schools that serve students who are underrepresented in STEM. Two organizations (CYBER.ORG and TIES Digital Fab) reported receiving support from RCC related to this focal population.



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DSEC HUB SNAPSHOTS

HUB INTRODUCTION

A key component of the DSEC strategy is enhancing targeted, place-based programming in select hub regions. This approach emphasizes expanding the pool of traditionally underrepresented and military-connected students who are aware of, equipped for, and interested in STEM careers in the national security sector. Hubs are located in select US regions that include high concentrations of DoD personnel, including military and research installations. Each hub region’s management is supported by a designated Hub Lead, an organization that helps guide regional goals and relationship building. By using this approach, DSEC aims to expand the reach of DoD STEM programs, establish connections between programs, create pathways into DoD laboratories, and identify opportunities to leverage partner collaboration within the hubs.

2020-21 DSEC HUBS

HUB REGION	HUB LEAD
Dayton, Ohio	Dayton Regional STEM Center (DRSC)
Washington, D.C./Maryland/Virginia (DMV)	Morgan State University (MSU)
San Diego, California	University of California–San Diego (UCSD) CREATE

This section includes information on

- challenges and accomplishments common across all three hub regions;
- a snapshot of each hub region, including information on STEM outreach programming provided by the Hub Lead, progress toward logic model outcomes, additional

programming in the hub region, and the Hub Lead's connectivity with other DSEC Partners; and

- information on TIES Ecosystems, a DSEC Partner whose 2020–21 work directly supported Hub Leads in all three regions.

CHALLENGES

All three Hub Leads described similar challenges related to the COVID-19 pandemic. Specifically, obstacles existed for accessing students through traditional partnerships and providing programming that was suitable for the pandemic.

ACCESS TO SCHOOLS

Hub Leads encountered more barriers in accessing schools and students for programming. As school systems struggled to keep up with the changes in instruction and health policy, communications regarding STEM programming became a lower priority. Hub Leads largely addressed this challenge by creating programming that required a low implementation burden for schools. One Hub Lead also increased access to students by expanding outreach to new sets of stakeholders, such as afterschool programs. In doing so, the Hub Lead reached students in a more informal educational setting that was not as pandemic burdened as school systems.

INABILITY TO PROVIDE IN-PERSON PROGRAMMING

Implementation of in-person programming was a challenge for all hub regions because health policies to mitigate the pandemic did not allow in-person events. Hub Leads addressed this obstacle by pivoting to online programming in a variety of ways that best suited their regions; however, this process often involved additional labor and resources from Hub Leads and STEM Outreach Partners. Hub Leads typically had to take on the burden of new or evolved logistics that accompanied virtual programming, such as virtual recruitment or learning new technologies. For example, MSU reshaped its annual regional STEM Expo from an in-person event to a virtual event and searched for an appropriate interactive platform that could accommodate a large audience. Hub Leads also had to get creative with ways to attract and maintain program participants. Given the nature of online programming, UCSD decided to focus on creating one-time programs that did not require participants to come back

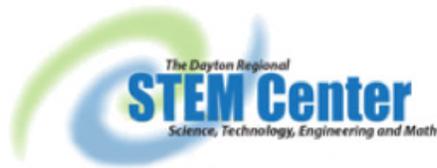
for multiple sessions. Although this Hub Lead believed that long-term programs typically allow for more interaction with participants and are more effective, UCSD found that short-term programs were a necessary adaptation because of the pandemic.

ACCOMPLISHMENTS

All Hub Leads found that their biggest accomplishments included not only adapting program delivery and content but also increasing their presence in their respective hub regions despite challenges created by the pandemic. All three Hub Leads found that they needed to alter the content of their programs to fit a virtual setting and did so successfully. Programming that was originally meant to be in person, including the STEM Fellows program (DRSC), Design Studios (UCSD CREATE), and the STEM Expo (MSU), were all adapted and implemented in a virtual format. In addition to adapting programming to a virtual setting, UCSD CREATE also adapted all its programming to provide social-emotional learning (SEL) so that students and teachers could connect with one another in ways that felt supportive of SEL while also helping teach them something new in a stressful environment.

As discussed in previous sections, Hub Leads sought to sustain existing hub relationships while pursuing new regional partnerships to maintain and grow their hub's impact. MSU credited this increase in presence to effective communication with regional partners via teleconferences and emails. Given their accomplishments in communication and programming, Hub Leads used the virtual format and new partnerships to broaden opportunities in STEM programming in their regions, especially for populations that are a priority for DSEC and may not have previously had access. Because they were able to reach more students virtually, MSU has plans to find ways to incorporate hybrid models for programming so that it can continue to provide online access to programming during in-person events.

DAYTON HUB LEAD: DAYTON REGIONAL STEM CENTER



PROGRESS TOWARD LOGIC MODEL OUTCOMES

INCREASE AWARENESS OF DOD STEM CAREERS.

Increase awareness of DoD STEM careers. All students who attended Air Camp and the Virtual Career Fair had the opportunity to hear from DoD STEM professionals. During the Virtual Career Fair, students could explore one of 40 virtual “booths,” where industry partners, including the Air Force Research Laboratory Educational Outreach, Gaming Research Integration for Laboratory Learning, the National Air and Space Intelligence Center, the Society for American Military Engineers, and several local defense contractors, discussed career pathways within their organizations. The welcome video that each student saw when entering the portal featured the installation commander at the nearby Wright-Patterson Air Force Base. In addition, 17 live sessions were broadcast via YouTube Live. DoD careers were specifically highlighted in three sessions. The Wright-Patterson Air Force Base Educational Outreach Department discussed careers with the Air Force Research Laboratory, Gaming Research Integration for Laboratory Learning focused on careers in technology, and the National Air and Space Intelligence Center discussed federal government careers.

IMPROVE COMMUNICATIONS WITH AIR FORCE STAKEHOLDERS.

Improve communications with Air Force stakeholders. DRSC worked to improve communications with DoD programs in the area to lead to more STEM opportunities for students and educators. The Dayton Ohio (DO) STEM Council (i.e., governing body) has two of its 16 members representing DoD assets in the Air Force Research Laboratory and the U.S. Air Force Museum. By developing the STEM ecosystem, DRSC anticipates more collaboration between DoD assets and local STEM programming.

INCREASE STEM LEARNING OPPORTUNITIES FOR DIVERSE STUDENT POPULATIONS.

Increase STEM learning opportunities for diverse student populations. The DO STEM Council adopted the core values of inclusivity, equity, and innovation. To that end, the council worked to ensure that it was a diverse group of individuals by ensuring representation from minority and military-connected individuals. DO STEM has five working groups, one of which is dedicated to promoting diversity, equity, and inclusion in STEM for the Dayton region. During Option Year 1, this group met two times. The key deliverable from these meetings was a list of organizations interested in networking for diversity. As a young ecosystem, the entity is working to map its assets first so that DO STEM can have the appropriate stakeholders engaged in their work. DRSC anticipates that this initiative will give partners in the region the ability to more effectively promote programming to focal populations.

ADDITIONAL OUTREACH PROGRAMMING IN COOPERATION WITH DSEC PARTNERS

Dayton Regional STEM Center (DRSC) worked with DSEC Partners to increase STEM learning opportunities for students and educators in the Dayton area:

- **Citizen Schools** provided Maker Fellow participation in Dayton Public Schools and increased collaboration with the Greater Cincinnati STEM Collaborative, which resulted in expanding STEM and maker-centered opportunities for military-connected students and students underrepresented in STEM.
- **National Center for Women and Information Technology (NCWIT)** increased the number of AspireIT awards in the Dayton region and increased the number of counselors in the area who participated in Counselors 4 Computing, both of which expanded STEM opportunities for military-connected students and students underrepresented in STEM.
- **TGR Foundation** expanded TGR's training capacity in the Dayton area through a master trainer program, leading to expanded STEM professional development opportunities, particularly for teachers of military-connected students and students underrepresented in STEM.

PROGRAMS AND PARTICIPANT DATA

DRSC is a professional development institute in southwest Ohio. It serves as a regional clearinghouse for information regarding STEM activities, awards programs, and research opportunities for students and teachers. As part of DSEC, DRSC provides both STEM outreach programming and serves as the Hub Lead for the Dayton, Ohio, area.

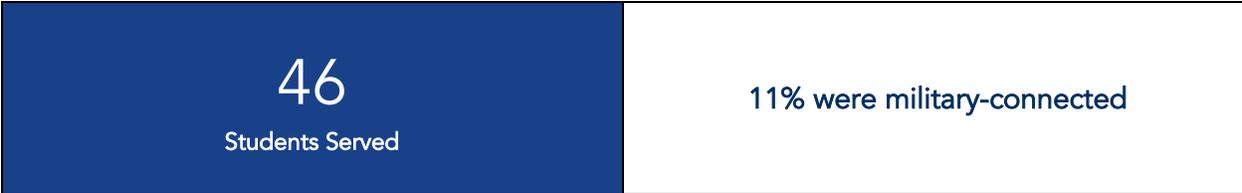
1

Air Camp. During Option Year 1, DRSC used DSEC funding to award Air Camp scholarships to six middle school students for a 5-day camp and 40 elementary school students for a 2-day camp. Air Camp provides K–8 students with an immersive STEM experience related to flight by focusing on STEM careers and applications at Wright-Patterson Air Force Base. The camps engage various speakers from the Air Force, as well as a trip to the U.S. Air Force Museum, and other hands-on experiences related to STEM and DoD careers.

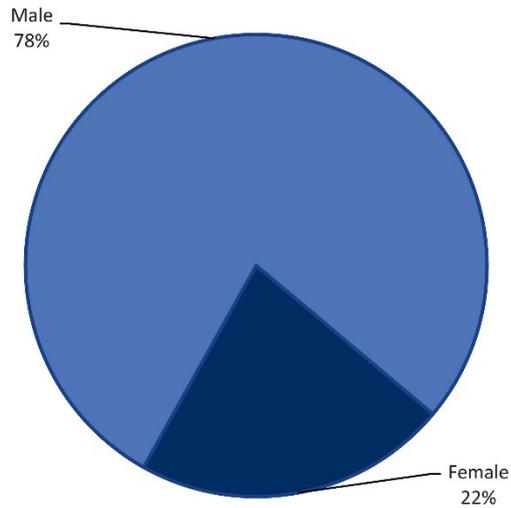
NOTE. DEMOGRAPHIC DATA WAS REPORTED AS REGISTRATION.

Registration. The partner used a registration form to collect data. In some cases, this was provided directly by the participant, while in others a teacher or coach registered a class or team.

STUDENTS



STUDENT GENDER



NOTE. Demographic data was reported as registration.

STUDENT RACE/ETHNICITY DATA NOT REPORTED.

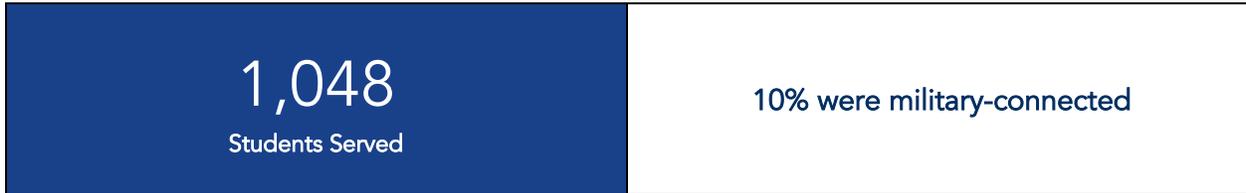
2

Career Awareness Week. DRSC offered 1,048 students in the Dayton area a chance to participate in a Virtual Career Fair. Schools with high numbers of underserved and/or underrepresented students or military-connected students were selected for this pilot program, as were other local STEM schools. Geographic data were unavailable for participants or educational institutions that participated in the career awareness event.

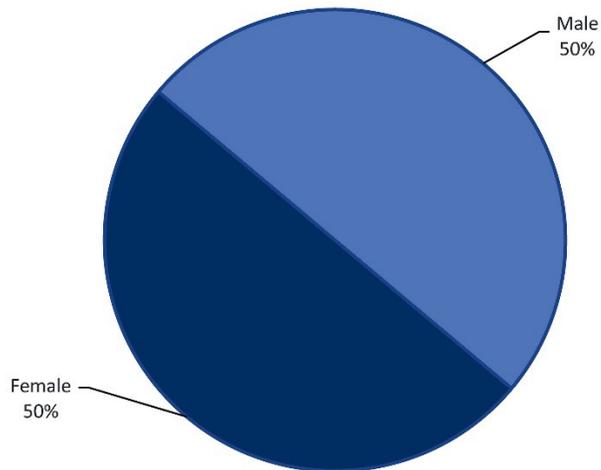
NOTE. DEMOGRAPHIC DATA WAS REPORTED AS HEADCOUNT.

Headcount. The partner inferred information based on what was seen during program implementation.

STUDENTS



STUDENT GENDER



NOTE. Demographic data was reported as headcount.

STUDENT RACE/ETHNICITY DATA NOT REPORTED.

TEACHERS





TEACHERS FROM UNDERREPRESENTED POPULATIONS: 9%

TEACHERS FROM TITLE I SCHOOLS: 2%

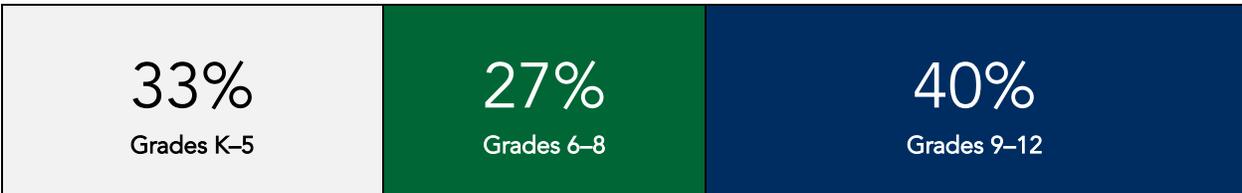
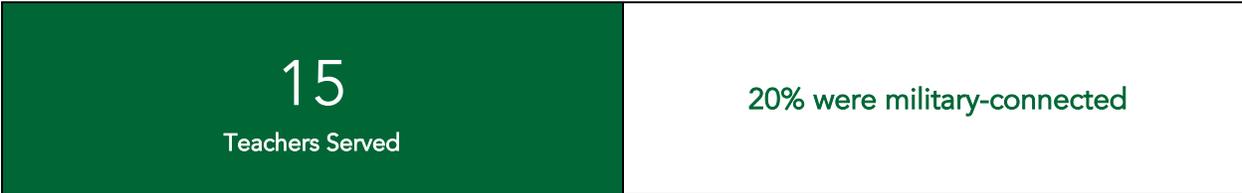
3

STEM Fellows. The STEM Fellows program brings together K-12 educators into a community of learners that explore the use of high-quality, problem-based learning experiences in the classroom as well as fostering STEM career connections.

NOTE. DEMOGRAPHIC DATA WAS REPORTED AS HEADCOUNT.

Headcount. The partner inferred information based on what was seen during program implementation.

TEACHERS

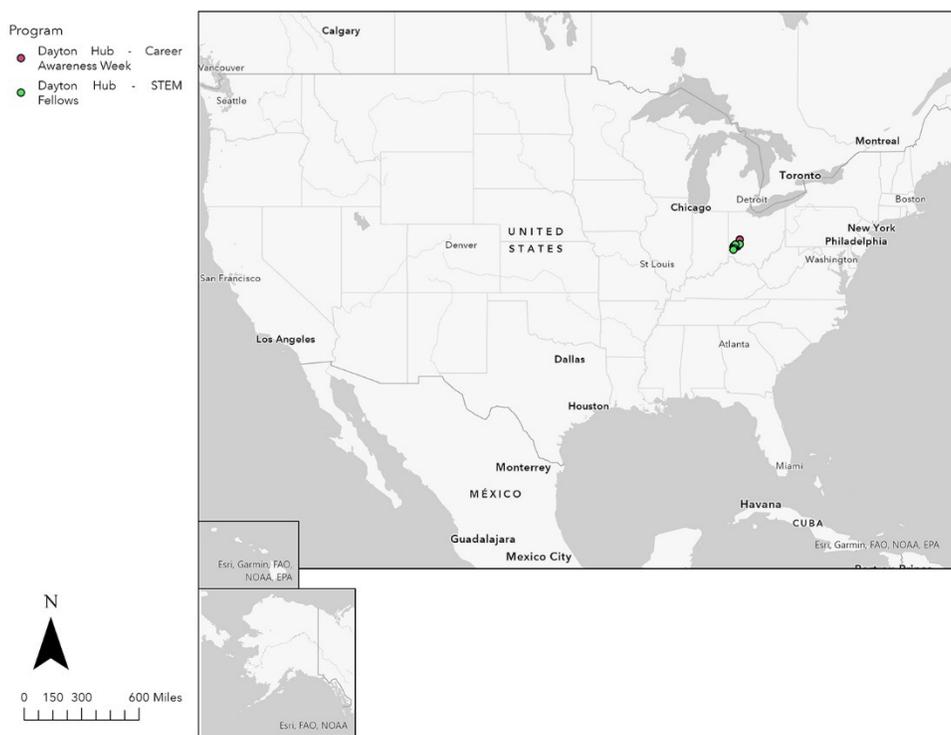


TEACHERS FROM UNDERREPRESENTED POPULATIONS: 20%

TEACHERS FROM TITLE I SCHOOLS: 27%

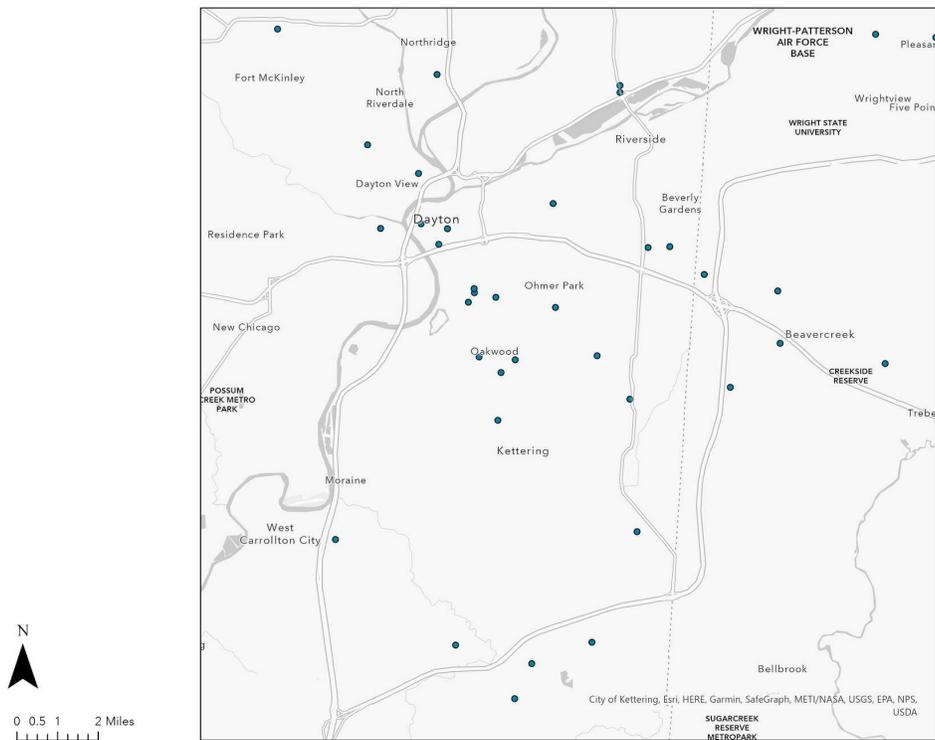
GEOGRAPHIC REACH

No geographic data were available for the Air Camp participants or their schools. However, education institution locations for participants in the Career Awareness Week and STEM Fellows programs were available; these institutions were spread around the Dayton region.



EDUCATIONAL INSTITUTIONS INVOLVED IN PARTNER ACTIVITIES IN THE DAYTON HUB REGION

Partner activities occurred at 45 educational institutions and community locations throughout the Dayton area. Note that these institutions include those for the TIES Ecosystems activities.



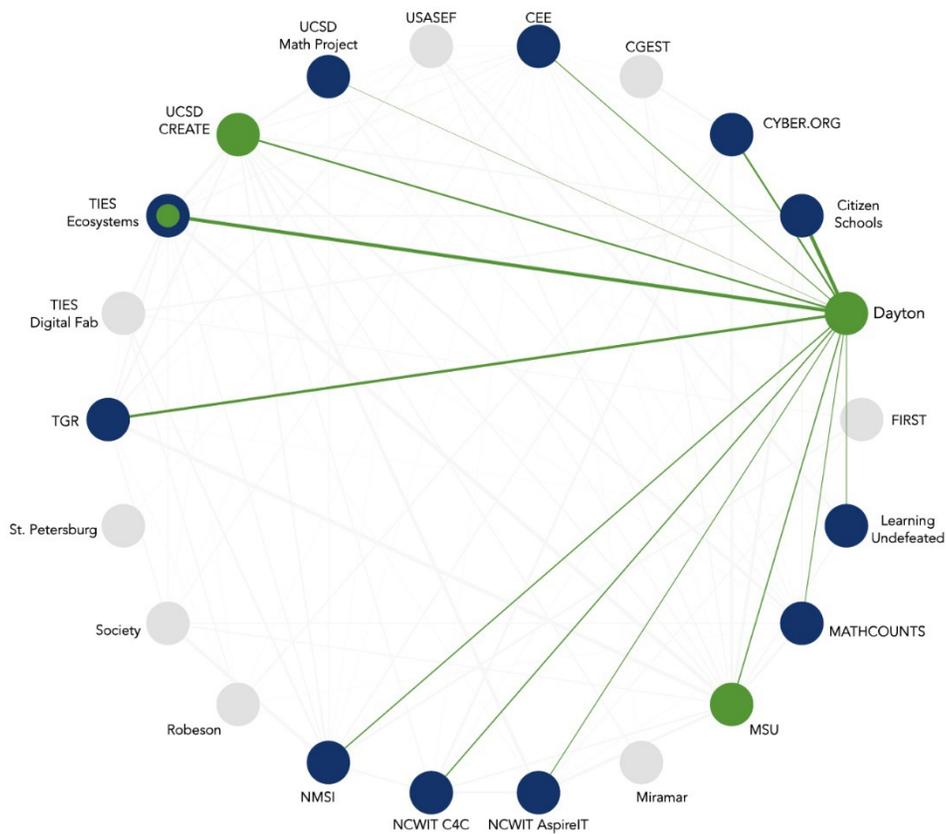
NETWORK CONNECTIVITY

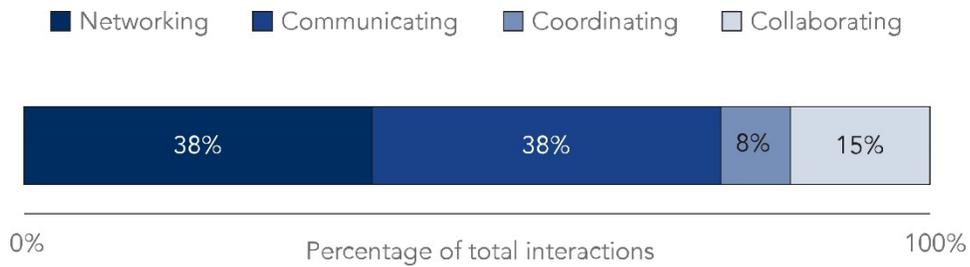
DRSC is connected to 10 other DSEC Partners, one Hub Lead Support Partner, and two Hub Leads. In total, DRSC is connected to 13 other organizations within the network, which is greater than the average of nine.

DRSC's connections occurred primarily at the networking and communicating levels, with ties also occurring at the coordinating and collaborating levels.

DRSC reported receiving support from seven organizations (Citizen Schools, CYBER.ORG, MSU, NMSI, TGR, TIES Ecosystems, and UCSD CREATE) with coordinating outreach or delivering programs to military-connected students. Eleven organizations (CEE, Citizen Schools, CYBER.ORG, MSU, NCWIT AspireIT, NCWIT C4C, NMSI, TGR, TIES Ecosystems, UCSD CREATE, and UCSD Math Project) reported receiving support from DRSC related to this focal population.

DRSC reported receiving support from 10 organizations (Citizen Schools, CYBER.ORG, Learning Undeclared, MATHCOUNTS, MSU, NCWIT AspireIT, NCWIT C4C, TGR, TIES Ecosystems, and UCSD CREATE) with coordinating outreach or delivering programs to schools that serve students who are underrepresented in STEM. Twelve organizations (CEE, Citizen Schools, CYBER.ORG, MATHCOUNTS, NCWIT AspireIT, NCWIT C4C, NMSI, Society, TGR, TIES Ecosystems, UCSD Math Project, and UCSD CREATE) reported receiving support from DRSC related to this focal population.





- **Networking:** exchanging information
- **Communicating:** building a shared understanding
- **Coordinating:** creating complementary programming
- **Collaborating:** jointly designing or delivering programming

To calculate the level of interaction between any two partners over Option Year 1, AIR used the an average of the reported levels of interaction across survey administrations, taking into account that some partners joined DSEC midway through the year. For analyses related to the focal populations (military-connected students, underrepresented students, DoD facilities and personnel, and DoD STEM alumni) AIR summed reported interactions across the survey administrations rather than taking an average.

DMV HUB LEAD: MORGAN STATE UNIVERSITY



PROGRESS TOWARD LOGIC MODEL OUTCOMES

INCREASE STUDENT KNOWLEDGE OF DOD STEM CAREERS.

Increase student knowledge of DoD STEM careers. The STEM Expo exposed more than 2,700 students to a variety of STEM and DoD STEM jobs and careers, including those affiliated with seven DoD laboratories. Students were required by their teachers to visit the DoD website as a part of gaining additional knowledge of DoD STEM careers. In addition, MSU students volunteered considerable technical expertise and helped organize and run the event, gaining additional knowledge of DoD STEM careers in the process. Geographic data were unavailable for participants or educational institutions that participated in the STEM Expo.

INCREASE CONNECTIONS WITH MILITARY-CONNECTED SCHOOLS IN THE DMV AREA.

Increase connections with military-connected schools in the DMV area. A total of 222 students from military-connected schools participated in STEM Expo 2020. MSU supported military-connected schools and students by purchasing STEM licenses in mathematics (DeltaPlus Math) and science (Labster) for high school teachers and students. One hundred Nearpod licenses were purchased for middle school teachers and students to use for the 2021–22 school year. Teachers also received professional development training on how to use the software.

INCREASE DOD LABORATORY INVOLVEMENT IN SUPPORTING DSEC.

Increase DoD laboratory involvement in supporting DSEC. Seven DoD laboratories participated in the STEM Expo for the DMV area. These laboratories included the U.S. Army Combat Capabilities Development Command Chemical Biological Center, the U.S. Naval Research Laboratory, the Naval Surface Warfare Center Carderock/Naval Sea Systems Command, the Army Educational Outreach Program, the Walter Reed Army Institute of Research, DEVCOM Army Research Laboratory, and the U.S. Naval Academy STEM Center. For the STEM Expo, these laboratories provided prerecorded STEM activities that students could engage in throughout the year at home or in a virtual class.

ACCOMPLISHMENTS AND CHALLENGES IN 2020-21

MSU worked with fellow Historical Black Colleges and Universities (HBCUs) to develop a new portfolio of DSEC work for Option Year 2. The HBCU/Minority Institutions Pathways project is designed to improve equitable pathways from K-12 through community college and university work for students underrepresented in STEM. Specifically, MSU helped outline the goals of the work and supported the proposal process for two prospective partnerships between community college and 4-year HBCU institutions in the DMV and Dayton regions.

PROGRAMS AND PARTICIPANT DATA

MSU's Center for Excellence in Mathematics and Science Education (CEMSE) supports STEM education in the Baltimore, Maryland, area with a specific focus on the historically underrepresented minority population. Located at the nexus of Washington, D.C., Maryland, and Virginia, CEMSE has access to DoD installations and serves as a professional development provider and a coordinator for facilitating connections between outreach partners, the local community, and DoD laboratories.

1

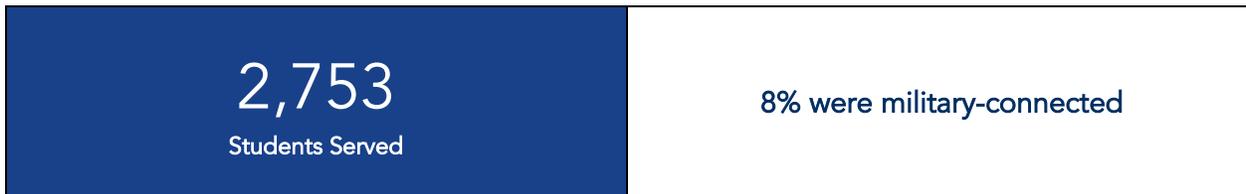
STEM Expo 2020. STEM Expo 2020 pivoted from an in-person, 3-day event to a year-long, virtual, on-demand event aimed at high school teachers and their students. The virtual platform allowed for a much larger student audience because it eliminated the transportation barrier. The STEM Expo included 35 exhibitors that displayed activities linked to STEM content, as well as DoD STEM jobs and careers. Seven DoD laboratories also uploaded mp4 videos/exhibits for students to participate in hands-on activities. All activities were geared toward increasing students' knowledge about DoD jobs and careers. Access to STEM Expo 2020 sessions and resources was available for an entire year, providing teachers and students with the flexibility to view the lessons and activities on their own time. Students emailed and posted assignments to discussion boards to be reviewed by their peers and teachers at a later time. At the

conclusion of their STEM Expo experience, exhibitors, students, and teachers took a satisfaction survey and listed their preferred labs and activities. In the satisfaction surveys, multiple educators and STEM professionals cited a preference for the asynchronous model for the STEM Expo. This insight led MSU leadership to shift future STEM Expos to hybrid formats to ensure transportation barriers no longer prevent students from attending.

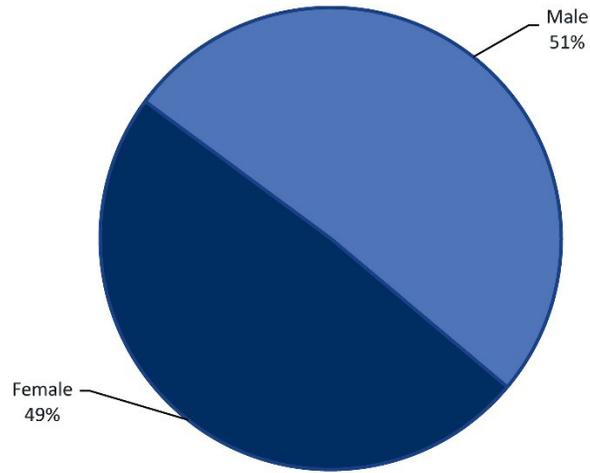
NOTE. DEMOGRAPHIC DATA WAS REPORTED AS AN ESTIMATION.

Estimation. The partner estimated information based on their knowledge of participants. Estimation varied considerably across partners. Some partners chose to report data as estimation because they were lacking specificity for a small number of participants, while others broadly estimated the makeup of participants.

STUDENTS

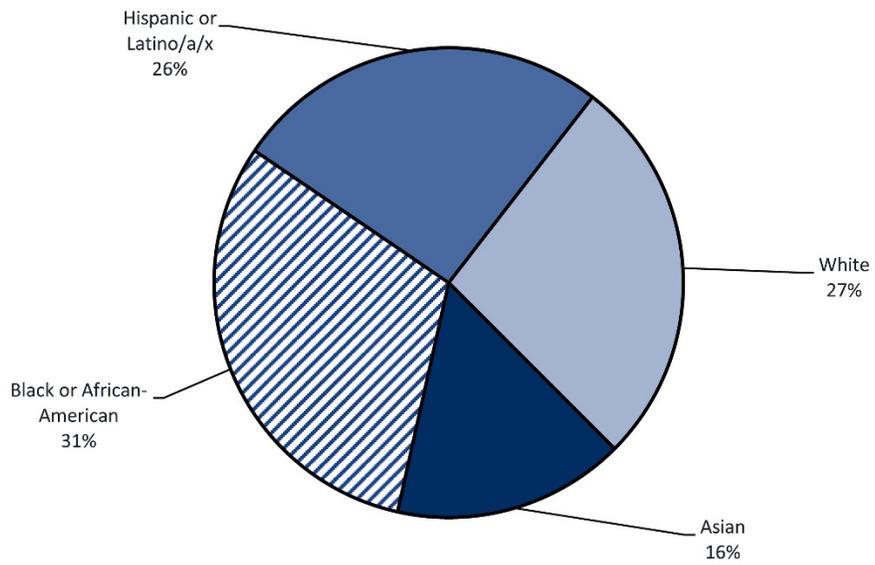


STUDENT GENDER



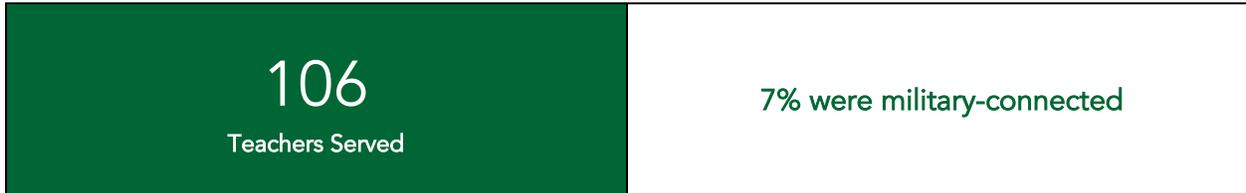
NOTE. Demographic data was reported as an estimation.

STUDENT RACE/ETHNICITY



NOTE. Demographic data was reported as an estimation.

TEACHERS



TEACHERS FROM UNDERREPRESENTED POPULATIONS: 3%

TEACHER TITLE I DATA NOT REPORTED.

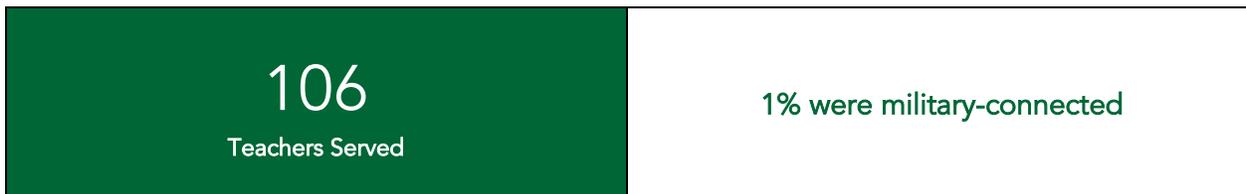
2

Professional Development Seminar. Working in partnership with TGR Foundation, MSU hosted a professional development seminar in September 2020. The target audience was pre- and in-service teachers in the D.C., Maryland, and Virginia area.

NOTE. DEMOGRAPHIC DATA WAS REPORTED AS REGISTRATION.

Registration. The partner used a registration form to collect data. In some cases, this was provided directly by the participant, while in others a teacher or coach registered a class or team.

TEACHERS





TEACHERS FROM UNDERREPRESENTED POPULATIONS: 17%

TEACHER TITLE I DATA NOT REPORTED.

3

MSU planned to continue the **Rocketry Club** this year but was unable to conduct programming because of COVID-19 restrictions.

GEOGRAPHIC REACH

No geographic data were available for the STEM Expo or Professional Development Seminar participants or their schools.

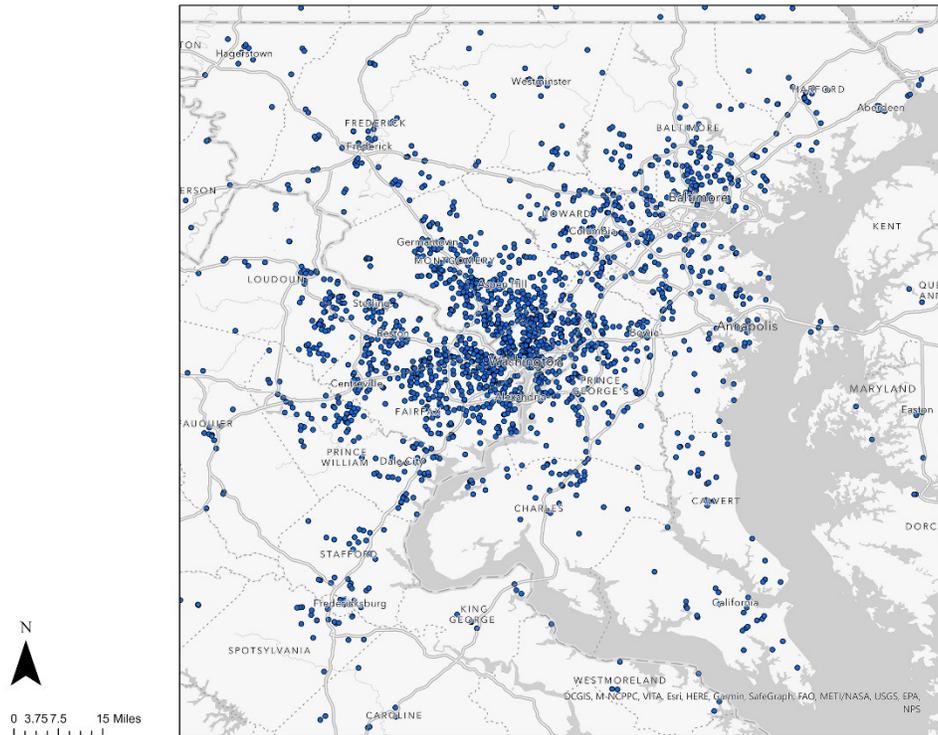
ADDITIONAL OUTREACH PROGRAMMING IN COOPERATION WITH DSEC PARTNERS

MSU worked with DSEC Partners to increase STEM learning opportunities for students and educators in the DMV area:

- **TGR Foundation:** Teacher professional development workshops for all levels of teachers (preservice and in-service).
- **NCWIT Aspire IT:** The Virtual Girl's Coding Camp, facilitated by MSU computer science students, helped participants gain knowledge in computational literacy and cyber safety as well as learning about potential jobs and careers that use computer coding skills.

EDUCATIONAL INSTITUTIONS INVOLVED IN PARTNER ACTIVITIES IN THE DMV HUB REGION

Over 1,992 educational institutions and community locations in the DMV region participated in partner activities spread out across the area but concentrated in Washington, D.C., and Baltimore. Note that these institutions include those for the TIES Ecosystems activities.



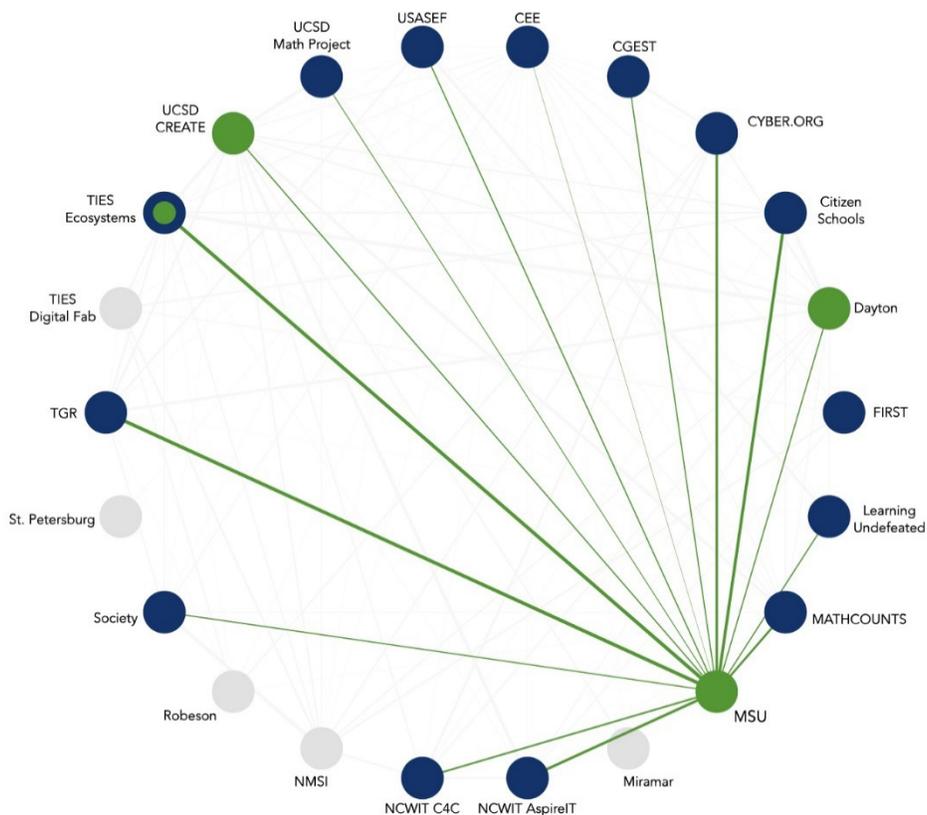
NETWORK CONNECTIVITY

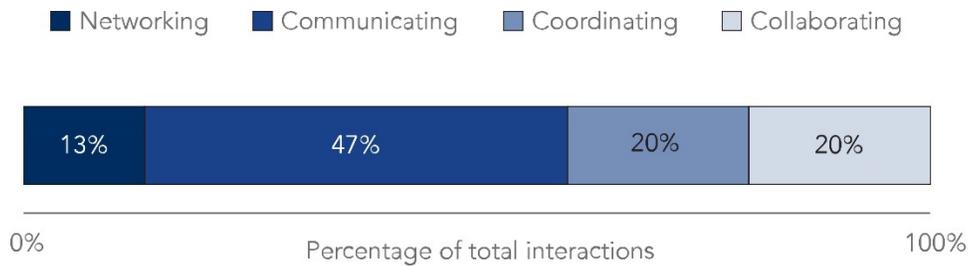
Among DSEC Partners and Hub Leads, MSU is connected to 12 other DSEC Partners, one Hub Lead Support Partner, and 2 Hub Leads. In total, MSU is connected to 15 other organizations within the network, which is greater than the average of nine.

MSU's connections occurred primarily at the communicating level, with fewer ties occurring across networking, coordinating, and collaborating levels.

MSU reported receiving support from 11 organizations (Citizen Schools, CYBER.ORG, DRSC, Learning Undeclared, NCWIT AspireIT, Society, TGR, TIES Digital Fab, TIES Ecosystems, UCSD CREATE, and UCSD Math Project) with coordinating outreach or delivering programs to military-connected students. Ten organizations (CYBER.ORG, DRSC, MATHCOUNTS, NCWIT AspireIT, NCWIT C4C, Society, TGR, TIES Ecosystems, UCSD CREATE, and UCSD Math Project) reported receiving support from MSU related to this focal population.

MSU reported receiving support from 14 organizations (CEE, CGEST, Citizen Schools, CYBER.ORG, FIRST, Learning Undeclared, MATHCOUNTS, NCWIT AspireIT, NCWIT C4C, Society, TGR, TIES Ecosystems, UCSD Math Project, and USASEF) with coordinating outreach or delivering programs to schools that serve students who are underrepresented in STEM. Sixteen organizations (CEE, CGEST, Citizen Schools, CYBER.ORG, DRSC, FIRST, Learning Undeclared, MATHCOUNTS, NCWIT AspireIT, NCWIT C4C, Society, TGR, TIES Ecosystems, UCSD Math Project, UCSD CREATE, and USASEF) reported receiving support from MSU related to this focal population.





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- **Communicating:** building a shared understanding
- **Coordinating:** creating complementary programming
- **Collaborating:** jointly designing or delivering programming

To calculate the level of interaction between any two partners over Option Year 1, AIR used the an average of the reported levels of interaction across survey administrations, taking into account that some partners joined DSEC midway through the year. For analyses related to the focal populations (military-connected students, underrepresented students, DoD facilities and personnel, and DoD STEM alumni) AIR summed reported interactions across the survey administrations rather than taking an average.

SAN DIEGO HUB LEAD: UNIVERSITY OF CALIFORNIA–SAN DIEGO CREATE



PROGRESS TOWARD LOGIC MODEL OUTCOMES

INCREASE PARTNER COORDINATION AND COLLABORATIVE EFFICIENCIES.

Increase partner coordination and collaborative efficiencies. TIES Ecosystems worked with UCSD CREATE to host two events in fall 2020, with the inclusion of the existing San Diego STEM Ecosystem as a fellow planner and host. Each event included 60 participants and resulted in bringing together individuals and institutions that were engaged in similar work in STEM but not connecting or collaborating. The attendees also expressed interest in the intent of the DSEC Hub Lead and DoD activities in the region.

BUILD RELATIONSHIPS BETWEEN DSEC PARTNERS AND LOCAL EDUCATORS AND SCHOOLS.

Build relationships between DSEC Partners and local educators and schools serving priority student groups. Recent GIS mapping revealed that UCSD CREATE grew its footprint of DSEC programming overall in the targeted areas/districts, particularly those in the south and central San Diego areas, as well as near Camp Pendleton. Contributions of growth came by adding the Miramar College Biotechnology program and the STEM Ambassador for MATHCOUNTS that UCSD's funding provided. The steps taken by UCSD CREATE to serve specific communities and grow additional robust relationships are designed to help further DSEC's agenda.

PROGRAMS AND PARTICIPANT DATA

The UCSD Center for Research on Educational Equity, Assessment, and Teaching Excellence (CREATE) supports local K–12 outreach and college preparation for students who often are underrepresented in higher education. CREATE serves as a professional development provider

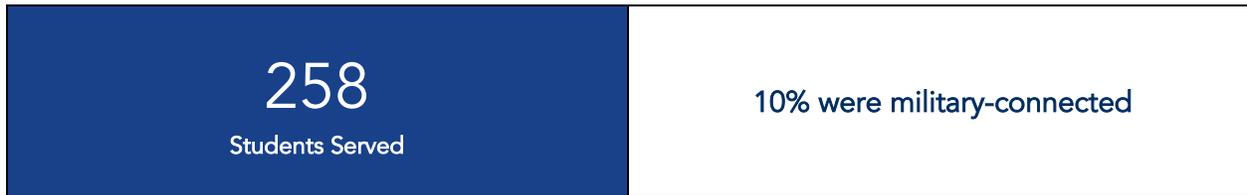
and coordinator to facilitate connections between outreach partners, the local community, and DoD laboratories.

STEM Panel Series. Using funds moved to Option Year 1 because of COVID-19, UCSD CREATE implemented a STEM Panel Series in fall 2021.

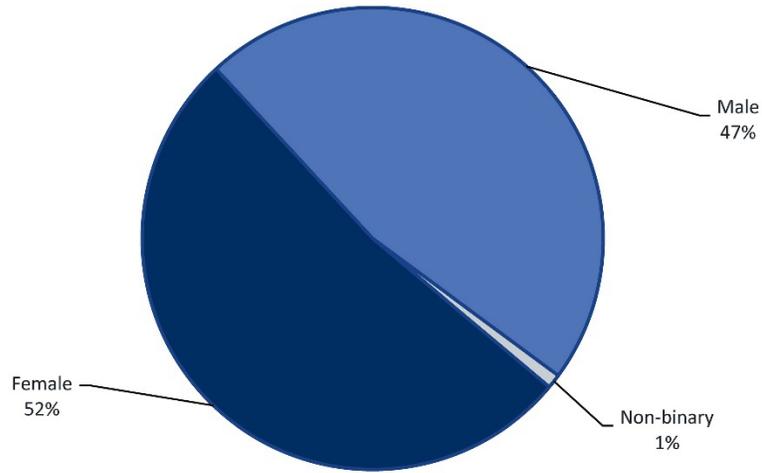
NOTE. DEMOGRAPHIC DATA WAS REPORTED AS AN ESTIMATION.

Estimation. The partner estimated information based on their knowledge of participants. Estimation varied considerably across partners. Some partners chose to report data as estimation because they were lacking specificity for a small number of participants, while others broadly estimated the makeup of participants.

STUDENTS

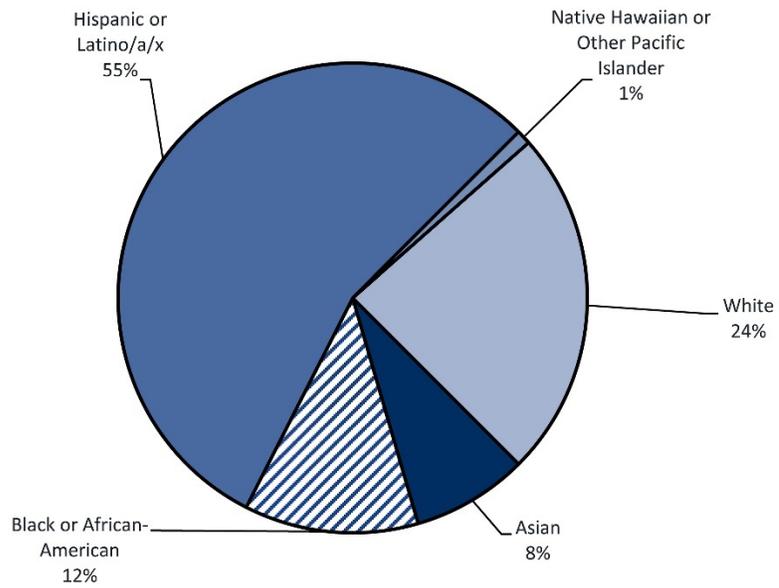


STUDENT GENDER



NOTE. Demographic data was reported as an estimation.

STUDENT RACE/ETHNICITY



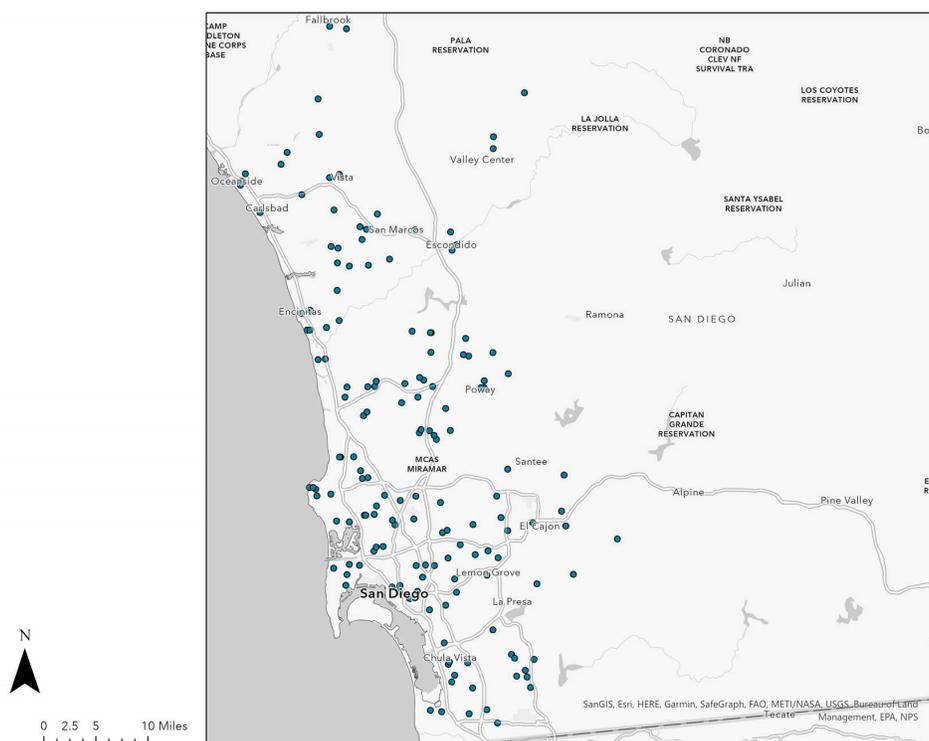
NOTE. Demographic data was reported as an estimation.

GEOGRAPHIC REACH

No geographic data were available for participants or educational institutions that participated in the STEM Panel Series.

EDUCATIONAL INSTITUTIONS INVOLVED IN PARTNER ACTIVITIES IN THE UCSD REGION

Over 160 educational institutions and community locations in the San Diego Hub region participated in partner activities. Note that these institutions include those for the TIES Ecosystems activities.



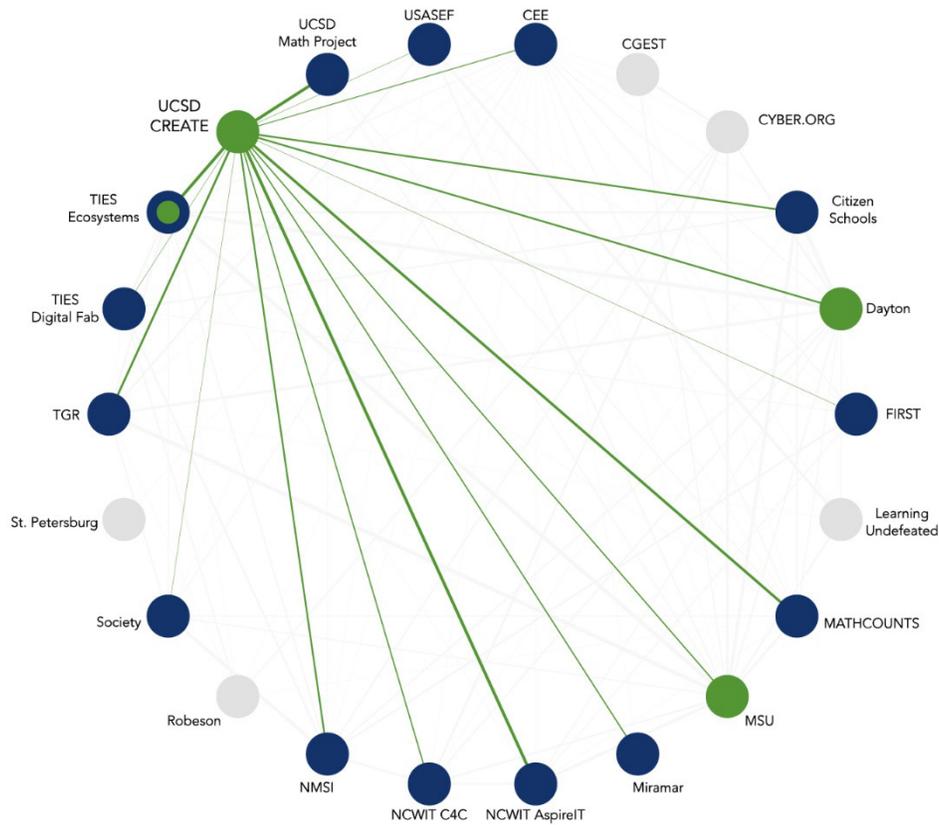
NETWORK CONNECTIVITY

UCSD CREATE is connected to 13 other DSEC Partners, one Hub Lead Support Partner, and two Hub Leads. In total, UCSD CREATE is connected to 16 other organizations within the network, which is greater than the average of nine.

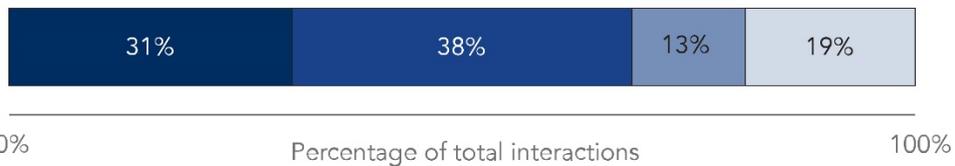
UCSD CREATE's connections occurred primarily at the networking and communicating levels, with fewer connections occurring at the coordinating and collaborating levels.

UCSD CREATE reported receiving support from 15 organizations (CEE, Citizens School, DRSC, FIRST, MATHCOUNTS, Miramar, MSU, NCWIT AspireIT, NCWIT C4C, NMSI, Society, TGR, TIES Ecosystems, UCSD Math Project, and USASEF) with coordinating outreach or delivering programs to military-connected students. Ten organizations (DRSC, MATHCOUNTS, MSU, NCWIT AspireIT, NCWIT C4C, NMSI, TGR, TIES Ecosystems, UCSD Math Project, and USASEF) reported receiving support from UCSD CREATE related to this focal population.

UCSD CREATE reported receiving support from 15 organizations (CEE, Citizen Schools, DRSC, FIRST, MATHCOUNTS, Miramar, MSU, NCWIT AspireIT, NCWIT C4C, NMSI, Society, TGR, TIES Ecosystems, UCSD Math Project, and USASEF) with coordinating outreach or delivering programs to schools that serve students who are underrepresented in STEM. Eleven organizations (DRSC, CEE, Citizen Schools, MATHCOUNTS, Miramar, NCWIT AspireIT, NCWIT C4C, NMSI, TGR, TIES Ecosystems, and UCSD Math Project) reported receiving support from UCSD CREATE related to this focal population.



■ Networking
 ■ Communicating
 ■ Coordinating
 ■ Collaborating



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To calculate the level of interaction between any two partners over Option Year 1, AIR used the an average of the reported levels of interaction across survey administrations, taking into

account that some partners joined DSEC midway through the year. For analyses related to the focal populations (military-connected students, underrepresented students, DoD facilities and personnel, and DoD STEM alumni) AIR summed reported interactions across the survey administrations rather than taking an average.

HUB SUPPORT PARTNER: TIES ECOSYSTEMS



PROGRAMS AND PARTICIPANT DATA

During 2020–21, **TIES Ecosystems** moved into the role of a DSEC Hub Support Partner, providing direct assistance to Hub Leads in coordinating and planning work. The DSEC logic model was updated to reflect this shift in work, with outcomes written to address the unique needs of each hub region.

During the previous year, TIES Ecosystems hosted STEM Design Studios in each hub region to begin development of their own STEM ecosystem or to coordinate with existing STEM ecosystems that were already viable in surrounding geographic areas. TIES Ecosystems built on this previous work to support hubs to strengthen their regional vision and expand their partnerships. TIES Ecosystems helped Hub Leads outline, integrate, and track operational sustainability goals for hub regional activities; their work is tailored specifically to the needs of each unique hub region. The individual nature of this work is described in subsections dedicated to each hub region. Geographic information for TIES Ecosystems is included in each hub region map.

1

SUPPORT IN THE DAYTON HUB REGION

In partnership with TIES Ecosystems, DRSC worked to expand its reach into neighboring STEM ecosystems to catalyze and grow awareness of the DSEC initiative. Collaborative work between TIES Ecosystems and DRSC included the following:

- Cultivating greater connectivity to other DSEC Partners.

- Creating a more sustainable DO STEM that will thrive beyond the DSEC-funded years. This included codifying a governance and organizational model that allows for impactful collaboration, recruiting a diverse leadership team to drive and become ambassadors for the work, and helping operationalize organically launched working groups that would deepen stakeholder engagement.

PROGRESS TOWARD LOGIC MODEL OUTCOMES

SUPPORT DAYTON REGION’S APPLICATION FOR THE STEM LEARNING ECOSYSTEM COP.

Support Dayton region’s application for the STEM Learning Ecosystem Community of Practice (CoP). DO STEM, led by DRSC, was accepted into the STEM Learning Ecosystem CoP after completing a comprehensive application process lasting more than a year. During the application preparation time, TIES coached the Dayton Hub Lead in cultivating a thriving STEM learning ecosystem through a series of Design Studios, deep dive stakeholder interviews, and a governance and operations webinar for the ecosystem leadership.

NOTE. DEMOGRAPHIC DATA WAS REPORTED AS ESTIMATION.

Estimation. The partner estimated information based on their knowledge of participants. Estimation varied considerably across partners. Some partners chose to report data as estimation because they were lacking specificity for a small number of participants, while others broadly estimated the makeup of participants.

DAYTON HUB DESIGN STUDIO: TEACHERS

<p style="text-align: center;">3 Teachers Served</p>	<p style="text-align: center;">Military-connected data not reported.</p>
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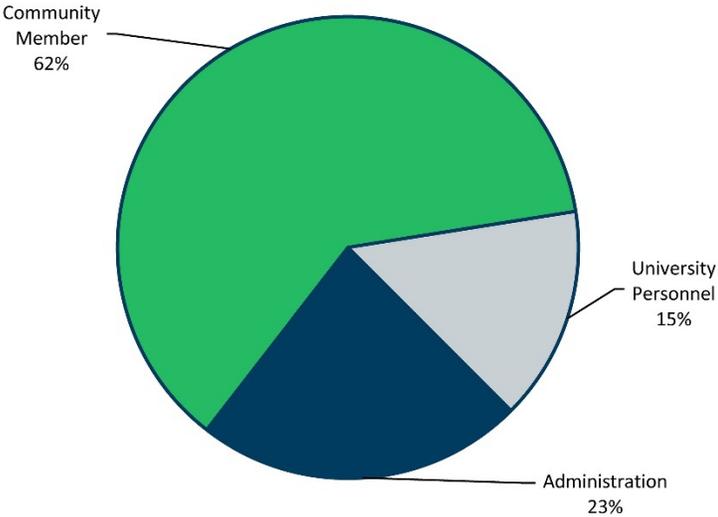
TEACHERS FROM UNDERREPRESENTED POPULATIONS: 66%

TEACHER TITLE I DATA NOT REPORTED.

DAYTON HUB DESIGN STUDIO: OTHER PARTICIPANTS



PARTICIPANT TYPES



NOTE. Demographic data was reported as estimation.

DEMOGRAPHIC AND TITLE I DATA WERE NOT REQUESTED ABOUT OTHER PARTICIPANTS.

SUPPORT THE DMV HUB EXPANSION

In partnership with TIES Ecosystems, MSU began expanding hub activities into northern Virginia and Washington, D.C., while maintaining existing work in Baltimore. Collaborative work between TIES Ecosystems and MSU included the following:

- Leveraging existing professional networks, DoD assets, and DSEC Partners to recruit new hub stakeholders. This included educators from Fort Belvoir, ensuring a focus on northern Virginia and military-connected families.
- Bringing in the newly appointed Virginia statewide STEM coordinator and leading conversations connecting the DMV hub work to the newly released Virginia Statewide STEM Plan.
- Working with the DSEC STEM ambassadors in Washington, D.C., Maryland, and Virginia to promote DMV hub activities and STEM professional development programs at MSU.
- Assisting MSU in adapting its annual STEM Expo to a fully virtual event with 27 exhibitors and more than 20 schools and districts.
- Deepening the relationship with and connectivity to the existing Baltimore STEM Ecosystem.

PROGRESS TOWARD LOGIC MODEL OUTCOMES

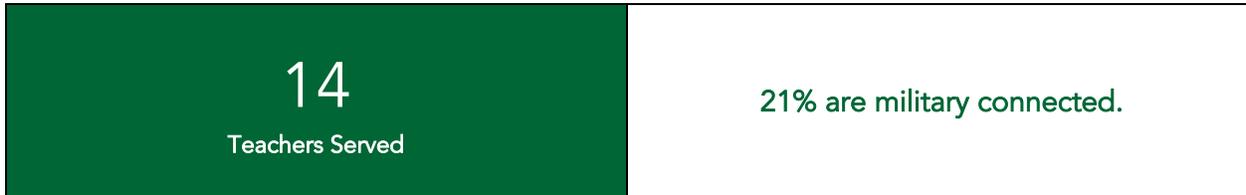
SUPPORT THE DMV HUB EXPANSION INTO PRIORITY GROWTH AREAS IN WASHINGTON, D.C.

Support the DMV hub expansion into priority growth areas in Washington, D.C., and northern Virginia. Working together, TIES and MSU established contact with working groups in the Washington, D.C., and northern Virginia areas to increase awareness of and promote DSEC activities.

NOTE. DEMOGRAPHIC DATA WAS REPORTED AS HEADCOUNT.

Headcount. The partner inferred information based on what was seen during program implementation.

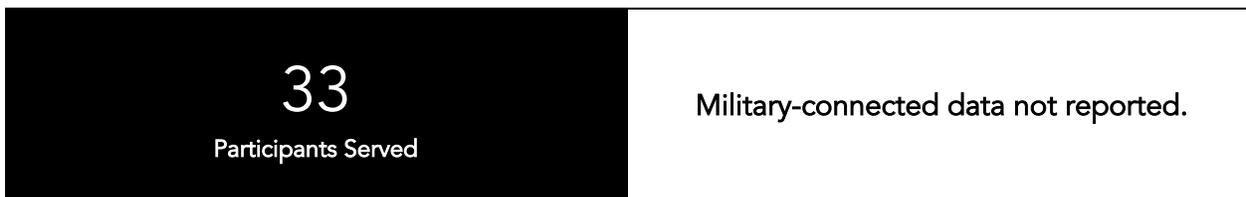
DMV HUB DESIGN STUDIO: **TEACHERS**



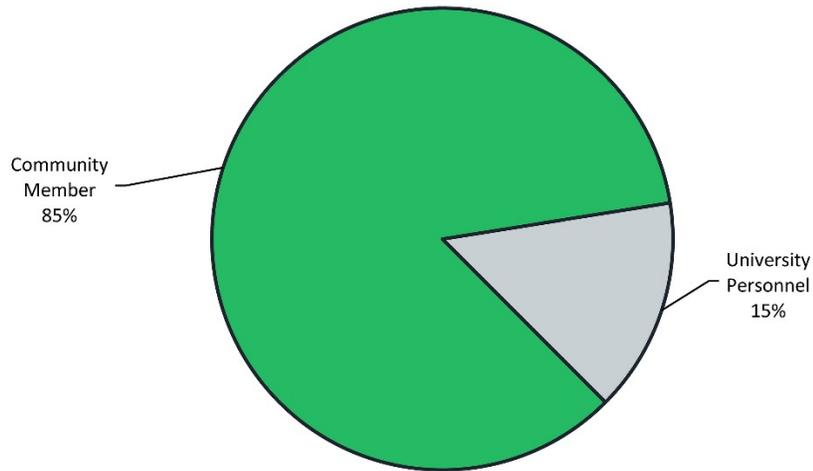
TEACHERS FROM UNDERREPRESENTED POPULATIONS: 93%

TEACHER TITLE I DATA NOT REPORTED.

DMV HUB DESIGN STUDIO: **OTHER PARTICIPANTS**



PARTICIPANT TYPE



NOTE. Demographic data was reported as headcount.

DEMOGRAPHIC AND TITLE I DATA WERE NOT REQUESTED ABOUT OTHER PARTICIPANTS.

3

SUPPORT IN THE SAN DIEGO REGION

In partnership with TIES Ecosystems, UCSD CREATE leveraged the existing San Diego STEM Learning Ecosystem (SDSLE) to better understand and build out a full portfolio of STEM offerings. UCSD has a well-developed STEM ecosystem within its institution and is narrowly focused on current partner relationships built in many years of serving the community.

Collaborative work between TIES Ecosystems and UCSD CREATE included the following:

- Hosting two STEM Design Studios in fall 2020 that were postponed from the prior year because of COVID-19.

- Increasing dialogue between UCSD CREATE and SDSLE to promote greater connectivity and collaboration. This resulted in UCSD hosting hybrid quarterly hub meetings, in which a portion of the meeting is open to a larger audience than just hub partners, allowing for attendance by SDSLE members and other community partners.

PROGRESS TOWARD LOGIC MODEL OUTCOMES

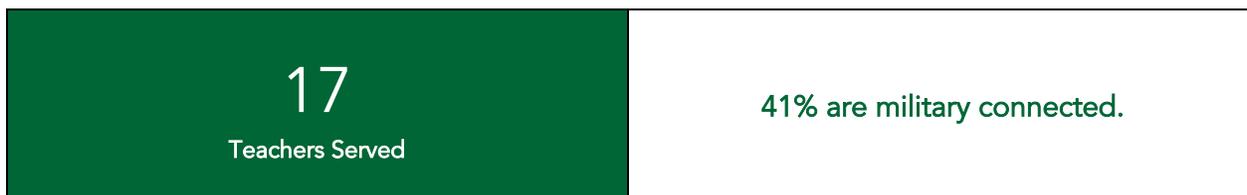
SUPPORT UCSD CREATE TO LEVERAGE THE EXISTING SAN DIEGO ECOSYSTEM (SDSLE).

Support UCSD CREATE to leverage the existing San Diego ecosystem (SDSLE) to better understand and build out a full portfolio of STEM offerings. TIES Ecosystems assisted in coordinating the creation of a comprehensive database, including the location and content/audience served by area STEM programs. SDSLE provided full access to its existing stakeholder data, but unfortunately its inventory management system suffered from technical glitches that prevented the full creation of a shared, comprehensive STEM asset map. UCSD CREATE continued work on its own to map STEM programs, creating an interactive map showing location and content data.

NOTE. DEMOGRAPHIC DATA WAS REPORTED AS ESTIMATION.

Estimation. The partner estimated information based on their knowledge of participants. Estimation varied considerably across partners. Some partners chose to report data as estimation because they were lacking specificity for a small number of participants, while others broadly estimated the makeup of participants.

SAN DIEGO HUB DESIGN STUDIO: TEACHERS

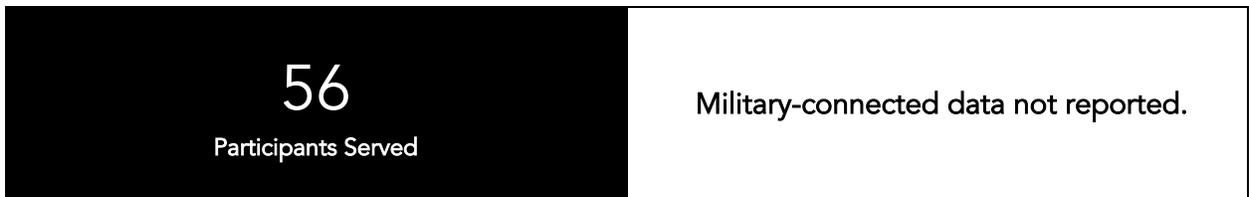




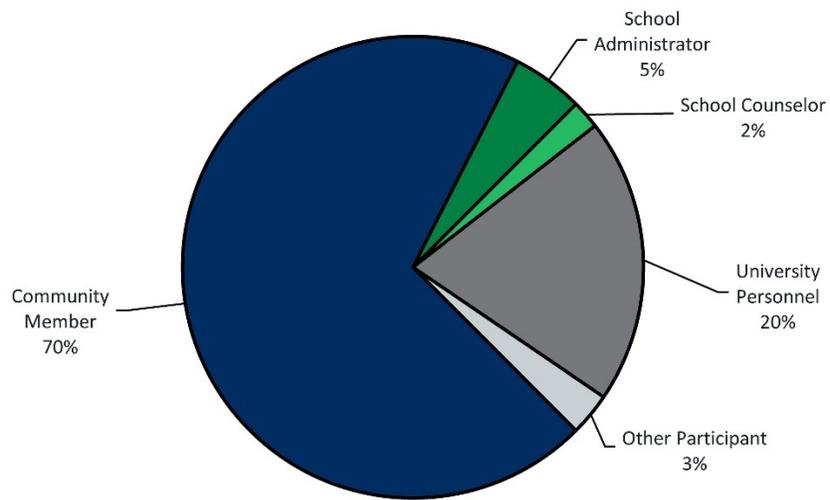
TEACHERS FROM UNDERREPRESENTED POPULATIONS: 59%

TEACHER TITLE I DATA NOT REPORTED.

SAN DIEGO HUB DESIGN STUDIO: OTHER PARTICIPANTS



PARTICIPANT TYPE



NOTE. Demographic data was reported as estimation.

DEMOGRAPHIC AND TITLE I DATA WERE NOT REQUESTED ABOUT OTHER PARTICIPANTS.

EDUCATIONAL INSTITUTIONS INVOLVED IN TIES ECOSYSTEM ACTIVITIES

All educational institutions associated with TIES Ecosystem activities are shown in the hub maps picturing overall partner activities.

Educational institution location data were available for the TIES Ecosystem activities in the DMV and Dayton regions. Seven educational institutions in Washington, D.C., and Baltimore were included in the DMV ecosystem activities, whereas five institutions centered in Dayton were included in the Dayton activities.

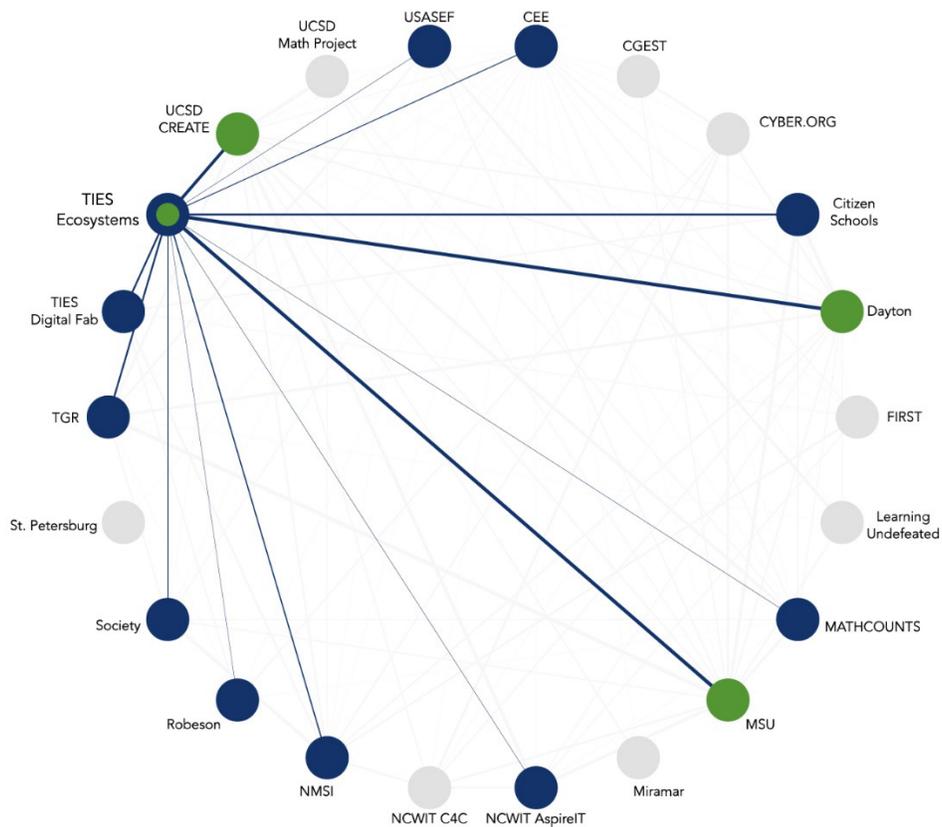
NETWORK CONNECTIVITY

TIES Ecosystems is connected to 10 DSEC Partners and three Hub Leads. In total, TIES Ecosystems is connected to 13 other organizations within the network, which is greater than the average of nine.

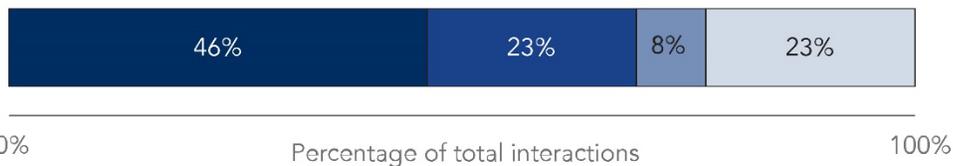
TIES Ecosystems' connections occurred primarily at the networking level.

TIES Ecosystems reported receiving support from 13 organizations (CEE, Citizens Schools, CYBER.ORG, DRSC, MATHCOUNTS, Miramar, MSU, NCWIT AspireIT, NCWIT C4C, Society, TIES Digital Fab, TGR, and UCSD CREATE) with coordinating outreach or delivering programs to military-connected students. Ten organizations (DRSC, CYBER.ORG, MATHCOUNTS, MSU, NCWIT AspireIT, NMSI, TIES Digital Fab, TGR, UCSD CREATE, and UCSD Math Project) reported receiving support from TIES Ecosystems related to this focal population.

TIES Ecosystems reported receiving support from 15 organizations (CEE, Citizen Schools, CYBER.ORG, DRSC, MATHCOUNTS, Miramar, MSU, NCWIT AspireIT, NCWIT C4C, NMSI, Society, TGR, TIES Digital Fab, UCSD CREATE, and USASEF) with coordinating outreach or delivering programs to schools that serve students who are underrepresented in STEM. Twelve organizations (DRSC, CEE, Citizen Schools, MATHCOUNTS, MSU, NMSI, Society, TGR, TIES Digital Fab, UCSD Math Project, UCSD CREATE, and USASEF) reported receiving support from TIES Ecosystems related to this focal population.



Networking
 Communicating
 Coordinating
 Collaborating



- **Networking:** exchanging information
- **Communicating:** building a shared understanding
- **Coordinating:** creating complementary programming
- **Collaborating:** jointly designing or delivering programming

To calculate the level of interaction between any two partners over Option Year 1, AIR used the an average of the reported levels of interaction across survey administrations, taking into

account that some partners joined DSEC midway through the year. For analyses related to the focal populations (military-connected students, underrepresented students, DoD facilities and personnel, and DoD STEM alumni) AIR summed reported interactions across the survey administrations rather than taking an average.

CONSORTIUM MANAGEMENT EVALUATION EXECUTIVE SUMMARY

This section summarizes findings from the second round of a developmental evaluation of the management of DSEC. This evaluation focuses on 3 broad consortium functions:

- management and coordination
- monitoring and evaluation,
- and external visibility.

Findings in this report are based on 27 interviews with all consortium member organizations, including:

13 interviews with outreach partners,

4 interviews across three hub lead organizations, and

10 interviews with members of the Consortium Management Committee or CMC.

The key evaluation questions and major findings are summarized on this page.

HOW DOES THE CMC SET A VISION FOR DOD STEM PROGRAMS AND ENCOURAGE ALIGNMENT TO THAT VISION?

- All respondents stated that the CMC encouraged the partners to align their programming to DSEC fundamentals and vision. Respondents described the following approaches:
 - Clarity of and consistent referencing to the “DSEC fundamentals”
 - Evaluation activities
 - Scope of work process

- CMC efforts to identify gaps
- **Although the CMC and hubs encouraged partners to align programming to the DSEC “Serve” fundamental, some partners requested more support.**
 - Most respondents stated that the CMC encouraged outreach partners to align their DSEC work to the “Serve” fundamental.¹
 - Outreach partners most frequently mentioned the hub regional model and peer networking sessions as forms of support.
 - A minority of partners expressed interest in more tangible support for reaching military-connected families, and for improved connections among partners that have similar interests and age groups or populations they serve.

HOW DOES COORDINATION, COMMUNICATION, AND SHARING OCCUR AMONG CONSORTIUM MEMBERS?

- Respondents described major CMC communication changes, which included the following modifications to meetings:
 - Each Element now has a standing meeting with the DoD STEM program office to discuss design questions and upcoming events.
 - There are now more frequent inter-Element meetings.
 - Pre-reads prior to the CMC biweekly meeting replaced time spent during each meeting where Elements reported out on their work and upcoming events/issues.
- The increased frequency of meetings with DoD STEM and among Elements improved awareness of work and connections for DSEC management. CMC members found the shift to pre-reads provided the opportunity for a more efficient use of discussion time.
- Outreach partners reported improvements to communication through additional structures, including a biweekly RTI email to DSEC partners, and monthly peer networking sessions.
- Outreach partners continued to use quarterly meetings and Amaze (the internal online communication platform for DSEC partners managed by RTI), to learn about each other’s work. The use of the Amaze platform increased, but there is still room for improvement. Respondents stated that DSEC partners use Amaze more frequently than

the previous year, to share information about the work of outreach partners. An analysis of Amaze indicates that outreach partners and CMC members use the platform primarily to share resources and publicize events.

- The CMC encouraged collaboration for all DSEC partners and facilitated collaboration for a majority of partners. Most stated that the CMC efforts in fact led to collaboration among partners; they cited the efforts of BEST, structured networking opportunities, and the regional hub model as serving this purpose.
- Some outreach partners seek greater opportunities for collaboration: a minority of partners stated that the CMC did not facilitate collaboration or that CMC efforts did not lead to “meaningful” or sustained collaboration.

HOW DOES DSEC SUPPORT PARTNERS WITH PROVIDING PROGRAMMING AND SERVING DSEC’S FOCAL POPULATIONS?

- The CMC supported outreach partners with both programmatic and DSEC-related responsibilities. The following are four major types of support for outreach partners:
 - Helping partners solve programmatic challenges by serving as a thought partner
 - Adapting DSEC budgets and creating scopes of work that are connected to their initiatives
 - Supporting data collection related to the DSEC evaluation and alumni studies
 - Connecting outreach partners to relevant stakeholders, including underrepresented and military-connected students, LEAs, universities, and the DoD workforce
- A minority of partners sought additional support with connecting to relevant stakeholders.

HOW DOES THE CMC COORDINATE AND MANAGE THE REGIONAL HUB APPROACH?

Hub lead organizations received most support from BEST or TIES. BEST supported hubs through regular meetings to collaborate and discuss the regional hub initiative, and TIES supported hubs in developing STEM ecosystems. The following are major findings about the role of the hubs:

- Hub leads reinforced efforts to implement the DSEC vision by incorporating a discussion of this vision when they organize different activities or collaborate with partners.

- Hub lead organizations played a role in fostering collaboration. Hub leads stated that they play a role in connecting outreach partners to local stakeholders that would like to collaborate on programs.
- There may be a need to clarify and reinforce the role of hub lead organizations. A minority of respondents stated that this role is not yet clear. A minority of respondents also sought a more intentional effort from hubs to integrate DSEC-funded programs into their regions.

HOW DOES DSEC MONITOR IMPLEMENTATION WITH RESPECT TO OBJECTIVES AND INDICATORS?

- CMC members monitored partners' progress through work conducted by Element 2 and Element 5. The Element 2 evaluation activities included the compiling of annual metrics for the APR, developing logic models with program leads, and creating reporting modules that programs can use to self-report on their progress to the CMC. The Element 5 activities used for progress monitoring were the periodic check-ins with outreach partners and hubs.
- Partners monitored their progress toward outcomes using DSEC-specific tracking activities or organization-specific tracking systems (or both).
- Partners were split on whether their logic model helped them monitor progress.
- Disruptions caused by the COVID-19 pandemic did not affect most partners' ability to collect program data, although a minority did report difficulty due to the pandemic.
- Partners reported their progress toward outcomes using both formal and informal methods. Formal approaches included post-event reports and updates offered during DSEC quarterly meetings. Informal methods of reporting to the CMC included ad hoc data requests, check-ins or email correspondence, and progress updates outside of the required DSEC reporting.
- A minority of partners described the data requests as a burden and requested additional supports for them.

HOW DOES THE CMC EVALUATE PROGRAMMING AND PROVIDE FEEDBACK TO PARTNERS?

- Partners stated that they received feedback through informal conversations with CMC members.

- CMC members stated that they monitored progress by comparing the partner's stated scope of work to the activities being invoiced.
- Partners were interested in receiving more feedback at regular intervals. Some partners suggested holding quarterly or annual discussions of their progress on their scope of work.

HOW DOES DSEC INCREASE VISIBILITY OF DOD STEM?

- Partners highlighted DoD STEM in outreach materials and invited DoD STEM staff to participate in events. Partners stated that they used resources produced by Element 3 in their outreach efforts, including alumni videos, the redesigned DoD STEM website, the DSEC digital brochure, and social media posts.
- Respondents believe that DoD STEM visibility is increasing among DoD professionals, students, and teachers.
- CMC members highlighted that one area for improvement in visibility of DoD STEM is among DoD labs. Fostering relationships with DoD labs would provide partners with more pathways to the DoD workforce.
- Visibility efforts could be improved by additional guidance from the CMC about how to communicate about DoD STEM in outreach materials.

DOES THE CONSORTIUM ADD VALUE TO THE WORK OF THE OUTREACH PARTNERS?

- All respondents believed that the benefits of being a member of DSEC are worth the effort required to participate. They described how DSEC has helped them expand or strengthen their program's ability to reach target populations and build important partnerships to further their work.
- A few respondents continued to report that DSEC administrative work can require a high level of staff time. They suggested either reducing or streamlining administrative requests or providing partners with more funding to cover staff time for these tasks.

RECOMMENDATIONS

INTRODUCTION

In this section we use the DSEC Fundamentals and 2021–22 priorities from the Annual Program Plan (APP) as a framework to organize our recommendations. Using the data from 2020–21, we provide specific recommendations for DSEC STEM Outreach partners, Hub Leads, and CMC members to prioritize their efforts in the upcoming year. Our goal is to support DSEC’s application of this formative evaluation so that DSEC may evolve over time.

DSEC FUNDAMENTAL: ENGAGE

ENGAGE STUDENTS AND EDUCATORS IN MEANINGFUL STEM EXPERIENCES.

2021–22 Priority	2021–22 Indicators
STEM enrichment opportunities expand across the K–16 continuum, building depth of engagement in a variety of disciplines and engagement methodologies.	<ul style="list-style-type: none">• Report an aggregate of total participation in DSEC programming (student and educator target numbers to be determined based on this report).• Report on types of engagement shows diversity of programming.

KEY FINDINGS RELATED TO THIS FUNDAMENTAL

Increase student interest and engagement in STEM. Increase STEM knowledge and skills. Student participation in DSEC-funded programming increased from 56,717 participants in 2019–20 to 111,127 participants in 2020–21—an overall

increase of 107%. This is associated with an increase of STEM Outreach Partners from 13 in 2019–20 to 19 in 2020–21, as well as an increase in the number of programs delivered from 24 in 2019–20 to 47 in 2020–21. The increase in programs delivered is associated with partners being able to pivot their programming to a virtual learning environment.

Teacher participation in DSEC-funded programming showed an overall decrease of 36% from 2019–20 to 2020–21 or 3,657 teachers to 2,350 teachers, respectively. This is associated with challenges schools faced during the pandemic, such as exhaustion/burnout from transitioning to virtual/blended learning environments as teachers tried to schedule required learning activities within a day, leaving little time for additional pursuits.

RECOMMENDATIONS

STEM OUTREACH PARTNERS

- Use lessons learned during the pandemic pertaining to virtual and hybrid program frameworks to continue to engage more students and educators in STEM programming.

HUB LEADS

- Create or update an inventory of available STEM programming in the hub region to determine areas of saturation and gaps where programming is not available.
- Determine whether DSEC programming in the region should more intentionally focus on or prioritize specific grade levels, STEM content areas, or school communities and collaborate with DSEC Partners to meet these needs.

CMC

- Track and document the level of participants' STEM engagement within and across programs and activities.
- Assess whether the STEM enrichment opportunities provided by DSEC Partners are meeting the depth of engagement necessary for a high-quality STEM learning experience.

DSEC FUNDAMENTAL: SERVE

SERVE STUDENTS WHO ARE MILITARY CONNECTED AND/OR UNDERREPRESENTED IN STEM.

2021–22 Priority	2021–22 Indicators
<p>Traditionally underrepresented and military-connected students are engaged in DSEC STEM programming opportunities.</p>	<p>Report aggregate participation in DSEC programming by military-connected and underrepresented students (student target numbers to be determined based on this report).</p>

KEY FINDINGS RELATED TO THIS FUNDAMENTAL

Increase access to STEM opportunities for military-connected and underrepresented in STEM students. DSEC began collection demographic data (gender, race/ethnicity) for students in 2020–21, resulting in a clearer picture of which programs are engaging military-connected and underrepresented in STEM students. 2020–21 can serve as a baseline with which to measure progress for this outcome in future years.

Location data showed an increase in programming from 39 states represented in 2019–20 to all 50 states in 2020–21. This is associated with the increased use of virtual programming which allowed for further reach than in-person events. While partners initially saw virtual programming as a challenge to be overcome, many now see the possibility of a virtual environment extending their programming reach.

RECOMMENDATIONS

STEM OUTREACH

- Include a focus on purposefully engaging the identified populations when planning programming.

- Use the DSEC registration form that includes participant demographic data categories to determine if programs are indeed reaching these focus populations.
- Allow program participants to self-report their gender and race/ethnicity via registration or a presurvey.
- Develop a data collection process and system to increase the accuracy and reliability of demographic data by lessening reliance on estimation.

HUB LEADS

- Support DSEC partner in determining locations within their respective Hub regions where partners can provide programming to better serve military-connected students and underrepresented in STEM students.
- Work to connect STEM Outreach Partners to relevant stakeholders who also serve these focus

CMC

- Publicize, clarify, and ensure understanding of new DoD STEM military-connected definitions for STEM Outreach Partners and Hub Leads.
- Determine if other hub regions, new STEM Outreach Partners, or revised programming are needed to make more progress toward serving military-connected students or those underrepresented in STEM.
- Directly ask for how an organization serves military-connected students and those underrepresented in STEM as part of the DSEC application process.
- Provide more resources to DSEC Partners and Hub Leads to help them focus on serving military-connected students.

DSEC FUNDAMENTAL: CONNECT

CONNECT TO THE DOD STEM WORKFORCE.

2021–22 Priority	2021–22 Indicators
<p>Expand connections and collaborations within DSEC ecosystems and partners with DoD STEM programs and other DoD outreach efforts, military installations, and personnel.</p>	<ul style="list-style-type: none"> • DSEC Hub Leads and Partners engage with military installations. DoD scientists and engineers are directly engaged in DSEC activities. • Data show increased awareness of DoD STEM careers.

KEY FINDINGS RELATED TO THIS FUNDAMENTAL

Increase student awareness of and interest in DoD STEM research and careers. Overall volunteer counts increased 3% from 1,177 volunteers in 2019–2020 to 1,211 volunteers in 2020–2021. DoD-affiliated volunteers increased 29%, from 730 volunteers in Base Year to 942 in Option Year 1. Of these 942 DoD-affiliated volunteers, 897 worked with *FIRST*. In responses on the *DSEC Outcomes and Reflections Survey*, DSEC STEM Outreach partners noted that use of a virtual learning environment enabled them to have more DoD-affiliated speakers from more varied locations at their program sessions. Because of this, students were potentially provided with greater learning opportunities related to DoD research and careers.

DSEC added Innovation Bloc partners at the community college level in 2020–21. These partners included internships and career pathways work in their programming to increase the number of students moving towards STEM careers, particularly in the DoD STEM modernization priorities of biotechnology and cyber technology.

RECOMMENDATIONS

STEM OUTREACH PARTNERS

- Continue working to include more DoD STEM personnel as part of programming, particularly to share their career pathways as well as their on-the-job experiences.
- Place more emphasis on highlighting DoD STEM careers for student participants beyond generalized STEM career knowledge.

HUB LEADS

- When possible, serve as a liaison between DoD installations/labs/facilities in the hub region and STEM Outreach Partners, providing introductions and helping the parties begin collaborative programming.

CMC

- Work with DoD STEM to promote participation of DoD STEM personnel in STEM learning opportunities in their regions or virtually.
- Help Hub Leads identify DoD assets, such as facilities and personnel who can volunteer or coordinate programming, that would complement and extend the STEM learning opportunities available in their region.

DSEC FUNDAMENTAL: LEVERAGE

LEVERAGE THE NETWORK AS A FORCE MULTIPLIER.

2021–22 Priority	2021–22 Indicators
Cohesion and collaboration between STEM Outreach Partners are enhanced to amplify reach and program impact.	<ul style="list-style-type: none">• Co-programming collaborations occur between DSEC Partners (target number to be determined).• Each Hub Lead hosts ecosystem events offering connectivity across DSEC and local DoD personnel.

KEY FINDINGS RELATED TO THIS FUNDAMENTAL

Increase connections among DoD STEM learning opportunities for students and educators. DSEC partner organizations and hub leads reported a total of 100 connections from August 2020 to July 2021, spanning from networking to collaborating. Eighty percent of reported connections occurred at the networking and communicating level, demonstrating that many organizations are engaged in exchanging information and building shared understanding. Twenty percent of reported connections occurred at the coordinating and collaborating levels, demonstrating that partners are engaged in altering programming to complement others as well as jointly designing and delivering programs. Further, 70% of organizations, or 15 out of 22, have at least one connection at the coordinating or collaborating level. The three hub leads (DRSC, MSU, and UCSD CREATE) and hub lead support partner (TIES Ecosystem) reported the highest level of connectivity, indicating they play key roles in connecting with consortium members. The partners that joined DSEC midway through 2020–21 (Learning Undeclared, Robeson, Miramar, and St. Petersburg) reported lower levels of connectivity; however, all four established connections with other partners in the consortium.

RECOMMENDATIONS

STEM OUTREACH PARTNERS

- Continue to learn about the program opportunities afforded by fellow DSEC members as well as establishing relationships with these members to lay the groundwork for future working partnerships.
- Work towards moving connectivity with fellow partners beyond the Network and Communicate levels so that more Collaborating and Coordinating programming efforts occur.

HUB LEADS

- Continue integrating with established STEM ecosystems in hub regions to promote relationships that advance DSEC Partner programming in the hub region.
- Use network connectivity data quarterly to review and inform location-specific partner interactions.
- Leverage relationships with regional military entities to provide locally based resources (speakers, mentors) for STEM Outreach Partners.

CMC

- Provide additional structures, leadership, and support for robust, cross-program collaboration.
- Continue to provide opportunities for DSEC members to come together and learn about each other's programs.
- Examine the consortium's network connectivity data. Use this information to identify (a) existing interactions that should be sustained; (b) existing interactions that could be strengthened; and (c) opportunities to form new interactions that may increase the reach, visibility, and outcomes of DSEC.

DSEC FUNDAMENTAL: EVOLVE

EVOLVE THE APPROACH BASED ON DATA.

2021–22 Priority	2021–22 Indicators
<p>The DSEC approach evolves as CMC uses data to shape and grow the consortium, both in content and behaviors, to meet DSEC fundamentals and DoD STEM goals.</p>	<ul style="list-style-type: none"> • Integration of new partners with diverse and unique STEM offerings from K-16. • Data shows health and maturity of the consortium.

KEY FINDINGS RELATED TO THIS FUNDAMENTAL

Increased use of evidence and continuous improvement across DSEC-funded programs. The *DSEC Participation Survey* asked STEM Outreach partners and Hub Leads to indicate which data collection methods they currently use. 90% of partners reported using participant surveys, and 84% reported using participation records, which shows that the majority of DSEC members are collecting data that could be used to inform program improvement.

RECOMMENDATIONS

STEM OUTREACH PARTNERS

- Use participant data to determine whether the shifts to virtual programming were as effective as in-person programs to better understand where to focus efforts in the future.
- Consider continuing the use of virtual learning environments for portions of your STEM programming. These environments may encourage more engagement across traditionally underrepresented and under-resourced communities and allow for expanded program reach.

- Preserve the relationships formed with fellow DSEC Partners as all turned to address the common challenges because of COVID-19, using these relationships to continue collaboration and enhancement of STEM program offerings for students and educators.

HUB LEADS

- Establish the Hub Lead as a connector in the region between existing STEM ecosystems, DSEC Partners, and military facilities/labs/installations to continue enhancing STEM programming for students and educators.

CMC

- Provide partners with more feedback on their progress on their scope of work at regular intervals, such as quarterly or biannually.
- Consider bringing together partners with similar populations/goals to form working groups that can tackle identified issues and challenges.
- Examine the portfolio of STEM Outreach Partners for effectiveness in reaching DoD STEM goals and objectives.
- Consider additional hub regions that can support serving military-connected students and educators and provide additional DoD locations to collaborate on programming with STEM Outreach Partners.

DSEC DATA DASHBOARDS

DSEC 2020-21 DATA DASHBOARDS

This section contains two Tableau dashboards that visualize data from a new version of the Defense Science, Technology, Engineering, and Mathematics Education Consortium (DSEC) Partner Taxonomy. This taxonomy is an organized classification of the unique characteristics of each DSEC partner. **The dashboards display the categorical partner and program data contained in the taxonomy, including:**

DSEC-SPECIFIC CHARACTERISTICS

- DSEC fundamentals
- Special characteristics

STRUCTURE

- Duration
- Engagement type
- Environment type
- Mechanism

CONTENT

- Science, Technology, Engineering and Mathematics (STEM) discipline
- Skill development
- STEM career interest
- STEM pedagogy content

PARTICIPANTS

- Grade level/age range
- Primary beneficiaries

GEOGRAPHIC REACH

- Hub region
- Location

The purpose of these dashboards is for DoD STEM to gain insight into the characteristics of each partner and their programs. The interactive charts filter the underlying data with user selections.

There are two data dashboards available. The information represented in each dashboard, as well as instructions on who to interact with them, are described below.

DASHBOARD 1: DSEC PARTNER OVERVIEW

The [DSEC Partner Overview dashboard](#) provides a high-level overview of all data in the taxonomy, split out by all the taxonomy categories. The dashboard features two drop-down menus, a stacked bar chart, a pie chart, a table, and a legend.

1. The user can select a **specific partner's data** by selecting the drop-down menu in the top left corner.
2. Another drop-down menu allows the user to select **characteristics from the taxonomy** to view, including, for example, program audience, delivery mechanism, and geographic region.
3. Finally, the user can select a slice of the pie chart, a bar in the bar chart, or a row or column of the table to see a **specific data point, partner, or category**.

DASHBOARD 2: ENGAGEMENT TYPE AND STEM DISCIPLINE BY DSEC PARTNER

The [Engagement Type and Discipline dashboard](#) presents the intersection of STEM disciplinary content areas with program delivery mechanism (e.g., camp, course, competition) within five different anticipated questions:

1. What are the programs' durations?
2. How are careers presented?
3. How many programs target students?
4. How many programs target teachers?

5. How many programs target community members?

This dashboard features a drop-down menu, six stacked bar charts, several additional stacked bar charts that change depending on the drop-down selection, and a legend.

- The **categories that answer each question** appear in the lower half of the visualization.
- The label for these categories can be selected to view the **disciplinary makeup for that category**
- The red (“yes”) portion of each disciplinary category can be selected to display the **breakdown of delivery mechanism and the selected other dimensions** within that discipline.

CONCLUSION

You have reached the end of the DSEC 2020–21 data chapter. You can return at any time to revisit the chapter as a whole, or specific sections of the chapter.

For more information about DSEC, visit <https://dodstem.us/about/partners/>.