



Building Strong Foundations for STEM Literacy

ANNUAL REPORT 2020



Photos reflect both
pre/post COVID-19 Pandemic

DoD STARBASE

Vision and Mission Statements

DoD STARBASE is a premier educational program, sponsored by the Office of the Assistant Secretary of Defense for Manpower and Reserve Affairs. At DoD STARBASE students participate in challenging “hands-on, minds-on” activities in Science, Technology, Engineering, and Mathematics (STEM). They interact with military personnel to explore careers and observe STEM applications in the “real world.” The program provides students with 25 hours of stimulating experiences at National Guard, Marine, Air Force Reserve, Army, Air Force, and Space Force bases across the nation.

VISION STATEMENT

To be the premier Department of Defense youth outreach program for raising the interest in learning and improving the knowledge and skills of our nation’s underserved and underrepresented youth in STEM education so that we may develop a highly educated and skilled American workforce who can meet the advance technological requirements of the Department of Defense.

MISSION STATEMENT

To expose our nation’s youth to the technological environments and positive civilian and military role models found on Active, Guard, and Reserve military bases and installations, nurture a winning network of collaborators, and build mutual loyalty within our communities, by providing 25 hours of exemplary hands-on STEM instruction and activities that meet or exceed the National Standards.

DoD STARBASE Curriculum

PHYSICS & CHEMISTRY

- A. Motion and Force
- B. Fluid Mechanics
- C. Building Blocks of Matter

ENERGY

- A. Energy Fundamentals

TECHNOLOGY

- A. Current and Emerging Technologies
- B. Applying Technology

ENGINEERING

- A. Engineering Design Process (EDP)
- B. 3-D Computer-Aided Design

MATHEMATICS OPERATIONS & APPLICATIONS

- A. Numbers and Number Relationships
- B. Measurement
- C. Geometry
- D. Data Analysis

SCIENCE, TECHNOLOGY, ENGINEERING, & MATHEMATICS (STEM) CAREERS

- A. STEM Careers on Military Facilities
- B. Personal Investigations

Table of Contents

INTRODUCTION

DoD STARBASE at a Glance	2
DoD STARBASE Program Response to the COVID-19 Pandemic	3
Letter of Support from Maj Gen David A. Weishaar.....	5

2020 ASSESSMENT

Executive Summary.....	8
Letter of Support from Lori Hoyum	12
DoD STARBASE Program Overview	14
Letter of Support from Col Eric J. Felt.....	16
The Program Elements of DoD STARBASE	19
Volunteers and Military Support.....	25
Outreach.....	25
Letter of Support from DoD STARBASE Graduate Edward Westerband.....	26
DoD STARBASE 2.0 Program.....	27
Letter of Support from Jacob Grosek	30
The DoD STARBASE Curriculum	32
Program Oversight	34
Letter of Support from DoD STARBASE Graduate Bridget Byquist	37
Fiscal Analysis.....	38
Student Assessment.....	40
Letter of Support from Denise Rutherford	50
Delivering STEM Education During a Pandemic	56
Letter of Support from Stephen C. Floyd.....	60
DoD STARBASE Native American Outreach	70
Participating Teacher Survey.....	73
DoD STARBASE Graduate Ruhi Doshi	83

DoD STARBASE DIRECTORY	93
-------------------------------------	----

APPENDIX	165
-----------------------	-----

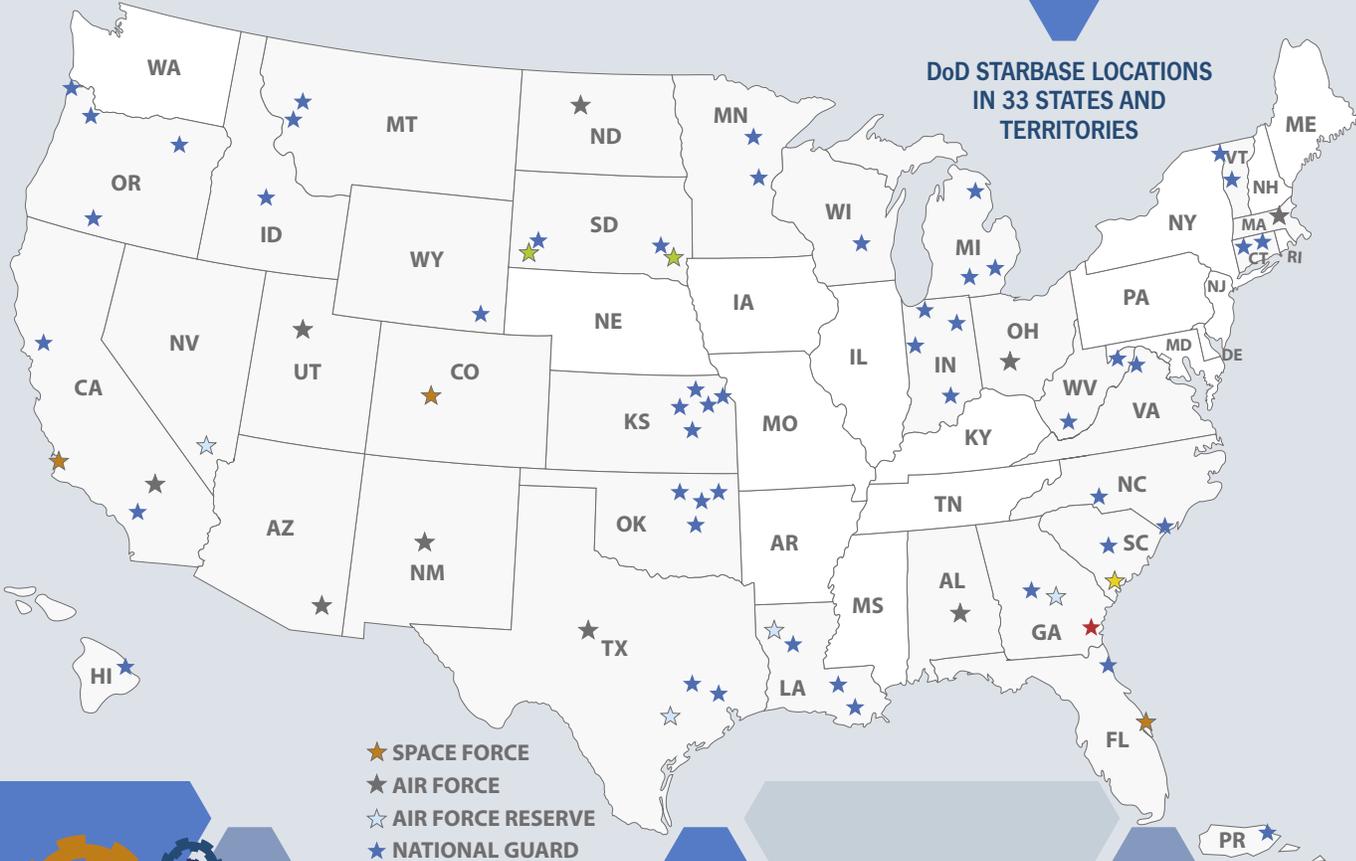
GLOSSARY	171
-----------------------	-----

All photo and name releases have been obtained and are on file with the STARBASE programs providing the images.

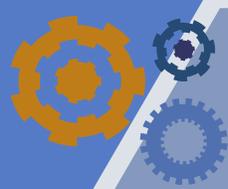
DoD STARBASE at a Glance



DoD STARBASE LOCATIONS
IN 33 STATES AND
TERRITORIES



- ★ SPACE FORCE
- ★ AIR FORCE
- ☆ AIR FORCE RESERVE
- ★ NATIONAL GUARD
- ★ MARINE CORPS
- ★ ARMY
- ★ OUTREACH



\$31,605,458
PROGRAM OPERATING
BUDGET

101,182
STUDENTS
SERVED IN 2020
BASIC AND
SUPPLEMENTAL PROGRAMS

107

\$415,750
MEDIAN OPERATING COST
PER LOCATION

1,404,649
STUDENTS SERVED
SINCE 1993

DoD STARBASE 2.0
OUTREACH PROGRAMS
IN 23 STATES
AND PUERTO RICO



DoD STARBASE PROGRAM RESPONSE TO THE COVID-19 PANDEMIC

In March 2020, educators and students around the world felt the extraordinary ripple effect of the COVID-19 pandemic as schools shut down amid the public health emergency. This also impacted DoD STARBASE, as programs and staff followed CDC guidelines, state/local requirements and procedures to prevent the spread of the virus, with most closing their doors to students by mid-March.

On March 17th, all DoD STARBASE sites received direction from the Deputy Assistant Secretary of Defense for Reserve Integration, to prepare a program action plan with detailed records to account for school cancellations, staff time, and productivity during the pandemic closures. In response, a survey was sent to all DoD STARBASE locations to provide requested information and to establish a baseline of current operating conditions, which included the status of assigned personnel, closure reasons and expected duration, as well as documentation of site specific comments and concerns. The information was placed in a shared document on the DoD STARBASE website to allow program directors to quickly update changes to meet the twice weekly reporting requirements of senior leadership through April.

Each Program Director was instructed to use this time out of the classroom as a “strategic pause” to do important work that is often pushed out of the schedule by other urgent requirements. A “COVID-19 Checklist” was provided with suggestions of items to work on including software upgrades, curriculum development, cross training, general maintenance and upkeep of supplies and equipment, sanitation and operations under pandemic conditions, refresh of websites as necessary, preparation of summer academies, deeper dive into new lessons, refresh of PowerPoint program briefings, outreach and marketing

material development, budget planning for FY 2021, and developing plans to re-open their program.

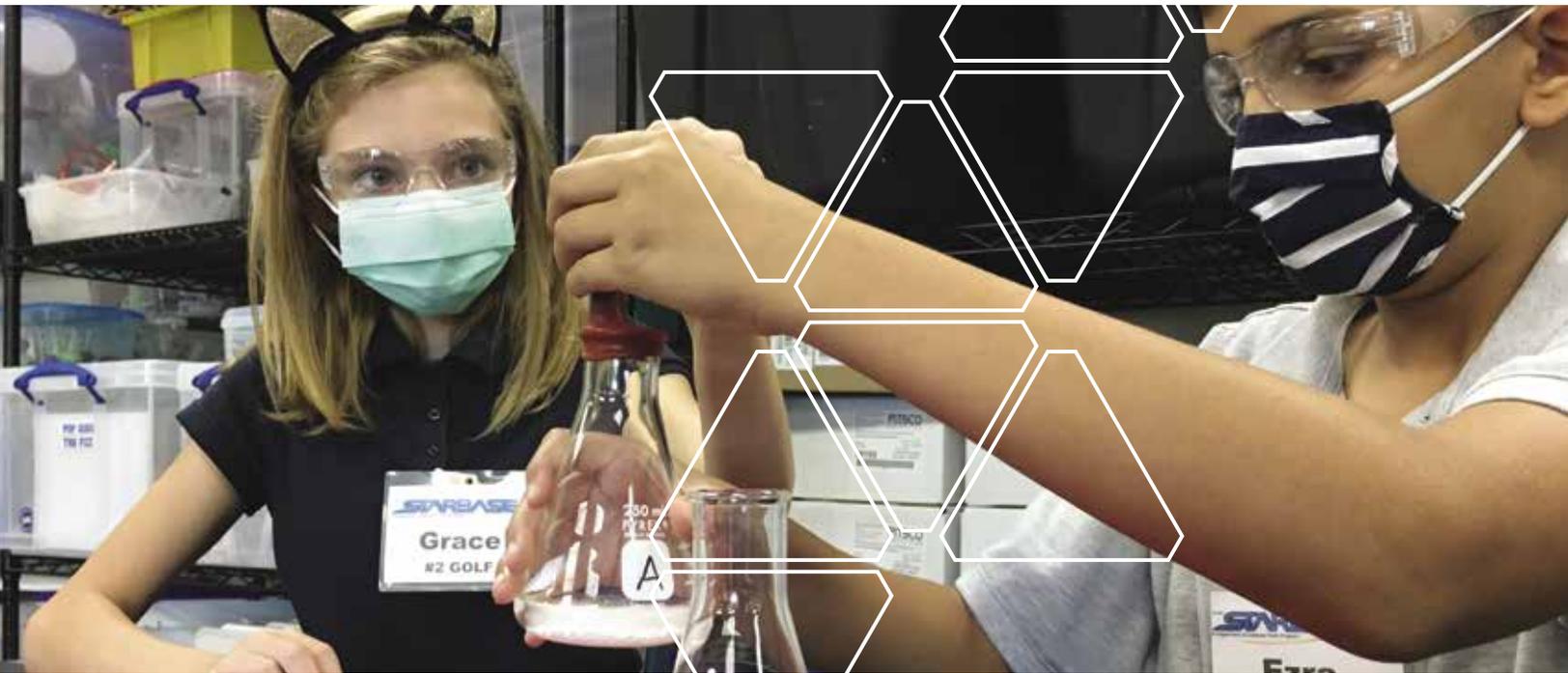
By May 2020, it became obvious that schools would not resume classes for the 2019-2020 school year. As such DoD STARBASE locations were asked to focus on possible summer activities and planning for the 2020-2021 school year. Reporting was reduced to once weekly to meet continuing requirements but was expanded to gather information on innovative communications and practices sites were using to communicate and work with schools in their service area.

Another program modification included the gathering of data for the annual Director’s Questionnaire, which provides operational information for program assessment as well as the DoD STARBASE Annual Report. In FY 2020, the reporting time periods were changed from “fiscal year” to “school-year” for all student/school related areas of interest in order to simplify reporting. When the school year ended abruptly because of the pandemic, all the data for the year was already available. Instead of waiting until July, the reporting was accelerated to take advantage of the unanticipated hiatus, thus freeing up time during the summer months to make necessary program modifications to restart the STARBASE program in the fall.

Over 63 percent (44 of 70) STARBASE locations were able to conduct some kind of supplemental programs during the summer months in spite of the continuing pandemic. Over half (28 of 44) took creative avenues for delivery and provided “virtual” programs to assist the students and schools when other educational initiatives and opportunities were totally shut down because of the pandemic. An additional 30 percent (13 of 44) provided safe, socially distanced, in-person camps/academies.

As the summer progressed, the vast differences in the impact of the COVID-19 virus at each STARBASE location became evident. Resuming STARBASE operations in the

CONTINUED



DoD STARBASE PROGRAM RESPONSE, CONTINUED

fall were dependent on local, state, federal, and military limitations, which continued to change on a daily basis. OASD/M&RA provided basic guidance to be followed when working with partner schools and school districts consisting, at that time, of three options:

- **Option 1** - Resumption of normal operations with considerations for CDC recommended protocols, taking extensive safety/sanitizing precautions to meet the requirements of participating schools. Normal class sizes, staffing, bus transportation, and execution of the full 25-hour curriculum were expected.
- **Option 2** - Same as above but with reduction in class size as needed to meet social distancing requirements. Delivery of the full 25-hour curriculum was required but waivers were possible for total number of classes and students served.
- **Option 3** - Initiate a “STARBASE-On-Wheels” program where instructors travel to the school site for program delivery. This option was intended as a last resort and was limited to the first 10 weeks of the school year, conducted only with OASD/M&RA approval.

In August, it was evident that the pandemic would severely impact operations at the beginning of the school year. The three options for STARBASE program delivery were further refined and new approaches considered. In mid-August,

OASD/M&RA conducted virtual meetings with the directors from each of the 70 DoD STARBASE sites to ascertain and document how they would be conducting business as schools resumed for the 2020-2021 school year. Directors could choose multiple options, and exceptions to policy would be granted, if warranted, to accomplish the option chosen. A virtual option would be available if there was documentation that no other option was possible to serve students.

While a couple of northern tier states, such as Montana and North Dakota, were able to resume operations under the Option 1 guidelines, the majority of programs operated under Options 2 and 3 - executing the STARBASE program with a reduced number of students on-site or through the STARBASE-On-Wheels initiative.

At the writing of this report, STARBASE continues in a proactive mode, reaching out to schools and school districts, as well as to groups typically unable to participate in the STARBASE program, and offering a variety of assistance to provide STEM education for the K-12 student population. The result has been extremely positive with teachers and school administrators expressing gratitude for the flexibility of the program and the dedication of STARBASE and its leadership to serve as a continuing catalyst for STEM education.

A LETTER OF SUPPORT FROM Maj Gen DAVID A. WEISHAAR



Kansas STARBASE: Building Strong Foundations for STEM Literacy

The Kansas National Guard is proud to have one of the nation's largest STARBASE programs with five sites across the state. From August 2019 to June 2020 Kansas STARBASE served almost 4,000 students. The goal of this hands-on program is to produce STEM (Science, Technology, Engineering and Math) literate students that possess an "I can do this" attitude. STARBASE accommodates students' varied ability levels, provides a safe, supportive atmosphere to encourage students to embrace subject matter they have either not experienced before, or have had limited exposure to prior to attending.

STARBASE assists schools as they prepare students to recognize and embrace STEM-related situations, make informed decisions to develop possible solutions, and to collaborate with others. From 3-D printing to building and then launching a model rocket, STARBASE is a hands-on program in which students are fully immersed with the curriculum.

The main line of effort of the STARBASE 1.0 program is focused on 5th graders. Through our STARBASE 2.0 program, some STARBASE students are afforded the opportunity to participate in the Air Force Association's CyberPatriot; a specialty program aimed at directing students towards careers in cybersecurity in addition to the STEM career fields.

Students literate in STEM and cyber understand that those disciplines encompass virtually every career path. To demonstrate this, STARBASE brings in both civilian and military mentors to showcase how STEM impacts their daily activities, practices, safety, and success. STARBASE alumni often participate to enhance the learning environment and provide real-life examples for students to emulate. Additionally, students are shown how the development of technology has transformed over time. This gives them a sense of the historical impact while exposing them to the exponential growth in technological advancements today and tomorrow.

Growing a workforce that meets the needs of Kansas, and our nation, must start early and is vitally important. The connection between the STARBASE curriculum and STEM jobs (both civilian and military) is woven throughout the 25 hours that students experience in the program. The educational opportunities Kansas STARBASE provides students are amazing and can be career inspiring. I look forward to seeing great successes, and perhaps opportunities to expand, as the Kansas STARBASE team challenges their students to learn big and dream bigger.

A handwritten signature in black ink that reads "David A. Weishaar".

DAVID A. WEISHAAR
Major General, ANG
The Adjutant General, Kansas



To me, STARBASE is the future for our next generations. Students are able to gain exposure to tools and technologies used by scientists and engineers in the real world. This inspirational form of learning is highly beneficial to our younger generations, encouraging them that they too can be engineers and scientists. Our Cummins' partnership with STARBASE is very important to our company and has been growing more and more each year. From us volunteering and relaying our extraordinary experiences with the students, it is easy to gain more volunteers within our company. I really appreciate the energy that is given off by the students and the instructors within STARBASE. It is really an electric feeling when you enter the STARBASE facility seeing students engaging and learning skills that we use in the field today."

- ANTONIO D. ROBINSON, SR. ELECTRICAL ENGINEER, CUMMINS POWER

ASSESSMENT 2020



Executive Summary

The Department of Defense (DoD) sponsored STARBASE program provides Science, Technology, Engineering, and Mathematics (STEM) learning and occupational awareness experiences to American youth at 70 military-affiliated installations across the United States. Each year, the conduct and effectiveness of the DoD STARBASE program is evaluated in many ways, including structured interviews, questionnaires, operational surveys, program visits, and conversations with program participants. The program also is evaluated annually in terms of measuring the students' basic STEM knowledge gained from program participation and improvements in student attitudes toward STEM subjects in the contexts of school, the military, and career opportunities. Assessments, interviews, and/or questionnaires were received from 350 students, 2,045 teachers, and all DoD STARBASE directors. A brief overview of the assessment highlights some of the key findings of the analysis.

FY 2020 HIGHLIGHTS

DoD STARBASE PROGRAM

- DoD STARBASE programs are located at a variety of military installations including: Air Force (9 locations), Air Force Reserve (4 locations), Army (1 location), Marine Corps (1 location), National Guard (52 locations), and Space Force (3 locations).
- The DoD STARBASE program conducted 2,299 classes serving 1,189 schools, in 409 school districts, across the United States and Puerto Rico during FY 2020.
- More than 56,814 students attended the 5-day program with an additional 41,491 students participating in supplemental programs during FY 2020.
- DoD STARBASE programs served primarily students from public schools (87 percent) in urban areas (73 percent) with 78 percent of the schools participating with DoD STARBASE meeting Title I requirements. Most of the DoD STARBASE locations (89 percent) serve school districts within a 50-mile radius of their program site.
- The majority of DoD STARBASE students (97.5 percent) are 5th graders.
- Groups of students underrepresented in STEM fields and STEM careers served at DoD STARBASE include: Females (49 percent), American Indian or Alaskan Native (3 percent), Blacks/African American (24 percent), Hispanic or Latino (21 percent), Native Hawaiian or other Pacific Islander (1 percent), Low Income Students (59 percent), Students with Disabilities (11 percent), and Students who use English as second language (12 percent). The average instructor-to-student ratio for FY 2020 was 1:14.
- The average class size for FY 2020 was 25 students.
- The median operating cost per location was \$415,750.

OPERATIONAL IMPROVEMENTS

- The redesign of the DoD STARBASE website, www.dodstarbase.com, was completed in FY 2020. The website was designed to ensure usability across platforms. A new learning management system, STARBASE-U, was implemented for employees across the nation to ensure information dissemination and areas for enhanced training possibilities.
- The STARBASE Circuit, a STARBASE newsletter, was implemented in FY 2020 to further highlight program successes and information relevant to staff members. Eight issues were released in FY 2020 that highlighted Level III programs, shared program success stories, provided DoD STARBASE program announcements, and offered STEM-related content of potential interest.

“ I love working with STARBASE because it reminds me that no matter how stressful my job may feel, it’s a pretty cool job! Each time a new engineer comes with me to volunteer at STARBASE they say the same thing!”

- JENNA PENDER, HARDWARE ENGINEER, DEVICE PRODUCT ENGINEERING, MEDTRONIC

DoD STARBASE STAFFING

- State affiliations make up 56 percent of the employment relationships, followed by contractor and federal¹ affiliations, which are at 41 percent and 3 percent, respectively.
- There was less than a 1 percent decrease in the number of employees from FY 2019 (372 staff members in FY 2020 compared to 377 in FY 2019).
- The majority (60 percent) of DoD STARBASE staff have more than 3 years of DoD STARBASE experience with most (30 percent) in the 3 to 5-year range. Directors and deputy directors have typically worked with DoD STARBASE for over 5 years, at 61 percent and 51 percent experience, respectively. The majority of instructors (52 percent) have over 2 years of DoD STARBASE experience with most falling in the 3 to 5-year range. The experience level of office managers has risen to 60 percent with more than 5 years with the STARBASE program. Teaching assistants have the least amount of DoD STARBASE experience with 60 percent in their first or second year.
- There were 48 staff departures in FY 2020. The majority (27 departures) were at the instructor level. Teaching assistants/classroom aides were the next highest with nine departures followed by “other” positions at eight departures. The overall turnover rate in FY 2020 was 13 percent, which was a slight decrease over last fiscal year’s turnover rate of 16 percent.

DoD STARBASE PROGRAM VOLUNTEERS AND OUTREACH

- DoD STARBASE locations documented participation of 6,685 volunteers who contributed a total of 86,761 hours, worth an estimated \$2,164,556.
- DoD STARBASE directors reported 10,278 hours of support by 1,931 military personnel with an additional 992 hours of support provided by 235 DoD Science and Engineering personnel.
- A number of DoD STARBASE locations (19 locations) reported they have relationships with nearby teacher colleges or training programs where student teachers may obtain practicum hours at DoD STARBASE. At the DoD STARBASE locations that offer teacher training, 72 percent of the teachers may use this training towards their certification requirements.
- DoD STARBASE locations (40 of 66 reporting locations) indicate that they have relationships with other outreach programs in their area to include: STEM Forward, FIRST LEGO League, FIRST Robotics, Project Lead the Way, Civil Air Patrol, Girl Scouts, and Scouts BSA.
- Many DoD STARBASE locations (46 of 66 reporting locations) also offer a variety of supplemental programs to area youth in grades K-12 when schools are not in session impacting an additional 41,491 students.
- In FY 2020, 50 DoD STARBASE locations in 23 states and Puerto Rico reported coordinating a total of 107 DoD STARBASE 2.0 programs and 132 STARBASE 2.0 clubs.
- Almost 2,900 students participated in STARBASE 2.0 clubs during FY 2020.
- The average student retention rate within the STARBASE 2.0 programs was 83 percent. Relocations, time conflicts, and lack of interest in the chosen curriculum are cited by directors as the main reasons why students leave the program.
- Former DoD STARBASE students made up 38 percent of the DoD STARBASE 2.0 program participants.
- STEM Coaches (610 coaches) from a variety of professions participated in the DoD STARBASE 2.0 program to include: Military (13 percent), DoD Science and Engineering Mentors (9 percent), non-military/DoD professionals (2 percent), industry professionals (6 percent), college students (6 percent), staff members for the school hosting the 2.0 program (35 percent), STARBASE staff members (22 percent), and other (6 percent).
- The DoD STARBASE 2.0 programs operate through a combination of federal and private funds. Of the 51 DoD STARBASE locations coordinating a 2.0 program, 59 percent operate using only their federal DoD STARBASE funds and 41 percent receive funding from both sources.

¹ STARBASE Edwards and STARBASE Wright-Patt are the only locations with federal employment affiliations (four and two employees, respectively) in FY 2020.

STUDENT ASSESSMENT

- Most (79 percent) of the 350 respondents were 5th grade students who attended DoD STARBASE in person at 14 STARBASE Academies during September and October 2020².
- The study sample of matched data pairs consisted of responses from 52 percent girls and 48 percent boys.
- Student performance on total STEM knowledge questions improved significantly from the pre- to post-program, with 17 percent more correct answers on average.
 - The largest gain was a 23 percent increase in Energy and Engineering.
 - Physics and Chemistry showed the next highest improvement at 15.65 percent.
- Students' positive opinions of STEM rose on more than 80 percent of the attitude questions, and 70 percent of those were significant increases. The largest shifts were toward greater science confidence, awareness of jobs using STEM, and wanting a STEM-related career.
- Analyses found that students with more favorable pre-program STEM attitudes attained greater improvements in STEM knowledge. Yet, students who initially show less interest in STEM still have a positive experience, although their gains in knowledge are smaller.
- Students who had more favorable pre-program opinions toward the military also scored higher on both pre- and post-program knowledge questions and achieved higher gains.

TEACHER ASSESSMENT

- 2,045 teachers from 64 academies responded to the survey. This number is about 27 percent lower than last year's total (N=2,820), which is expected given that most STARBASE academies were not operational from March 2020 to June 2020.
- The teacher results continue to affirm the very consistent, very favorable feedback DoD STARBASE has received from teacher participants. This year, the mean rating for nearly all the survey items was 6.04 out of 7.00. The mean score garnered 86 percent of the highest favorability possible on a composite scale.
- Teachers gave their highest endorsement of meaningful changes in students' attitudes and behaviors following STARBASE participation for students' improved understanding of science. Comparably high ratings were found on two other items addressing students' interest in learning about science and technology.
- Teachers also gave higher ratings for increases in student willingness to try new things, appreciation of applications of math, and understanding STEM skills/abilities required for career choices.
- Teachers strongly endorsed the statement regarding their schools' plans to participate in the DoD STARBASE program in the future (mean = 6.88 out of 7.00).
- Teachers strongly endorsed the statement that DoD STARBASE has helped to improve the students' understanding of science (6.68 out of 7.00).
- Teachers strongly endorsed the statement that DoD STARBASE reinforces the many positive behaviors they try to teach their students (6.65 out of 7.00).
- Teachers strongly endorsed the statement that their students enjoyed being on a military base (6.64 out of 7.00).
- Teachers strongly endorsed the statement that students talk about DoD STARBASE long after the program has ended (6.47 out of 7.00).
- 99.3 percent (2,030) of the teachers indicated they will recommend DoD STARBASE to other teachers, principals, or school administrators.

² The Student Assessment, typically a larger sample size and conducted in the spring of each year, was impacted by COVID-19 program closures and cancellations during FY 2020.

- 91 percent (1,860) of participating teachers report that attending DoD STARBASE has influenced them to become skilled in STEM instruction.
- Similar to 2019, the number of teachers very or extremely likely to recommend the DoD or the military as a career option to students jumped by approximately 29 percentage points (67 percent increase) after participating in the DoD STARBASE program (Pre-program 43 percent Very or Extremely Likely to recommend versus 71.5 percent Very or Extremely Likely to recommend Post-program).

Each section of the following report provides an assessment of the program’s progress and describes the unanticipated and/or unresolved issues that emerge in program operations.



“ As a scientist, I encounter daily the challenges, triumphs, and the inevitable frustrations that are a part of working in a STEM field. I can attest with absolute certainty that the fundamental skills reinforced in the STARBASE program are in line with what today’s students will need to be successful in the ever-changing scientific landscape. I believe this so thoroughly that I have altered my own pedagogy to provide Centenary undergraduates with experiences that help them practice these skills as well.”

- DR. REBECCA MURPHY, ASSOCIATE PROFESSOR/BIOLOGY DEPARTMENT CHAIR, CENTENARY COLLEGE OF LOUISIANA



A LETTER OF SUPPORT FROM LORI HOYUM, MINNESOTA POWER



30 West Superior Street
Duluth, MN 55802-2093
www.mnpower.com



STARBASE MINNESOTA DULUTH: A PATHWAY TO STEM LITERACY

The expansion of the STARBASE Minnesota program to Duluth, Minnesota, in 2017 has created much excitement not only for educators and students, but also for employers in Northeastern Minnesota. Primarily comprised of smaller cities and rural communities and located in an area that occasionally is mentioned on national news for its chilly climate, compiled with the perception that interesting and challenging jobs that pay well are limited, has historically made it difficult to retain, or attract back to the area, young adults to fill the region's future workforce needs. The STARBASE Minnesota-Duluth Program and its innovative STEM-curriculum delivery, that also showcases the diversity of career paths available in this region, has brought new energy and optimism to employers.

There are a significant number of STEM-based companies located in this region. Many of these companies compete on a national and global level. This heightens the importance to develop STEM literacy in our youth, ideally creating curiosity and excitement in the areas of science, technology, engineering, and math early on in their K-12 education that continues into their post-secondary education. Learning about STEM-related concepts through engaging, hands-on curriculum delivery increases the possibility they will develop a passion for it and pursue a STEM career with a regional company. Through STEM education, youth gain STEM literacy abilities producing critical thinkers, problem solvers and innovators; important skills for our workforce to possess, now and in the future, regardless of the type of organization. A STEM literate workforce that has the ability to use concepts from science, technology, engineering, and math to examine complex problems and innovate solutions is crucial to these companies successfully competing and persevering during this time when technology and industries are evolving at a rapid pace.

Regardless of the industry (e.g. manufacturing, utilities, mining, retail, service, etc.) you work in, STEM literacy is only increasing in importance as employers plan for their workforce of the future. Technology is utilized across almost every industry. Employees may not always realize they are regularly performing math, science or engineering skills as part of their daily duties. The STARBASE program not only teaches youth

important STEM literacy skills in a fun and interesting way, it partners with employers, listens to their future workforce needs, and encourages participation and showcasing of commonly known and the “not-so commonly known” STEM careers. That may end up being the “moment” that sends a young person down a career path they may not have otherwise known existed. Through this partnership, employers have a voice in presenting STEM career opportunities and the transformative delivery of STEM education for greatest impact. The STARBASE program has brought an exciting and innovative learning experience for educators and youth to Northeastern Minnesota, and a new and creative workforce development tool to help retain young adults in our communities for generations to come.

Yours truly,



LORI HOYUM
Regulatory Compliance Administrator
Minnesota Power, an ALLETE Company

““ *The STARBASE program not only teaches youth important STEM literacy skills in a fun and interesting way, it partners with employers, listens to their future workforce needs, and encourages participation and showcasing of commonly known and the ‘not-so commonly known’ STEM careers. That may end up being the ‘moment’ that sends a young person down a career path they may not have otherwise known existed.”*

- LORI HOYUM

DoD STARBASE Program Overview

THE PARTICIPANTS

DoD STARBASE programs operate under the auspices of the Department of Defense (DoD) through the Office of the Assistant Secretary of Defense (OASD) for Manpower and Reserve Affairs (M&RA). A Congressional Appropriation to the DoD funds the operation of DoD STARBASE. Synergy between the local military base, schools, and surrounding communities enhance and strengthen the program.

During FY 2020, the DoD STARBASE program conducted 2,299 classes serving 1,189 schools, in 409 school districts, across the United States and Puerto Rico. A total of 56,814 students attended the 5-day program in FY 2020. After a 6 percent increase in the number of students served in FY 2019, COVID-19 school closures from March 2020 until the end of the school year reduced student participation numbers by 28 percent in FY 2020. The number of completed classes reflected a similar reduction with a drop of 29 percent.

The COVID-19 related school closures also had an impact on supplemental programming. During the summer months, many DoD STARBASE locations offer a variety of supplemental programs to area youth in grades K-12.³ Of the 70 locations, 46 locations were able to provide some type of supplemental programming. In addition to the impact of COVID-19, a location's ability to offer supplemental programming may be impacted due to the number of part-time or seasonal staff, funding, and facility agreements with the host military command.⁴ Even with the COVID-19 impact, creative methods of reaching students through supplemental programs resulted in a significant increase in student participants during FY 2020. A total of 18,682 students participated in supplemental programs in FY 2019. FY 2020 participation data more than doubled that number to 41,491 students.

This increase can be attributed to new outreach activities conducted in Puerto Rico and at STARBASE Martinsburg in West Virginia. During FY 2020, STARBASE Puerto Rico provided weekly STEM webinars through the Museum of Science of Puerto Rico "EcoExploratorio" social media platform to over 30,000 students. STARBASE Martinsburg reached over 5,000 students through a variety of programs that included an assembly type "STARBASE Science Day" to showcase STARBASE and STEM, Engineering Design Process (EDP) and Rocketry days with middle school students, and a variety of STEM camps. Some locations offer a wide range of supplemental programs while most locations tend to offer one to three programs. The duration of supplemental programs ranges from brief demonstrations at STEM events and airshows to STEM camps and special subject academies lasting up to two weeks. In FY 2020 supplemental activities included, but were not limited to: all girls academies, advanced academies, academies for special needs students, summer academies for military dependents, participation in air shows and local STEM festivals, STEM/Science nights and fairs as well as aerospace education, robotics programming, and engineering challenges and competitions.

³ The majority (51 percent) of the students participating in supplemental programs are in the 5th, 6th, and 7th grades.

⁴ Supplemental programs were not offered at AZ - STARBASE Arizona, CT - STARBASE Waterbury and STARBASE Windsor Locks, FL - STARBASE Florida, HI - STARBASE Hawaii, IN - STARBASE Gary and STARBASE South Bend, LA - Bayou State STARBASE, STARBASE Jackson Barracks, and STARBASE Louisiana, MI - STARBASE One, MN - STARBASE Duluth, NC - STARBASE Charlotte and STARBASE Ft Fisher, ND - STARBASE North Dakota, SD - STARBASE NOVA Honor and STARBASE Rapid City, TX - Texas STARBASE Houston, and WY - Wyoming STARBASE Academy. CA - STARBASE Vandenberg, NV - STARBASE Nellis, OR - STARBASE Umatilla and SC - STARBASE MCAS Beaufort did not see students in FY 2020.

THE MILITARY

The military hosts and supports DoD STARBASE programs. Programs are located at various military installations⁵ including: Air Force (9 locations), Air Force Reserve (4 locations), Army (1 location), Marine Corps (1 location), National Guard (52 locations), and Space Force (3 locations).

Most of the DoD STARBASE locations (89 percent) serve school districts within a 50-mile radius of the programs' duty station.⁶ Locations that extend beyond a 50-mile radius generally have made special accommodations to reach more students such as those in the Native American outreach programs in South Dakota or the sparsely populated area surrounding Kingsley Field in Oregon. The demand for DoD STARBASE is so great that students travel from all over the island of Puerto Rico to participate in the program located in San Juan. DoD has a wealth of expertise in STEM education and provides the DoD STARBASE locations access to resources and services that most school districts cannot offer. Many elementary teachers do not have the time, educational background, and/or resources to cover STEM topics appropriately and simply cannot match the DoD STARBASE experience in their own classrooms. OASD/M&RA provides state-of-the-art equipment and technology, but military bases provide classroom space, utilities, and security. The base may also provide additional equipment, janitorial services, maintenance, travel services, and IT support. DoD STARBASE operates at the discretion of the base commander who may view this program as a venue for military personnel to positively interface with their community. As such, military personnel are encouraged to volunteer their time to the program as mentors, expert speakers, and tour guides.

Military volunteers provide students with additional linkages between education and application. They may serve as guest lecturers to explain the use of STEM in different careers and/or act as base tour guides highlighting the use of STEM concepts in their missions and giving students access to military facilities and operations. Military volunteers share unique, informative, and highly varied experiences with the students, which provide an exciting, stimulating environment to enhance their STEM experience. Military volunteers provide a very powerful force to inspire students to set goals for their own lives and serve their communities as they grow. Modeling selfless service, consistent and conscientious leadership, dedication to mission, and respect and dedication to the United States, these hard-working, highly disciplined men and women distinguish themselves in such a way that others admire and want to emulate. Participating classroom teachers are also inspired and encouraged by the involvement of military volunteers in the DoD STARBASE program.



“ Ecolab knows that our future STEM workforce is reliant on youth engaging in meaningful STEM experiences. We have chosen to partner with STARBASE because we believe they are one of the best STEM programs out there and is inspiring the next generation of engineers.”

- BELINDA CORDINA, DIRECTOR OF OPERATIONS -
LIFE SCIENCES, ECOLAB

⁵ Most of the STARBASE academies operate within the confines of a military base. A few operate in an affiliate site contiguous to the military installation but under the property management of the base. Bayou State STARBASE in Rosedale, Louisiana, is currently located at the original Iberville High School because there is not a military installation within 50 miles of a population of Title I students. STARBASE Oklahoma - Burns Flat, STARBASE NOVA Courage, and STARBASE NOVA Honor are outreach programs that serve Native Americans in Oklahoma and South Dakota. STARBASE Connecticut - Waterbury is currently located at Naugatuck Community College because space became limited at the Waterbury Armory.

⁶ LA - STARBASE Louisiana, NC - STARBASE Charlotte, NM - STARBASE New Mexico, PR - STARBASE Puerto Rico, SD - STARBASE NOVA Honor and STARBASE NOVA Courage serve students beyond 50 miles of their host facility.

A LETTER OF SUPPORT FROM ERIC J. FELT, Col, USAF



DEPARTMENT OF THE AIR FORCE
AIR FORCE RESEARCH LABORATORY
KIRTLAND AIR FORCE BASE NEW MEXICO



MEMORANDUM FOR DoD STARBASE NM
FROM: AFRL/RV DIRECTOR
3550 ABERDEEN AVE SE
KIRTLAND AFB NM 87117

SUBJECT: AFRL/RV Letter of Support to DoD STARBASE NM

The United States Air Force mission is to fly, fight, and win in air, space, and cyberspace domains. At Kirtland Air Force Base, NM, the Air Force Research Laboratory (AFRL) is leading the discovery, development, and integration of warfighting technologies for our nation's air, space, and cyberspace forces. The base is home to two AFRL directorates, the Space Vehicles Directorate and the Directed Energy Directorate. AFRL is one laboratory, supporting two services—the newly formed U.S. Space Force and the U.S. Air Force. In order to respond to the dynamic environments we are tasked with defending, our workforce must be innovative, creative, flexible, agile, have a sound understanding of science, technology, engineering, and mathematics (STEM) concepts, and adequately represent the rich diversity our state and nation embrace.

DoD STARBASE engages young people from diverse backgrounds, in hands-on experiences with STEM content and exposes them to potential careers on DoD installations. Students who have positive interactions with STEM professionals are better equipped to make decisions about the role of STEM in their futures, and are more likely to decide to join the workforce supporting our nation's defense. Many DoD STARBASE NM students learn for the first time that the United States military is a pathway to STEM careers that is accessible to all Americans. Since 2003, DoD STARBASE NM has been working towards a robust and diverse workforce, and in the process, has impacted more than 13,000 students from mostly Title I schools. In 2015, the University of New Mexico Center for Education Policy Research completed a longitudinal study on the effectiveness of DoD STARBASE. The results of that study indicated that DoD STARBASE NM students demonstrated gains in both mathematics and language arts that persisted throughout their middle school and high school coursework.

New Mexico boasts one of the most diverse populations in the United States, and as such, is an ideal setting for a DoD STARBASE program. It is essential for our nation to build a STEM workforce that represents a wide spectrum of perspectives, experiences, and expertise in order to remain on the cutting edge of science and technology. DoD STARBASE supports this goal by creating unique opportunities for these students to explore exciting hands-on STEM applications and interact with military and civilian personnel. DoD STARBASE NM is fortunate to have a large group of volunteers interacting with students, teachers and parents. Members of the 377th Air Base Wing, 58th Special Operations Wing, Air Force Research Laboratory, Nuclear Weapons Center, and Sandia National Laboratories have provided an opportunity for students to see the wide range of careers available on a military base. Through these activities, students can envision themselves in new careers, and are motivated to focus on STEM concepts in school. The interactions between volunteers and DoD STARBASE participants help Kirtland AFB build and maintain a strong partnership with our local community.

The United States Air Force and Space Force recognize the importance of K-12 STEM outreach, and will continue to wholeheartedly support DoD STARBASE in its mission to introduce traditionally under-represented groups to the vast opportunities that are open to them through STEM careers. DoD STARBASE evens the playing field for students; it does not matter what neighborhood or community students come from, all student participants are able to explore the same technology and hands-on, minds-on experiences in STEM.

I am honored to lead an organization that places such emphasis on equality, diversity, and meaningful engagement with the generations that will see our organization's research to its ultimate destination—to infinity and beyond!

ERIC J. FELT, Col, USAF
Director, Space Vehicles Directorate
Commander, Phillips Research Site



Students who have positive interactions with STEM professionals are better equipped to make decisions about the role of STEM in their futures, and are more likely to decide to join the workforce supporting our nation's defense."

- Col Eric J. Felt

THE SCHOOL DISTRICT

Students from local school districts surrounding the host military installation participate in the DoD STARBASE program. Schools participating in the DoD STARBASE program in FY 2020 include schools from Title I eligible, public, private, urban, and rural districts (see Table 1).

Table 1: FY 2020 Participating School Demographics⁷

School Type	Number of Schools	Percentage of Total Schools
Title I Eligible	923	78%
Public	1,032	87%
Private	111	9%
Urban	866	73%
Rural	300	25%

As shown in Table 1, DoD STARBASE programs served primarily students from public schools (87 percent) in urban areas (73 percent) with 78 percent of the schools participating with DoD STARBASE meeting Title I requirements. The Title I program provides financial assistance through state educational agencies (SEAs) to local educational agencies (LEAs) and public schools with high numbers or percentages of economically disadvantaged children to help ensure that all children meet challenging state academic content and student academic achievement standards.⁸

School districts enter a formal agreement with the military base hosting the program in order to participate in DoD STARBASE. Accompanied by their classroom teacher, entire elementary classes are transported to their DoD STARBASE location to attend the 25-hour program over five consecutive days or on a weekly basis over five consecutive weeks. As such, DoD STARBASE exposes a richly diverse population of students to content and careers in STEM fields presenting unparalleled opportunities for underrepresented/underserved populations in STEM enrichment. As a result of the school's participation in DoD STARBASE, the school's curriculum is enhanced; students are better prepared for standardized state testing, and they are excited about continued STEM education and STEM careers.

THE COMMUNITY

Public and private organizations support and enhance the DoD STARBASE curriculum and operation. Community leaders may volunteer their time by serving on boards, assisting with gaining access to community facilities, visiting classrooms and/or raising financial support and awareness about the DoD STARBASE program. They also view the program as benefiting the community by promoting better life choices, problem-solving skills, and future job opportunities. Community leaders identify DoD STARBASE as a mechanism to nurture student interest in STEM, facilitate a well-trained STEM workforce and a STEM-literate public, thereby enhancing the future of their communities.

⁷ Numbers shown are for five-day programs and do not include other supplemental programs. Some schools may be counted in more than one category.

⁸ U.S. Department of Education, Office of State Support. (2015). Improving Basic Programs Operated by Local Educational Agencies (Title I, Part A). Retrieved from <https://www2.ed.gov/programs/titleiparta/index.html>.

The Program Elements of DoD STARBASE

The Department of Defense Instruction (DoDI) 1025.7 outlines the guidelines and directives for the DoD STARBASE program. The DoDI covers operational requirements such as budget, desired student grade level, class size, scheduling hours, curriculum guidelines, the desired demographics, documentation requirements, testing, and program location. If a DoD STARBASE director wishes to deviate from the DoDI requirements, he/she must submit a written request to OASD/M&RA. DoD STARBASE directors are required to report on these items annually by obtaining aggregate data on students from the schools participating in the DoD STARBASE program.⁹

DoD STARBASE STUDENTS

GRADE LEVEL

The DoD STARBASE program is authorized to serve students in Kindergarten through 12th grade. Because of the dramatic decline in math and science performance by U.S. students after the 4th grade, the DoD STARBASE curriculum and standards are developed for the 5th grade level. Some locations (20) reported serving students in other grade levels in addition to the 5th grade, but most DoD STARBASE students are 5th graders (97.5 percent).¹⁰ Table 2 shows the number of students at each grade level. The total number of students served in FY 2020 was 56,814, down from 81,062 in FY 2019. This reduction can be attributed to the loss of three-months attendance due to COVID-19 related program closures.

Table 2: Grade Level of FY 2020 DoD STARBASE Students

Grade Level	Number of Students
Kindergarten through 3rd Grade	1
4th Grade	849
5th Grade	55,376
6th Grade	526
7th Grade	34
8th Grade	2
9th Grade and Above	26
Total Number of Students	56,814

⁹ Federal reporting requires aggregate data about all elementary and secondary students be reported to the DoD using one of the seven aggregate reporting categories discussed in the guidance given by the Department of Education (<http://www2.ed.gov/policy/rschstat/guid/raceethnicity/questions.html#elsec>).

¹⁰ The locations serving grades other than the 5th grade are: CA - STARBASE Edwards and STARBASE Los Alamitos, CO - STARBASE Peterson, CT - STARBASE Connecticut - Windsor Locks, GA - STARBASE Savannah, LA - Pelican State STARBASE, MI - STARBASE Alpena and STARBASE One, MN - STARBASE Minnesota - St. Paul, MT - STARBASE Fort Harrison, PR - STARBASE Puerto Rico, TX - STARBASE Kelly, VA - Winchester STARBASE Academy, VT - STARBASE Vermont - South Burlington and STARBASE Vermont - Rutland.

UNDERREPRESENTED/UNDERSERVED IN STEM

DoD STARBASE presents a unique opportunity to expose groups of students that have been historically underrepresented in STEM fields to STEM content and STEM careers. These groups include: Women, Alaskan Natives, Native Americans, Blacks/African Americans, Native Hawaiians or other Pacific Islanders, low income students, students with disabilities, and students that use English as a second language. As stated previously, in FY 2020, DoD STARBASE programs primarily served students from public schools in urban areas. The concentration of students in these areas differs by race and ethnicity. The most recent data from The National Center for Education Statistics (NCES) documents a higher percentage of minority students¹¹ (65 percent) attended schools in the central city with White students attending schools in mostly rural areas (79 percent).¹² Table 3 shows the percentage of students from each of these groups. It should be noted that the “Low Income Students” category fell from 76 percent in FY 2019 to 59 percent in FY 2020. Additionally, the “Students who use English as a second language” category fell from 16 percent in FY 2019 to 12 percent in FY 2020. The rest of the categories were consistent with FY 2019 data. Based on the participation numbers forecast by STARBASE directors, these reductions in participation percentage are most likely due to the COVID-19 school closures that did not allow for full completion of FY 2020 STARBASE programming.

Table 3: Groups Underrepresented/Underserved in STEM

Group	Percentage of Students
Females	49%
American Indians or Alaskan Natives	3%
Blacks/African Americans	24%
Hispanics or Latinos	21%
Native Hawaiians or other Pacific Islanders	1%
Low Income Students	59%
Students with Disabilities	11%
Students who use English as a second language	12%

CLASS SIZE

Smaller class size is particularly important to the inquiry-based instruction used at DoD STARBASE locations. The DoDI requires two DoD STARBASE teachers per class or an average DoD STARBASE instructor-to-student ratio of 1:15, with 20-35 students as acceptable class sizes. The average instructor-to-student ratio for the FY 2020 program year was 1:14, with the average class size for the FY 2020 program year at 25 students. STARBASE Minnesota - St Paul reported an average below 20 students because of the occupancy restrictions of their six small classrooms. At STARBASE Minnesota - St Paul, participating school classes are divided into groups not to exceed 16 students. The highest reported average class size was 35 students at STARBASE Topeka.

Many DoD STARBASE locations have increased their efforts to serve more students by opening additional DoD STARBASE classrooms so that classes may operate simultaneously. Additional DoD STARBASE classrooms allow schools to send more students, using the same transportation, who are then assigned a DoD STARBASE class. Depending on the number

¹¹ Hispanics and Latinos, African Americans, American Indians, Alaska Natives, Native Hawaiians and Pacific Islanders.

¹² National Center for Education Statistics (2007). Status and Trends in the Education of Racial and Ethnic Minorities. Retrieved from https://nces.ed.gov/pubs2007/minoritytrends/tables/table_7_1.asp?referrer=report.

of students arriving from the school, the resulting “DoD STARBASE class” may contain students originating from multiple classrooms. In FY 2020, most (48 DoD STARBASE locations) operated simultaneous classes ranging from two to as many as four. On average, DoD STARBASE locations operate two simultaneous classes. The ability to operate simultaneous classes is dependent upon available space and personnel. DoD STARBASE locations are expected to serve a minimum of 28 classes per classroom and instructor pair each year. Table 4 shows the average number of classes conducted by sites operating one to four simultaneous classrooms.

Table 4: Number of Locations and Classes Served by Number of Classrooms

Number of Classrooms	Number of STARBASE Locations ¹³	Average Number of Classes Served
1	24	22
2	34	36
3	4	70
4	3	89

DoD STARBASE STAFF

EMPLOYMENT AFFILIATION

The DoDI provides general guidelines on staffing models, salary parameters, and position descriptions. The primary employment affiliations are federal, state, and contractor agencies. Employment affiliation is an important consideration for each location. The employee’s affiliation determines his/her salary administration, hiring requirements, benefits, personnel policies and practices, as well as reporting relationships. Federal and state affiliations often provide retirement and health benefits, which increases a location’s personnel costs and uses a greater portion of the location’s operating budget. State affiliations make up 56 percent of the employment relationships, followed by contractor and federal¹⁴ affiliations, which are at 41 percent and 3 percent, respectively.

STAFFING MODEL

The DoDI outlines the prototypical staffing model for a DoD STARBASE location operating a single classroom. It includes broad guidelines on pay scale for each staff position. This model is also the basis for an annual budget for each location. The staffing model includes four full-time paid staff positions: a director, a deputy director/instructor, an instructor, and an office manager/administrative assistant. The suggested pay scale equivalencies of the above positions in the DoDI are GS 12-13, GS 11-12, GS 9-11, and GS 6-9, respectively. Determination of starting salaries is the prerogative of each location. If a location does not meet the DoDI prescribed manning model, the director must submit a written request for a waiver to OASD/M&RA. Of the DoD STARBASE locations, 24 operate a single classroom.¹⁵ Of these 24 locations, 16 also coordinate a DoD STARBASE 2.0 program. Table 5 outlines the staffing profile for full-time and part-time personnel of DoD STARBASE locations with a single classroom.

¹³ CA - STARBASE Vandenberg and FL - STARBASE Patrick were not able to become fully operational because of COVID-19 closures. OR - STARBASE Umatilla is a new program, with initial funding provided at the end of FY 2020. NV - STARBASE Nellis and SC - STARBASE MCAS Beaufort were not operational during FY 2020 due to contractual issues. Both are expected to re-open in FY 2021.

¹⁴ STARBASE Edwards and STARBASE Wright-Patt are the only locations with federal employment affiliations (four and two employees, respectively) in FY 2020.

¹⁵ DoD STARBASE locations that operate a single classroom: AZ - STARBASE Arizona, CA - STARBASE Edwards, CT - STARBASE Connecticut - Waterbury and STARBASE Connecticut - Windsor Locks, GA - STARBASE Savannah, HI - STARBASE Hawaii, KS - STARBASE Kansas City, STARBASE Manhattan, STARBASE Salina, STARBASE Topeka, STARBASE Wichita, LA - Bayou State STARBASE and Pelican State STARBASE, MA - STARBASE Hanscom, MT - STARBASE Fort Harrison and STARBASE Great Falls, ND - STARBASE North Dakota, OK - STARBASE Oklahoma - Burns Flat, OR - STARBASE Kingsley and STARBASE Camp Rilea, SD - STARBASE NOVA Courage, TX - STARBASE Kelly, VT - STARBASE Vermont - Rutland, and WI - STARBASE Wisconsin.

Table 5: FY 2020 Single Classroom Staffing Profile

Position	Number of Staff	Full-Time ¹⁶	Part-Time
Director	24	24	0
Deputy-Director/Instructor	20	20	0
Instructor	32	31	1
Office Manager	16	14	2
Instructional Support	2	0	2
Other	3	1	2
Total	97	90	7

Many locations adjusted the staffing model to support additional classrooms and serve more students and/or support a DoD STARBASE 2.0 program. The most common changes in the staffing model are additions to instructional and support staff to meet the “two instructors per STARBASE classroom” requirement. Some locations restructure the administrative position to include instruction. Other DoD STARBASE locations have made the following adjustments: hire part-time instructors, establish job-sharing positions, consolidate job tasks, limit benefits, eliminate the deputy director position in favor of two instructors, eliminate the administrative position, and/or hire retirees who require fewer benefits. In FY 2020 other instructional support positions included: An Executive Director (IN), DoD STARBASE 2.0 coordinators, teaching assistants, technical assistants, principal oversight, accountants, and project managers. Table 6 shows the staffing profile for full-time and part-time personnel for DoD STARBASE locations operating two to four classrooms simultaneously.

Table 6: FY 2020 Multiple Classroom Staffing Profile

Position	Number of Staff	Full-Time	Part-Time
Director	30	30	0
Deputy-Director/Instructor	34	34	0
Instructor	109	81	28
Office Manager	32	21	11
Instructional Support	43	7	36
Other	27	15	12
Total	275	188	87¹⁷

Tables 5 and 6 also show there are fewer staff directors than DoD STARBASE locations. Some directors manage more than one location, some DoD STARBASE locations are new and have not hired a director yet, and other DoD STARBASE locations are in the process of replacing directors who have left the program.¹⁸

¹⁶ Full time is defined as an employee working more than 125 days per year.

¹⁷ Some part-time positions are shared with other locations.

¹⁸ Directors in Connecticut, North Carolina, Oklahoma, Oregon, South Dakota, and Vermont operate multiple STARBASE locations. The locations in Indiana are under the oversight of an Executive Director.



“ I thoroughly enjoyed speaking with the students at DoD STARBASE and providing them with insight into aviation operations and STEM related activities. I was extremely excited to be able to demonstrate Unmanned Aircraft Systems (UAS) and feel that making learning fun helps spark interest in technical fields. I feel the children greatly benefit from the open discussions with aviation enthusiasts and those who work in aeronautics. These talks allow the STEM fields to become relatable and accessible to those who otherwise would not have been exposed to them. The information they gain opens their eyes to the possibilities and opportunities that lay ahead. The hands-on learning and application of STEM subjects gives the students a better understanding of the world around them and broadens their educational and career horizons.”

- MSGT EVAN BRITTON, AIR FORCE, STARBASE NEW MEXICO

STAFF CHANGES AND DEPARTURES

The majority (60 percent) of DoD STARBASE staff have more than 3 years of DoD STARBASE experience with most (30 percent) in the 3 to 5-year range. Directors and deputy directors have typically worked with DoD STARBASE for over 5 years at 61 percent and 51 percent experience, respectively. The majority of instructors (52 percent) have over 2 years of DoD STARBASE experience with most falling in the 3 to 5-year range. The experience level of office managers has risen to 60 percent with more than 5 years with the STARBASE program. Teaching assistants have the least amount of DoD STARBASE experience with 60 percent in their first or second year. New staff members are typically trained on-the-job. Prior to teaching at DoD STARBASE, new instructors may observe experienced instructors, who often serve as their mentors. Instructors also attend regional workshops for delivery of computer-aided design (CAD) instruction, tablet training, and updates to the DoD STARBASE curriculum.

There was a 23 percent decrease from FY 2019 in the number of employees leaving the STARBASE program (62 employees) with 48 staff departures in FY 2020. The majority (27 departures) were at the instructor level. Teaching Assistants/Classroom Aides were the next highest at nine departures followed by “other” positions with eight departures. The overall turnover rate in FY 2020 was 13 percent. Directors reported the most common reasons given from staff members leaving the DoD STARBASE program were: better opportunity at another academic institution (25 percent), relocation (25 percent), personal (21 percent), returning to school (10 percent), and retirement (10 percent). Four employees (8 percent) were terminated from the program.



“*...once I began working in closer proximity to the classroom, I became hyperaware of the demographics being served by this program, at least here in Tucson. What this means to me, as a female, Hispanic Airman, I recognize that for many students I represent an image or portrayal of a lifestyle that many students may not have exposure to. I believe that having positive interactions with our STARBASE students is helpful in broadening their horizons regarding career paths that they may not have considered before. For some of these students, the fact that I am an Airman and visually representative of their ethnic community, I think this opens possibilities for them that they may not have previously considered. Furthermore, these students are able to interact with many Airmen that also come from very diverse backgrounds, which is beneficial in shaping their world view at an impressionable age. Overall, I believe STARBASE is an awesome program that encourages our future leaders to explore, dream, and create in a supportive and dynamic environment!*”

- MSgt YVETTE MORALES, AIR FORCE, STARBASE ARIZONA

VOLUNTEERS AND MILITARY SUPPORT

Volunteers are an essential participant group in the DoD STARBASE program. They serve as presenters, board members, advisors, tour guides, instructor aides, and perform a wide variety of daily support services. Volunteers include teachers, parents, and community leaders. All locations reported using volunteers.

The DoD STARBASE locations documented a total of 6,685 volunteers who contributed a total of 86,761 hours, worth an estimated \$2,164,556¹⁹ contribution, to the program during FY 2020 (see Table 7). Parents account for the greatest number of volunteers, followed by teachers. Teachers participate in the DoD STARBASE program along with their students. Teachers and school personnel provide instructional support to the DoD STARBASE classroom and gain valuable classroom techniques that can be applied to activity-based education. It is estimated that teachers provided a volunteer value of \$1,449,689 to the program in FY 2020. The amount of time donated by this field of experts (over 58,000 hours) is a testament to the schools' commitment and support of the DoD STARBASE program.

Military personnel who support the DoD STARBASE program inspire students' interest and community engagement with linkages between education and application. They may serve as guest lecturers to explain the use of STEM in different careers and/or act as base tour guides highlighting the use of STEM concepts in their missions and giving students access to military facilities and operations. Military personnel share unique, informative, and highly varied experiences with the students, which provide an exciting, stimulating environment to enhance their STEM experience. DoD STARBASE directors reported 10,278 hours of support by 1,931 military personnel with an additional 992 hours of support by 235 DoD Science and Engineering personnel.

Table 7: FY 2020 Volunteer Participation

	Volunteers	Hours	Value
Teachers/School Personnel	2,900	58,157	\$1,449,689
Parents	3,275	23,416	\$577,303
Community/Other ²⁰	510	5,188	\$137,564

OUTREACH

Many DoD STARBASE locations provide resources and training to local teachers. Of the 70 locations, 19 locations provided training to local teachers in FY 2020. At the DoD STARBASE locations that offer teacher training, 72 percent of the teachers may use this training towards their certification requirements. The most common types of teacher training include continuing education workshops and experiential training for student teachers.

Students may attend DoD STARBASE at the 5th grade level, as well as participate in other outreach programs that are available in their area at other grade levels. OASD/M&RA encourages DoD STARBASE locations to connect with other local outreach organizations to create an inventory of STEM programs to share with schools, teachers, and students. Directors from 40 of the 70 DoD STARBASE locations report that they have relationships with a wide variety of local and national outreach programs in their area to include: FIRST LEGO League, FIRST Robotics, Civil Air Patrol, Team America Rocketry Challenge, Girl Scouts, and Scouts BSA. In addition, the DoD STARBASE location may coordinate a DoD STARBASE 2.0 program at the middle school level.

¹⁹ The value of volunteer time presented here is the average wage of non-management, non-agricultural workers by state found at: https://www.independentsector.org/volunteer_time. FY 2018 rates were used. At the time of this report, referenced site had not yet updated data due to COVID-19 closures.

²⁰ Other volunteers include STEM groups, firefighters, board members, etc.



A LETTER OF SUPPORT FROM DoD STARBASE GRADUATE: EDWARD WESTERBAND



As the son of a science teacher, I grew up with a natural interest in science and discovery; maybe it was my mother's influence on me or just an inclination to understand the natural world and the rules that govern it.

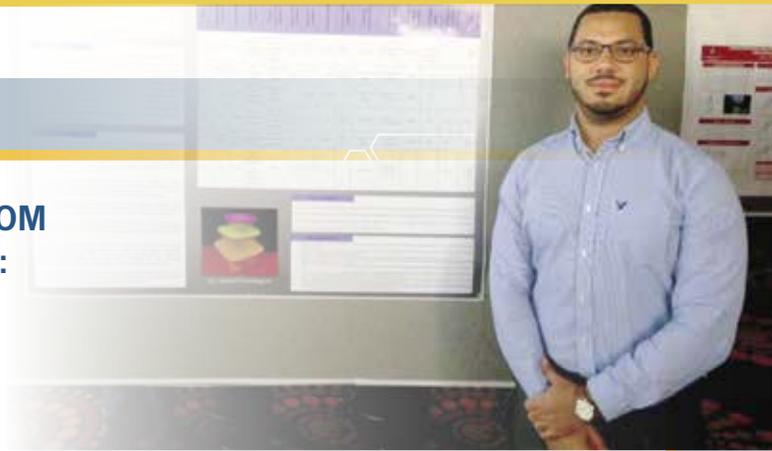
Regardless of the origin of my passion for science, today I understand the impact that a teacher can make on a kid's life, like my mother did to thousands of students who passed through her classroom. STARBASE Puerto Rico was one of those "teachers" that positively impacted my academic and professional career. Even though STARBASE is not an educational institution, its goal is the same and the impact transcends beyond the program.

As a 12-year-old middle schooler back in 2005, I was unaware of what to expect once I entered STARBASE facilities, but by the look of the airplane monuments, I knew it was going to be a great experience. We were all new students to our school (Bilingual School Padre Rufo), and STARBASE gave us the space and time to make new friends and strengthen our relationships with each other while learning amazing things; until the point that today, 15 years



“STARBASE Puerto Rico was one of those ‘teachers’ that positively impacted my academic and professional career.”

- EDWARD WESTERBAND



later, some of us still remember the good moments that we had during the program.

It is well known that hands-on activities boost the students' attention and learning. STARBASE took good advantage of this. Definitely, some of my favorite activities during the program involved interacting or creating some type of device or object with the main purpose of conceptualizing an idea. Some of us who participated in the program ended up being engineers, where hands-on skill is fundamental. STARBASE shaped my interest in science by giving me more appetite for learning, discovering, and adventuring.

Today, 15 years later, I am a living example of how programs like STARBASE can impact the future generations, especially the minority population in the Science, Technology, Engineering, and Mathematics (STEM) field. Years later after participating in the program, I was accepted into the Polytechnic University of Puerto Rico-School of Engineering, performed undergraduate research in China and California, obtained an Environmental Engineering bachelor degree, was a graduate Research Assistant (RA) at the University of Wisconsin-Madison, published three scientific papers as first author and a research thesis, did volunteer engineering work in Guatemala, obtained a Master's degree in Environmental Engineering, and I'm currently performing as environmental remediation engineer for a global firm.

Through this letter, I want to thank STARBASE Puerto Rico and also to encourage the support and funding for this type of program, especially for minority communities. Not only do the students benefit from STEM educational programs, but the entire nation too by creating generations of discoverers, thinkers, innovators, and most importantly selfless members of society.

DoD STARBASE 2.0 Program

2.0 PROGRAM ELEMENTS

DoD STARBASE 2.0 is a STEM-based extracurricular program that is based at a collaborating school site.²¹ The objective is to serve students typically at the middle school level in STEM areas beyond their initial DoD STARBASE experience. The program was introduced in 2010 and has since expanded to 25 states. Initially identified as a “mentoring” program, STARBASE 2.0 has evolved as an initiative more focused on STEM coaching, and the terminology was changed to reflect the refined approach. In FY 2020, 2.0 programs were organized by 50 DoD STARBASE locations who reported coordination of 107 DoD STARBASE 2.0 programs. The completion of many of these programs was, however, adversely impacted by COVID-19 related school closures (see “Participants” section below). Throughout FY 2020, directors of the 50 locations were interviewed during site visitations and surveyed to obtain data on program requirements, participants, curriculum, staff, and funding to help determine the overall operational status of the DoD STARBASE 2.0 program.

PROGRAM REQUIREMENTS

DoD STARBASE 2.0 is a unique school-based extracurricular program that targets at-risk 6th to 8th graders. The program takes place in partnering schools that have expressed the desire for additional DoD STARBASE program resources. As with other school-based coaching/mentoring programs, DoD STARBASE 2.0 is highly structured and intends to help support school goals, provide safe environments for students, and improve student-teacher relationships. Basic program requirements are outlined in the DoD STARBASE 2.0 Program Guide. The guide lists expectations for the partnering school, participant eligibility, and the STEM Mentor Coordinator position. The basic guidelines are:

- DoD STARBASE 2.0 meetings are held at a school.
- There is ample space for meetings.
- Meetings are typically held after school hours.
- Parking is provided for coaches.
- A nutritional snack is provided for the students.
- The students are typically in 6th, 7th, and/or 8th grades.

PARTICIPANTS

In FY 2020, school districts and schools partnered with DoD STARBASE at 99 school locations to operate 132 STARBASE 2.0 clubs. Because of school closures starting in March 2020 due to the COVID-19 pandemic, only 67 clubs were able to complete their full 2.0 program. Seven STARBASE 2.0 programs were set to begin in March 2020 but were never able to launch.²² The number of DoD STARBASE sites (50) electing to coordinate a 2.0 program increased by two, and the number of school-based operating locations increased by 7 percent. Many of the FY 2020 DoD STARBASE 2.0 students were former DoD STARBASE students (38 percent). While most participants were male (57 percent), that number has dropped by 3 percent over the past two years, which could be as a result of efforts to include more girls in programs for underserved groups. The average club size was 16 students. In FY 2020, the DoD STARBASE 2.0 program served 2,877 student participants, up 11 percent from FY 2019 in spite of program cancellations. For those locations able to complete their 2.0 programs, the retention rate was up slightly at 83 percent from 81 percent in FY 2019. Directors reported several reasons why students discontinued the program. Relocation, time conflicts, and lack of interest in the chosen curriculum were cited as the main reasons why students drop from the program.

²¹ In FY 2020, DoD STARBASE 2.0 programs were offered in Alabama, California, Connecticut, Georgia, Indiana, Kansas, Louisiana, Massachusetts, Michigan, Minnesota, Montana, New Mexico, North Carolina, Ohio, Oklahoma, Oregon, Puerto Rico, South Carolina, South Dakota, Texas, Utah, Vermont, Virginia, and West Virginia.

²² STARBASE 2.0 Clubs in CA - Sacramento, OR - Rilea and Portland, SD - Rapid City and Sioux Falls, VT - South Burlington and WV - Charleston were not able to begin their programs due to COVID-19 school closures.

2.0 CURRICULUM

Over the course of three to five months, DoD STARBASE 2.0 students work with a STEM coach on a team project at their school during club meetings. The outcomes for students participating in DoD STARBASE 2.0 are as follows:

- Increased STEM interest and knowledge
- Reduced high-risk behavior
- Increased engagement with school
- Increased STEM career awareness

Program locations use a variety of different team projects to achieve these goals. STEM projects include: Scalextrics, robotics, rocketry, engineering, physics, FIRST LEGO League, solar cars, chemistry, technology, and aerospace. Several programs culminate with some sort of related competition, such as FIRST LEGO League competitions and Team America Rocketry Challenge.²³

STAFF

STEM COACH COORDINATOR

DoD STARBASE 2.0 is primarily a volunteer program. The participation of volunteer STEM coaches and volunteer classroom teachers is coordinated by a designated DoD STARBASE STEM Coach Coordinator. This is typically a part-time position, and many programs choose to identify the STEM Coach Coordinator in-house with their existing DoD STARBASE director, deputy director, program instructor, or office manager taking on the additional responsibilities. If hiring in-house is not possible, candidates are recruited from the partnering school or community. The duties of the STEM Coach Coordinator play an invaluable role in the success of DoD STARBASE 2.0. The responsibilities of the STEM Coach Coordinator include:

- Marketing the program
- Managing relationships with schools
- Recruiting and screening program volunteers
- Managing volunteer STEM coaches
- Coordinating and delivering volunteer training
- Tracking data
- Supporting and motivating program volunteers
- Selecting program curriculum

STEM COACHES

STEM Coaches play a vital role in the success of the participants and the STARBASE 2.0 program as accessible examples of successful STEM professionals. Serial engagements with professionals in STEM careers allow students to network with someone experienced in the field and to envision pathways for themselves to pursue those careers. Additionally, STEM coaching can be a powerful experience for STEM professionals, building communication skills and connecting them to their community.

²³ FIRST LEGO League is a global competition in which elementary and middle-school students build LEGO-based robots to complete tasks on a thematic playing surface. The Team America Rocketry Challenge (TARC) is an annual American model rocketry competition for students in 7th -12th grades in which they design, build, and launch a rocket with specific characteristics.

The ideal STEM coaching team consists of a lead STEM Coach, representatives from local STEM industries, college students, and members of the military. To serve as a DoD STARBASE 2.0 STEM coach, volunteers must meet the following minimum requirements:

- Be at least 18 years of age
- Successfully pass coach screening/background check
- Volunteer approximately six hours per month through the club duration

The 610 coaches who participated in the 2.0 program during FY 2020 came from a variety of STEM professions and included military, non-military, DoD professionals, industry professionals, and college students (see Table 8). Working with a coach, participating students are exposed to the lifelong benefits of higher education and a career in a STEM-related field. They may also receive guidance about educational and career options. In spite of the impact of COVID-19 on STARBASE 2.0 programs, the number of participating coaches increased from FY 2020 by 6 percent with the largest increases in the DoD Science and Engineering, College Student, and Host School Staff Member categories. The coach-to-student ratio was reported as 1:4 or less at 27 of the 51 participating STARBASE locations.

Table 8: STEM Coach Types

Type	Number of Coaches
Military	80
DoD Science and Engineering	56
Non-Military, DoD Professionals	14
Industry Professionals	37
College Students	39
STARBASE Staff Members	133
Host School Staff Members	214
Other ²⁴	37
Total Number of Coaches	610

FUNDING

The DoD STARBASE 2.0 programs operate through a combination of federal and private funds.²⁵ Of the 51 DoD STARBASE locations coordinating a 2.0 program, 59 percent operate solely using their federal DoD STARBASE funds. The remaining 41 percent receive funding from combinations of federal and private funds.

²⁴ Other types of coaches include high school students, parents, and police officers.

²⁵ Private funds include not-for-profit, donations, grants, and host school contributions.

A LETTER OF SUPPORT FROM JACOB GROSEK, PH.D., DR-02



DEPARTMENT OF THE AIR FORCE

AIR FORCE RESEARCH LABORATORY
WRIGHT-PATTERSON AIR FORCE BASE OHIO



12 October 2020

Jacob Grosek, Ph.D., DR-02
Computational Physicist
Air Force Research Laboratory, Directed Energy Directorate, Laser Division
3550 Aberdeen Ave SE
Albuquerque, NM 87117-5776

Mr. Michael O'Toole
Director of Civil-Military Programs, National STARBASE Program Lead Office
of the Assistant Secretary of Defense for Manpower and Reserve Affairs

Dear Mr. O'Toole,

It is my pleasure to have this opportunity to express my support for the Department of Defense STARBASE program. I have enjoyed being a mentor for STARBASE 2.0 project in the Albuquerque, New Mexico, region since the 2014-2015 school year. I know that the STARBASE program is having a positive impact on our community. It provides an exciting, yet challenging, introductory experience in building essential skills for a career in the STEM fields.

Each year starts with the reticence of students who have never built a model rocket before, and are intimidated by the opportunity to compete at a national level against other teams that may be much older and more experienced. With their first rocket, they learn that the build quality directly affects the flight performance in very salient ways. They are also exposed to a new software tool that helps them design the model rocket and predict its performance. This software program also shows the uncertainty in results due to environmental factors like wind, temperature, altitude, and humidity. However, the students also experience the interplay that must occur between the computer model and real-life testing, where lesser understood parameter values like the coefficient-of-drag or final rocket and payload mass are tuned in the model to align with their measurements and flight results. The computer model and real-world testing reveal that there are multiple avenues for resolving any single issue, and they must explore this solution space. Furthermore, the students must learn to adapt to the given circumstances, including how the weather changes from week to week, or finding out on launch day that the motor does not quite fit into its mount because one, or both, parts are out of specification.

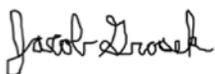
The students are asked to maintain a journal that documents their rocket designs, their daily progress, launch conditions and results, and any alterations made to tune their performance. Though middle school students are not usually excited about documentation, they eventually learn that the journal helps them recall where they left off the week before, what were the consequences of their past choices, and to bring team members up-to-speed if they missed a session. It is a basis for their team collaboration, and a measure of progress for achieving their project goals.

As the year progresses, the students transition from relying on their mentors and teachers and begin to take charge of the project. Many students naturally start to take on leadership roles, becoming their team's expert over a few tasks and helping their fellow team members accomplish other tasks or resolve issues. Soon they are confidently telling you, the mentor, what the next steps are or how to best fold and pack parachutes or why their modifications will result in a better flight. There is a noticeable improvement throughout the year in the students' ability to communicate with their peers and with their mentors, providing better explanations and arguments to support their ideas, proposed solutions, and methodologies.

Without necessarily recognizing it, the students are developing foundational proficiencies that engineers, scientists, and technicians utilize daily. Most all projects are accomplished by teams, rather than individuals, and the STARBASE program has students work in collaborative groups that draw upon the creativity and unique talents of each participant. No one starts as a complete expert, knowing the solutions ahead of time. In reality, success in any STEM field demands that one is constantly learning, remaining versatile in dealing with ever-changing requirements, and having patience, persistence, and confidence in problem-solving. And, maybe most importantly, I've seen students start to enjoy the process rather than be discouraged by each set-back that they face.

I'm excited for the new challenges that we will encounter in this next school year as we transition the STARBASE program to something completely different and suited to the coronavirus restrictions and social distancing mandates. I hope our efforts will be an example for the students on how STEM field participants and educators use their skills to acclimate to and accommodate new circumstances. I know that the STARBASE program will continue to cultivate excitement and competency in the STEM fields for the youth in our community.

Sincerely,



JACOB GROSEK, PH.D., DR-02 Computational Physicist



The DoD STARBASE Curriculum

Today's DoD STARBASE STEM curriculum is standardized, cutting-edge, research-based instruction that meets national educational standards and ensures a qualitative assessment of curriculum outcomes. Curriculum development is aligned with the concepts presented by the Executive Office of the President of the United States. It also supports the Federal STEM Education goal to improve STEM instruction. As such, the DoD STARBASE curriculum is designed to increase the students' involvement and interest in STEM activities, enhance their understanding of the role that STEM literacy plays in their lives, strengthen potential for future careers, and make the pursuit of STEM activities more attractive and accessible. It also contains the presentation of accurate scientific information, which promotes the development of STEM skills, knowledge, and practices, thereby supporting the federal goals of a learning investment. According to the Executive Office of the President, "Basic STEM concepts are best learned at an early age – in elementary and secondary school – because they are the essential prerequisites to career technical training, to advanced college-level and graduate study."²⁶

The 36 learning objectives are clearly outlined for each of the curriculum's STEM categories, which are consistent with National Science Education Standards.²⁷ The DoD STARBASE curriculum engages students with a rigorous, "hands-on, minds-on" STEM lessons. STEM is intertwined in standardized lesson plan activities and experiments to address real-world issues. Students work in teams simulating a workplace environment. Students find the learning meaningful and inspiring. For example, while studying the engineering design process, students design and create items with 3-D computer-assisted technology. The student summative assessment tool is applied pre- and post-program to determine if the learning objectives have been met.

There are four basic types of lesson plans that are used to teach DoD STARBASE learning objectives:

1. **Parent lesson plans** provide the introductory background, instructional strategies, and materials required to teach the overall concepts of the curriculum objective. These are used in conjunction with lesson plan appendices.
2. **Appendix lesson plans** offer a choice of activities that provide students "hands-on, minds-on" opportunities to understand the introductory material presented in the parent lesson plan. Instructors teach the parent lesson plan and then choose one of the approved appendices to complete the lesson. This allows DoD STARBASE instructors to differentiate their approach to teaching the learning objective.
3. **Activity Station lesson plans** are intended to give students multiple activities to strengthen their understanding of the learning objective. These inquiry-based stations are generally short, and in most cases, a number of stations are taught in conjunction with a curriculum segment.
4. **Stand-Alone lesson plans** are complete, self-contained documents that fully address the stated components of the curriculum objective. They contain the necessary background information, instructional guidance, and support criteria to meet the requirements for the objective.

STARBASE utilizes a rigorous process to expand and enhance the DoD STARBASE curriculum offerings. DoD STARBASE directors and instructors may choose from multiple approved lesson plans to teach the required 36 objectives. Directors are asked to create a schedule outlining the lessons they have chosen to teach. The schedule also includes any time spent on academy management, student breaks, lunch, and graduation to give an accurate portrayal of how students spend their days at each DoD STARBASE location. Curriculum schedules are submitted annually with the Directors' Questionnaire and are verified and validated during visitations by the evaluation team.

²⁶ Executive Office of the President of United States, "Charting a Course for Success: America's Strategy for STEM Education, Report by The Committee on STEM Education of the National Science and Technology Council," December 2018. Executive Summary, page v.

²⁷ Karen S. Hollweg and David Hill, Editors, "Steering Committee on Taking Stock of The National Science Education Standards: The Research, Committee of Science Education K-12, National Research Council." ISBN: 0-309-50749-9, Appendix D pages 31-33.

CURRICULUM DELIVERY DURING THE COVID-19 PANDEMIC

The impact of the COVID-19 virus was felt differently at each DoD STARBASE location. Resuming STARBASE classes was subject to the variations in the approaches taken by participating schools and educational partners. In August, each STARBASE academy was asked to report on what options they would be using to re-start for the 2020-2021 school year. Guidance provided by OASD/M&RA included the following approaches.

Option 1 – Normal Operations/Business as Usual. The first option was to resume on-site, normal operations with considerations for the implementation of CDC recommended safety precautions, i.e. hand washing, hand sanitizing, PPE, compliance to social distancing, more frequent janitorial and cleaning of all surfaces, etc. This option was basically business as usual with regards to class size, staffing, busing, etc. The difference being that the STARBASE staff takes extensive safety precautions to meet the requirements of the participating schools.

Option 2 – Modified On-Site Classes. The second option was to reduce class size (meet or exceed the 6-foot social distancing requirement) with all of the above considerations but still require students to come to the DoD STARBASE site. Each program would still provide the 25-hour approved curriculum with the understanding that waivers from OASD/M&RA for the total number of classes, number of students served, or program hours may be necessary.

Option 3 – STARBASE-On-Wheels. Under the STARBASE-On-Wheels option, instructors would travel to the school site for program delivery, bringing equipment and supplies with them and provide whatever portion of the 25-hour approved curriculum is possible given the constraints of not being at the STARBASE site. Supplementary STEM lessons were authorized in this scenario. Instructors would take extensive safety precautions to meet the requirements of the participating schools. Waivers would be provided for total number of classes, number of students served, or program hours, as necessary.

Virtual Instruction. Virtual instruction would be considered only as a last resort when no other option was available. Prior approval would be required by OASD/M&RA.

Each STARBASE location was contacted via teleconference in August 2020 to discuss and determine the way forward for the upcoming school year. This included discussion of the safety measures and protocols to be put in place to meet CDC guidelines and/or the requirements of the schools/district/host command served. These efforts will be reported and documented in the FY 2021 DoD STARBASE Annual Report.

“**STARBASE is the best field trip I have ever had. I got to see lots of planes, do all kinds of experiments like tornado tubes, making marshmallow space cadets, and trying to save Eggbert. We launched rockets and learned a lot about Isaac Newton. I really learned a lot this week but didn't realize it until our flight won Jeopardy. It was tense but exciting. I would recommend STARBASE to anyone, because I had a great time.**”

- NATALIE LUYAMO, STUDENT AT CLARKDALE ELEMENTARY SCHOOL, ATTENDING PEACH STATE STARBASE



Program Oversight

COMPLIANCE

The Office of the Assistant Secretary of Defense (OASD) for Manpower and Reserve Affairs (M&RA) has the overall responsibility for the management of the DoD STARBASE program. The Department of Defense Instruction (DoDI) 1025.7 provides the policies and procedures that guide the current DoD STARBASE academies. The DoDI directs the locations on operational requirements such as the number of classes, classroom hours, student numbers, target student population, participant eligibility, program site location for instruction, core curriculum, and the frequency of fiscal and property audits, and reporting requirements.

COMPLIANCE PROCEDURES

A compliance program was designed and developed to ensure that the DoD STARBASE academies adhere to the DoDI requirements as well as administrative directions and reporting requirements. The program is reviewed and adjusted annually based on OASD/M&RA guidelines and is comprised of three progressive levels of program and organizational performance. Each level has a prescribed set of activities that range from obtaining adherence to the DoDI requirements that guide basic operating procedures and full installation of program delivery (Level I); to obtaining desirable operating outcomes, key planning strategies, and managerial efficiencies (Level II); and lastly, to exhibit advanced strategic program linkages and downstream relationships for promoting a continuum of student skills and abilities in STEM-related activities (Level III). The following sections outline details of the performance assessment system.

For each DoD STARBASE location, the assessment system requires the attainment of each of the objectives at each level and their maintenance and sustainability over time to retain their status level. Performance level is determined through site visitations, academy reporting requirements, and periodic surveys using detailed criteria that is established and reviewed annually by OASD/M&RA and the evaluation team. Shortfalls or non-compliance in required activities are usually handled through a corrective action plan agreed upon by the participants and OASD/M&RA. In most cases, these corrective action plans are short-term and successfully obtained. The attainment of the performance level under review is held in abeyance until the corrective action requirements are completed and verified.

The assessment system ensures that the academy can advance to higher levels of performance only after it successfully attains a positive assessment at the prior level (i.e., an academy must meet all required activities at Level I before it can claim any activities at Level II and so on). While an academy program could move towards and complete an activity at another level, the program would not be reviewed for acceptance until the prior level had been successfully achieved.

The successful attainment of these levels of performance provides OASD/M&RA and the military service representatives a way to determine the efficacy of the program. The system also distinguishes and identifies those locations that operate at higher levels of performance to their sponsors and participant groups, the local community, the target group of students, the school systems, and military sponsors.

“ STARBASE has the ability to inspire our children in the classroom, and then show them how the lessons apply to real, fun, and exciting careers. This bridge, coupled with the amazing skills and enthusiasm of the instructors, provides kids with hope and direction for their futures.”

- CW2 NICK HEMEN, ARMY NATIONAL GUARD, STARBASE RAPID CITY



PERFORMANCE LEVEL DESCRIPTIONS

LEVEL I: THE BASIC/FULLY OPERATING LOCATION

Level I criteria includes all DoDI requirements and operating guidelines stipulated by OASD/M&RA. This incorporates required program activities such as student numbers, classroom hours, installation of core curriculum content, military-base program delivery, emphasis on target student population, required documentation (i.e., MOU's, student waivers, etc.), reporting requirements, and a number of administrative responsibilities such as written waivers, building accessibility, testing samples, teacher assessment, etc.

LEVEL II: THE ADVANCED PERFORMING LOCATION

The second level of performance requires attainment of Level I status and success with a set of defined operational, planning, and managerial upgrades, fiscal program operations, and the successful installation and maintenance of a DoD STARBASE 2.0 program. These are organizational and administrative requirements set up by OASD/M&RA to obtain program delivery efficiencies and operational effectiveness.

These requirements include, but are not exclusive to, participant group involvement; program enhancements; STEM program inventories and an assessment of potential fit that enhances student participation in further skill development; budget management planning and review; public relations planning; personnel management plans; equipment status assessment; "children-at-risk" review; staff development/personnel plans; transfer of leadership plans (i.e., succession plans); management resource manuals; and several other considerations that upgrade program management and operating performance.

LEVEL III: THE HIGH PERFORMING LOCATION

Academies must achieve Level I and II status levels before they can be assessed at Level III. Level III requires maintenance of Level I and II for two evaluation cycles (six years) and the development of an activity, or set of activities, that significantly advances the DoD STARBASE program vision and mission.

Operational and program enhancements, higher-level problem-solving techniques, time-sensitive improvements, and efficiencies in operations could be included in the assessment of Level III activities if they are of significant magnitude. High priority activities are those that promote the welfare and STEM skill/abilities of the student population, demonstrate program sustainability, provide transportability to other locations, and have the ability to be installed and operable within an 18-to-24 month period.

The validation of the program's installation and sustainability, as well as the operational potential for transportability, would be reviewed by the evaluation team for approval by OASD/M&RA.

Each of the above performance levels are reviewed on an ongoing basis for location-wide application, appropriate-level designation, the typical period in which they can be successfully attained, and the ability for downstream sustainability. As collaborations and newly established operations are introduced, the academy performance level review process is expected to be refined and expanded.

COMPLIANCE ADHERENCE

Seventeen of the 27 scheduled FY 2020 visitations focused primarily on Level I compliance. This included six periodic Level I evaluations, nine new director orientations, and two Level I follow-up visits. In addition, there were eight Level II evaluations that included Level I follow-up and three locations that were evaluated for specific operational issues. No STARBASE programs were eligible for Level III consideration in FY 2020. Due to COVID-19 related travel restrictions, 16 of the 27 evaluations were accomplished virtually via email, phone calls, electronic submission of documents, and on-line meetings.

The Level I visitation is conducted on a three-year cycle, regardless of performance level, to confirm basic compliance with program requirements. This visitation involves a two-to-three day review of documents, audits, fiscal reports, classroom observation, and structured interviews with staff, school administration, sponsor groups, not-for-profit board members (if appropriate), and members from other participant groups. At the conclusion of the visit, a meeting is conducted with the commanding officer hosting the program and the DoD STARBASE director to review the preliminary results of the compliance visit and to discuss if any corrective action is required. A plan-of-action is developed, and a schedule for completion is mutually agreed upon. A written report is then sent to the OASD/M&RA program manager upon completion of the visitation. OASD/M&RA may discuss the key points of the report with the director and/or the commanding officer. A written summary of progress, made by the DoD STARBASE director, is sent to OASD/M&RA as corrective action tasks are completed, and copies may be forwarded to sponsors and military service representatives. In some instances, a follow-up visit is recommended for the following year by the evaluation team to document that corrective action has been taken and provide assistance in obtaining Level I performance.

Newly established academies (or existing sites with a new DoD STARBASE director) may receive an orientation visitation to outline DoDI requirements and document Level I compliance. As indicated above, nine new director orientation visits were conducted in FY 2020.²⁸ The director and staff are briefed and provided information and materials on best practices, testing administration, reporting schedules, documentation, performance expectations, and protocols. This time is also used to answer any questions and concerns the staff and sponsors may have.

The non-compliant activities most commonly noted are primarily technical in nature. They include lack of timely responses to periodic and required reporting schedules; lack of local financial and property audits within the required three-year period and/or documented requests by the academy to have them conducted by the appropriate local base agency; incomplete documentation and/or lack of a written request for modification to OASD/M&RA for exceptions to DoDI 1025.7 requirements; and incomplete implementation of the core curriculum. Given the number and scope of activities, the number of incidents is small and involves only a few academies. Overall, most locations met compliance requirements. A small number of locations face challenges in obtaining student numbers, hours of instruction, audit schedules and completions, and meeting reporting requirements in a timely fashion.

Level II visitations build upon Level I program responsibilities and also include evaluation of any DoD STARBASE 2.0 program activities. If a location has a 2.0 program, the evaluator attends and observes a club meeting, interviews school staff and mentors and examines the execution/recordkeeping of the program in accordance with compliance guidelines. An orientation to the purpose and establishment of a 2.0 program is provided for those fully compliant Level I programs who have not yet started any 2.0 activities.

No STARBASE locations were eligible for “Level III - High Performing DoD STARBASE Academy” designation in FY 2020. Past academy performance for all other DoD STARBASE locations will continue to be reviewed on an annual basis to determine future eligibility for Level III consideration/designation.

²⁸ Orientation visits were conducted at: CA - STARBASE Vandenberg, CT - STARBASE Connecticut, FL - STARBASE Patrick, KS - STARBASE Wichita, LA - STARBASE Louisiana, NV - STARBASE Nellis, OK - STARBASE Tulsa, and UT - STARBASE Hill. A new director orientation was scheduled for SC - STARBASE MCAS Beaufort, but the site ceased operations before the visit could be scheduled.



A LETTER OF SUPPORT FROM DoD STARBASE GRADUATE: BRIDGET BYQUIST, MD, MPH

Dear STARBASE Salina,

I grew up in Salina, Kansas, and I always had an interest in science, medicine, aviation, and spaceflight. I read everything I could get my hands on about the subjects and loved visiting science museums and the Kansas Cosmosphere. The summer after I was in fourth grade, I had the opportunity to attend STARBASE summer academy. I loved learning about the principles of flight, building rockets, learning about and seeing Black Hawk helicopters, and meeting pilots from the Kansas National Guard. I enjoyed STARBASE so much that I attended the summer academy again the next year. STARBASE helped me realize that I needed to pursue a career related to science and technology, although I wasn't exactly sure what I wanted to do yet.

Following graduation from high school and college, I decided to attend medical school. While in medical school, I realized that I loved the thrill of helping to stabilize critically ill patients in the emergency department and pre-hospital settings. After I graduated from the University of Oklahoma College of Medicine, I completed residency in emergency medicine at East Carolina University in Greenville, North Carolina. While in residency, I had the opportunity to learn more about pre-hospital medicine and flight medicine. I was able to fly with EMS crews transferring unstable patients by helicopter and provide online medical control by radio to helicopter crews. I also had the opportunity to conduct pre-hospital medicine research about layperson use of tourniquets to control bleeding and present my research at the National EMS Physicians conference.

Today, I am an emergency physician in Wichita, Kansas. I am still fascinated by aviation and spaceflight and I hope to have more opportunities to be involved with flight medicine and space medicine in the future. My dream career is to be a physician astronaut with NASA. I credit STARBASE with helping me discover the broad array of possible careers in science and technology that led me to where I am today.

BRIDGET BYQUIST, MD, MPH



“ I credit STARBASE with helping me discover the broad array of possible careers in science and technology that led me to where I am today.”

- BRIDGET BYQUIST

Fiscal Analysis

A congressional appropriation to the Department of Defense (DoD) funds the operation of DoD STARBASE. The Office of the Assistant Secretary of Defense for Manpower and Reserve Affairs (M&RA) oversees the program and distributes funding. In FY 2020, the total program budget was \$35,000,000, an increase from the \$30,000,000 allocated in FY 2019. This increase funded the start-up of three new program sites and modest plus-ups to individual program budgets that had been held at the same level for the past seven years. As such, it allowed for much needed upgrades to classroom technology in the form of new computers/tablets, the addition of staff to increase program capacity and other overall program improvements. During FY 2020, OASD/M&RA allocated \$31,605,458 to program operations. The remainder of the appropriation was used for assessment activities, staff development and training programs, and overall program design and development activities.

In FY 2020, the median operating cost per location was \$415,750. Several factors contribute to the cost variances, including geographic location, number of operational classrooms, type and number of outreach programs, salary and benefit schedules and number of employees. OASD/M&RA annually reviews each location's budget to maintain an equitable distribution of funds.



Today more than ever, getting young students interested in and more confident with STEM-related careers is vital to our state and our nation as we move into the increasingly high tech and complex reality of our future. With its hands-on, engaging STEM lessons, STARBASE is the perfect tool to get students to see the relevance and the 'cool factor' to a career in STEM!"

- BRIGADIER GENERAL (RET) WALTER MERCER,
WINCHESTER STARBASE ACADEMY

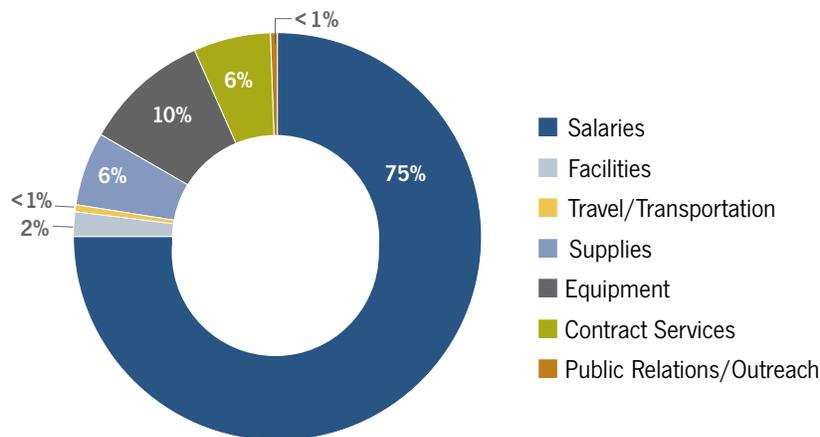
The operation of simultaneous classrooms requires duplicate equipment, supplies, and staff. Many DoD STARBASE locations offset these expenses by sharing equipment between classrooms and hiring seasonal and/or part-time instructional staff. These offsets keep staff costs down to an average of 73 percent of their operating budget. Operating costs per operational classrooms are given in Table 9.

Table 9: Operating Costs Per Operational Classroom

Classrooms	Median	Range	Average Staff Costs
1	\$380,000	\$172,600 - \$502,250	\$256,424
2	\$429,500	\$267,750 - \$1,006,000	\$325,964
3	\$674,500	\$500,000 - \$965,000	\$541,947
4	\$675,000	\$660,000 - \$1,059,000	\$573,120

Overall expenditures of DoD STARBASE funds allocated to each program site are shown in Figure 1. Staff costs, on average, account for 75 percent of the site budget followed by equipment (10 percent), supplies (6 percent), and contract services (6 percent). Also shown are costs for facilities at 2 percent. Travel/transportation and public relations expenditures were less than 1 percent each. Travel and transportation costs are for staff business travel.

Figure 1: FY 2020 Expenditures of DoD Funds



In addition to DoD funds, 33 of the 70 locations obtained funding from non-DoD sources such as state allocations, grants, and donations. The total raised from non-DoD funding for FY 2020 was \$2,379,078, and a total of \$2,284,834 non-DoD funding was expended. Academies used supplemental funding for staff salaries (54 percent); supplies (22 percent); contract services (11 percent); equipment (9 percent); public relations/outreach (2 percent); transportation/travel (2 percent); and facilities/furnishings (1 percent).

Student Assessment

THE OVERVIEW

The DoD STARBASE program exposes students at primarily the 5th grade level to concepts and applications of science, technology, engineering, and mathematics (STEM). The objective is to spark interest in learning about STEM subjects and possible career options related to STEM. A student assessment of knowledge and attitudes is used to measure improvements in STEM understanding and interests of students.

The effectiveness of the STARBASE program is evaluated each year by measuring student gains in STEM knowledge, as well as changes in student recognition of the STEM-related nature of jobs. In addition, the program’s impact is gauged by surveying shifts in student attitudes toward and interest in STEM activities in the contexts of school, the military, and potential future careers. The results of this annual evaluation serve to document the program’s value and impact and are useful in identifying further enhancements of the STARBASE program’s curriculum.

This evidence-based approach to program evaluation commences with a pre-program assessment. Students are asked to complete the online STARBASE student assessment at the start of the program. The students are given no feedback about their results. The students then complete a second, post-program assessment at the end of the program. The pre- and post-program assessments are identical, except that the post-program version includes five additional STARBASE program evaluation questions. Key pre- and post-program assessment domains include:

- Attitudes about STEM topics (e.g., subjects, applications, and personal mastery)
- Attitudes about STEM careers, both military and civilian
- Attitudes about the military (e.g., military personnel and locations)
- Knowledge items that measure STEM conceptual understanding

The student assessment has been modified annually over the past 20 years to reflect continual refinements of the STARBASE program. For 2020, the student assessment’s knowledge test was revised extensively to align better with the updated STEM National Objectives introduced in 2018. This was accomplished with input and guidance from STARBASE directors and other STEM education specialists.

Of the 20 multiple-choice knowledge questions that comprised the 2019 knowledge test, eight were retained for 2020 that mapped sufficiently well to curriculum objectives and also demonstrated satisfactory measurement performance. These serve as a core set of questions to support comparing trends of students’ STEM understanding in the 2020 program year with those of previous years.



“ After being at STARBASE, my dream of becoming some type of engineer has become more real and I know that it is not going to be easy, but I will work hard for it. STARBASE has really inspired me to make a real difference in the world!”

- LUCIA O., STUDENT AT WINDOM DUAL SPANISH IMMERSION ELEMENTARY SCHOOL, ATTENDING STARBASE MINNESOTA-ST. PAUL

Added to the core set of questions were 12 new STEM knowledge questions. There is also a question by which students select from among 30 diverse jobs all the ones they believe make use of STEM principles and concepts. Some of the core and new questions, as well as the job rating question, were reworded slightly based on expert review and discussion. This resulted in a total set of 21 questions for the revised knowledge test.

Additionally, adjustments were made to the student assessment's attitudinal survey. Four pilot items added recently to the survey were discarded because they performed unsatisfactorily and/or did not have a clear relatedness to the STEM interest dimensions defined in prior reports. Another item was reworded slightly for easier understanding. The total number of items in the attitude survey for 2020 was 33.

Besides content changes, the student assessment was transitioned successfully to online administration for 2020. Directors of selected STARBASE academies participated in user acceptance testing before release of the online format. Their feedback was invaluable in ensuring a flawless roll out of the student assessment's online administration during the second week of March 2020.

However, almost immediately after the launch, nearly all STARBASE programs were forced to discontinue normal operations due to the COVID-19 pandemic lockdowns. As a result, just three academies were able to administer the pre-program assessment. The students could not complete the post-program assessment, however, because students could not return to finish the full program and complete the assessment at the end of their experience.

As it turned out, school districts did not resume classes for the remainder of the spring semester despite early optimism. Yet it was necessary to obtain a large number of complete pre/post assessments to analyze the efficacy of new and revised student assessment items, as well as to evaluate the impact of the program. In a typical year, approximately 1,600 to 1,700 students complete the student assessment at the start and end of their STARBASE participation.

Through consultation, it was decided to extend administration of the student assessment into the opening weeks of the fall 2020 academic semester when schools were expected to reopen. As classes got underway again, 26 STARBASE academies were identified in which operations were planned to conform with DoD criteria to present the full 25-hour curriculum with onsite student attendance. A further requirement was to include only classes beginning the program during September. Ultimately, 14 of the invited academies were able to meet all conditions and agreed to administer the online student assessments.

To compensate for the short time period and smaller number of locations, academies were instructed to assess multiple classes if feasible instead of the usual limitation of assessing only one randomly selected class. Although this violates assumptions of random sampling and potentially the normal distribution of cases necessary for firm conclusions, it was deemed necessary due to the extenuating circumstances.

SAMPLE DEMOGRAPHICS

The 14 STARBASE academies in the 2020 program year that contributed student assessments represents 21 percent of the total population of the 67 active academies. A total of 768 completed student assessments were received (402 pre-program and 366 post-program). This resulted in 350 students who completed both the pre- and post-program assessments. This group of 350 students represents 23 percent of the 1,524 matched assessments in 2019. Importantly, it is often true that some initial participants are not present at the time of follow-up in a time-series research design such as this one. Having said that, a full 87 percent of pre-program assessments had a usable post-program counterpart. However, given the overall 2020 situation (i.e., smaller number of academies and students), the 2020 results, while continuing to demonstrate the value of the STARBASE program, should be interpreted with the goal of collecting a normal complement of matched assessments in 2021 to provide a stronger test of the core and especially the new student assessment items.

STUDY HIGHLIGHTS

Analyses of the 2020 student assessment data reveal yet again, as in years past, that students acquire STEM knowledge and understanding of STEM concepts from their STARBASE participation. This is evidenced by the increased number of correct student responses to the knowledge items from pre- to post-program. Likewise, favorable attitudes toward STEM subjects and careers increase from STARBASE participation, along with favorable attitudes toward military facilities as a locus of exciting activity, including applications of technology and engineering. Such attitude change demonstrates that the STARBASE program promotes positive student perceptions of both STEM and the sponsoring military services.

Additionally, analyses showed that a student's favorable pre-program attitudes, particularly in relationship to the importance of STEM and the roles of engineers and scientists in solving problems and improving life, predict greater improvements in that student's knowledge scores. This suggests that students who are motivated about STEM and the STARBASE program from the beginning are particularly likely to benefit from their hands-on learning experiences. It is important to point out also that even students who initially show less interest in STEM typically still have a positive and rewarding experience by attending a program, although their gains are generally less than those obtained by students who were enthusiastic at the outset.

KNOWLEDGE TEST AND ATTITUDINAL SURVEY

The main focus of this evaluation and report is whether STARBASE is achieving its mission to promote greater student understanding and awareness of, and interest in, STEM subjects, activities, and vocations. At the most fundamental level, that entails looking for significant changes in knowledge and attitudes that move upward from baseline measures after completing the program.

- **Knowledge Test** – Performance on the knowledge items increased significantly from pre- to post-program. Specifically, there was a 17 percent improvement in the number of correct answers going from pre- to post-program. Pre-program scores in 2020 were higher than in recent years, although post-program scores were comparable. This resulted in a smaller increase from pre- to post-program in 2020 compared to recent years. This may be the result of the large number of new questions in the 2020 knowledge test, and/or the higher number of students in the 6th and 7th grades compared to 2019. Regarding the knowledge curriculum areas:
 - o Energy showed the largest improvement among curriculum areas (an average increase of 23 percent in the number of correct answers).
 - o Engineering showed the second strongest gain, also with 23 percent more correct answers.
 - o Physics and Chemistry showed the third largest improvement, with a 15.65 percent gain in the average number of correct answers.
- **Attitudinal Survey** – A total of 23 of the 28 attitudinal items²⁹ (82 percent) increased in favorableness from pre- to post-program. Of the 23 items that changed in a positive way, 16 (70 percent) were statistically significant. The largest shifts in favorableness were found for attitudes about science confidence, awareness of jobs utilizing STEM concepts, including those in the military, and desiring a STEM-related career.

²⁹ A total of 33 items are included on the attitudinal section of the student assessment. Twenty-eight items are administered both pre- and post-program, and five STARBASE program evaluation items were administered post-program only.

DEMOGRAPHIC COMPARISONS

To evaluate whether STARBASE program participation creates comparable experiences for all students, responses to various demographic categories were compared to assess significant differences between and among groups. Differences in attitudes and knowledge linked to group cohorts can help to target areas or populations needing additional attention or development within the program. Some areas may be easier to target for improvement, while others may need to be explored further.

- **Knowledge and Experience** – Students with previous experience with military personnel scored significantly higher on both the pre- and post-program attitude surveys compared to students with no previous experience. Students with prior knowledge of the STARBASE program did not score significantly higher on the pre- or post-program attitude surveys compared to those with no prior knowledge. Students with previous experience with military personnel also scored higher on the pre- and post-program knowledge tests. Experience with military personnel may act as a motivator to do well in the program, and/or help set students more at ease. (Tables 15, 24, 25)
- **Gender** – Although boys' attitude scores were significantly more positive than girls' scores on the pre-program survey, this difference disappeared on the post-program survey. In addition, the gap score difference between boys and girls was not significant. Responses of boys and girls did not differ significantly on 70 percent of the post-program attitude items (23 of 33 items; boys scored more favorably on 10 items). Boys' knowledge scores were not significantly higher than girls' scores on either the pre- or post-program tests, and the gap score difference between the boys and girls was reduced to just 0.15 percent by post-program. Lastly, there was no gender by experience with military interaction for the attitude survey or knowledge test. The 2020 analyses almost exclusively show no differences between girls and boys. It should be noted, however, that the differences found in prior years may be a function of the larger sample sizes, which provides more statistical power to detect differences. (Tables 16, 27, 28, 29)

“**STARBASE empowered me to be even more involved in STEM and just because I'm a girl doesn't mean I can't do great things too.**”

- MIA NICHOL, STUDENT AT DOXEY ELEMENTARY SCHOOL, ATTENDING STARBASE HILL



ASSESSMENT METHODOLOGY

The 2020 STARBASE student assessment was comprised of 20 multiple-choice type knowledge items, one nomination-based knowledge item, and either 28 (pre-program) or 33 (post-program) attitudinal items in a *Strongly Disagree* to *Strongly Agree* format. A copy of the FY 2020 Student Assessment is provided in the Appendix.

INSTRUMENT DESIGN

The STARBASE student assessment is updated annually to:

- Continually align the assessment with the STARBASE learning objectives and sponsor objectives.
- Potentially gather data on pilot items that can be utilized in designing future assessments.
- Minimize the risk of teaching solely to the assessment.

As in previous years, the 2020 student assessment consisted of two separate assessments (knowledge test and attitude survey). For the first time since STARBASE program inception, the student assessment was administered using a web-based survey system instead of scannable answer forms. A major advantage of this approach is that students were required to answer all of the questions, eliminating the issue of missing data found in past years. The first assessment is a 20-item test of STEM knowledge that is focused on the core STARBASE curriculum.

- **Knowledge Test** – Twenty multiple-choice items and one “choose all that apply” nomination item were included in the STEM understanding assessment (the knowledge test). Eight of the 20 items were used in prior years and were judged to be relevant to the 2020 curriculum objectives. Twelve new items (60 percent of the 20 items) were added to align more closely with the 2018 STEM National Objectives and STARBASE curriculum.

The “choose all that apply” nomination item listed 30 jobs and asked students to identify those jobs that utilize or require STEM knowledge. The item was designed to measure change in perceptions based on how many of the jobs a student selects as STEM-related after attending the STARBASE program compared to before the program. Results from this exercise consistently reflect favorably on the program. But it would not be psychometrically sound to co-mingle the results of this item with results from the more traditional knowledge items. Thus, a composite score based on just the 20 multiple-choice items was used to evaluate knowledge gains for most comparative analyses.

- **Attitudinal Survey** – Twenty-eight attitudinal items were administered both pre- and post-program. A composite (overall) score based on these 28 items was used to evaluate attitudinal changes in most analyses. In addition, five STARBASE program evaluation items were administered post-program only. Four items (11 percent of the original 37 items) were removed from the 2020 survey. These items asked about STEM enthusiasm of teachers at the student’s school, whether the student would be interested in a STARBASE club at school, and if the student talks with his/her family about future plans. These four were removed from the 2020 survey because they were underperforming and/or unrelated to STEM interest dimensions.

Data collected from students with the knowledge test and attitude survey appear in this report as item-level results; results based on groups of items are identified as category results. There are also overall composite scores, which are presented as an average (mean) score (i.e., group average score) and as a percentage score (i.e., percentage correct for the knowledge test; percentage favorable for the attitude survey).

Item results, category results, and overall results are typically compared and contrasted between different groups of students or between different time periods. This approach permits statistical tests for significant differences between groups that may reveal important information about the students, the impact of their STARBASE participation in a given year, or trends that can be seen across years.

STUDY LOGISTICS AND EXECUTION

Typically, the STARBASE student assessment is administered between January and June of a program year. However, because of the COVID-19 pandemic that began in March 2020, the student assessment was not administered until September 2020, concluding in October 2020.³⁰ The assessment was administered online twice to participating classes of students (pre-program and post-program) at each participating academy to gauge program impact. Locations assessed one or more classes.

STUDENT SAMPLE INFORMATION

The student assessment was administered during the months of September and October 2020, yielding 768 assessments (402 pre-program and 366 post-program). Student assessments were received from 14 of the 67 active STARBASE academies. Pre- and post-program assessments were matched based on unique student ID codes (based on STARBASE academy number, class number, and student number). The 350 students with matching pre- and post-program assessment data were retained for analysis.

In 2020, three of the six military service components provided student assessments. The National Guard was the most represented component, with 10 sites providing approximately 67 percent of the students assessed. The Air Force had three sites (22 percent of the students assessed), and the Air Force Reserve had one site (11 percent of assessed students). No students were assessed at Army, Marine Corps, and Space Force sites.

Table 10: Military Components Associated with the 2020 Student Sample

	Response	Academy Frequency	Student Frequency	Student Percentage
Sponsoring Component	National Guard	10	234	66.9%
	Air Force	3	76	21.7%
	Air Force Reserve	1	40	11.4%
	Army	0	0	0%
	Marine Corps	0	0	0%
	Space Force	0	0	0%

Note: Percentages may not total to precisely 100 percent within categories due to rounding.

Students' previous exposure to military people and awareness of the STARBASE program are presented in Table 11. Over half of the students knew someone who had attended STARBASE (53 percent) and/or had met military people before attending the program (59 percent). In addition, approximately 44 percent of students had heard about STARBASE before attending a program, and one-fifth (20 percent) had a parent or guardian serving in the military. Still, 41 percent to 56 percent of the participating students had no prior contact with the program and/or with military personnel before their participation, indicating that the program is successfully reaching out to the general community of 5th grade students in the locale of each academy.

³⁰ Three STARBASE locations did administer the pre-assessment to 86 students in March 2020 before the pandemic lockdowns began. However, they did not administer the post-program assessment, so these students are not represented in this report.

Table 11: Students' Prior Experience with Military and DoD STARBASE

Item	Response	Frequency	Percentage
I have met military people before coming to DoD STARBASE	Yes	205	58.6%
	No	145	41.4%
I heard about DoD STARBASE before I knew I was coming here	Yes	155	44.3%
	No	195	55.7%
I know someone that went through DoD STARBASE before me	Yes	184	52.6%
	No	166	47.4%
My parent or guardian is in the military	Yes	71	20.3%
	No	279	79.7%

Note: Percentages may not total to precisely 100 percent within categories due to rounding.

The frequency and percentage of students who self-reported belonging to select demographic categories are presented in Table 12. As in previous years, the STARBASE student population is fairly evenly split between boys and girls (48 percent and 52 percent, respectively). In addition, nearly four-fifths (78.6 percent) of the 2020 students were in the 5th grade.

Table 12: Demographic Profile of Student Sample

Item	Response	Frequency	Percentage
Grade	4	11	3.1%
	5	275	78.6%
	6	45	12.9%
	7	19	5.4%
Gender	Boy	168	48.0%
	Girl	182	52.0%

Note: Percentages may not total to precisely 100 percent within categories due to rounding.

INCREASES IN KNOWLEDGE SCORES BY CURRICULUM AREA

Knowledge scores are calculated in terms of the percentage correct of the 20 items and the percentage correct within each curriculum area. Table 13 shows the pre- and post-program knowledge mean score in total and by area. Total knowledge score went up by approximately 17 percent from pre- to post-program. All curriculum areas, especially Energy (+23 percent) and Engineering (+23 percent), showed significant increases post-program as compared to pre-program. The smallest post-program increases were in Mathematics (+11 percent) and Technology (+8 percent), which were nevertheless significant increases. Regarding Technology, it is a single-item measure whereas the other areas are measured by multiple items that form a scale in which there is a mixture of item difficulties.

Table 13: Pre/Post Knowledge Percentage Correct Scores by Curriculum Area

Curriculum Area	# of Items	Pre-Program Percentage Score	Post-Program Percentage Score	Score Gap
Knowledge Items Total	20	47.29%	63.81%	16.52%***
Energy	3	39.81%	62.86%	23.05%***
Engineering	3	38.29%	61.14%	22.85%***
Mathematics	4	49.93%	60.86%	10.93%***
Physics & Chemistry	9	51.97%	67.62%	15.65%***
Technology	1	44.00%	52.29%	8.29%**
STEM Job Awareness	30	42.13%	59.96%	17.83%***

** $p < .01$; *** $p < .001$.

PRE-PROGRAM AND POST-PROGRAM ATTITUDINAL SURVEY MEANS

Table 14 presents the pre- and post-program mean scores, percentage correct, and gap differences for the knowledge test since 2016. In 2011, 2015, 2019, and 2020, the knowledge test content was revised based on program curriculum changes. Starting in 2012, the knowledge test began assessing concepts that were more challenging to students, resulting in lower scores overall. Content changes first implemented in 2011 were carried through to 2020, including the replacement of straight knowledge-based items by problem-solving questions. For example, instead of asking students to recall specific facts regarding the learning activity, the 2012-2020 knowledge test presented students with situations in which they must apply principles learned in order to answer a question from the facts provided. As a consequence of the difficulty of such questions, the 2016-2020 pre-program scores have been consistently below 50 percent correct.

When comparing year-to-year results, it is important to keep in mind that the number of items on the test has fluctuated somewhat through the years. That is because the assessment is evaluated annually to ensure that all items on the assessment are showing statistical evidence of being effective, and that the content is aligned to the current STARBASE program objectives. This is important because the number of items on the knowledge test directly impacts the gap score potential since the pre- to post-program test differences on each item contribute to the overall gap measurement (more items = more gap potential). As such, it is not a concern that the gap score may be higher or lower in a given year; what is important to Table 14 is that there is a significant increase in knowledge as a result of STARBASE. This acquisition of knowledge is indicated by the post-program mean number of correct responses, which has consistently resulted in many questions being answered correctly.

While the 2020 results generally align with the results from previous years, two aspects of the 2020 results are worth mentioning. First, particularly when compared to 2018 and 2019, the 2020 pre-program results show that the students scored higher on the pre-program assessment (47 percent correct for 2020 compared to approximately 36 percent correct over the two past years). Second, the gap score for 2020 is a bit lower than the previous years in the table. Given that the post-program score is fully comparable to the previous years (12 - 13), the smaller gap score is likely the result of the higher pre-program scores. This suggests that the assessment items maybe be somewhat easier than in the recent past, and/or that

the 2020 sample included a larger proportion of 6th and 7th graders (18 percent) who may have been more knowledgeable given their additional schooling compared to the 5th graders who typically participate in STARBASE (there were 79 percent 5th graders in 2020).³¹

Table 14: Pre/Post Knowledge Test Mean Total Scores and Percentage Correct (2016 to 2020)

Year	2016	2017	2018	2019	2020
# of Items	17	18	17	20	20
Pre-Program Score	7.44 (43.8)	7.33 (40.87%)	6.20 (36.47%)	7.03 (35.17%)	9.46 (47.29%)
Post-Program Score	11.73 (69.0%)	12.33 (68.47%)	11.34 (66.70%)	12.30 (61.51%)	12.76 (63.81%)
Gap Score	+4.29 (25.2%)	+5.00 (27.61%)	+5.14 (37.23%)	+5.27 (26.34%)	+3.30 (16.52%)

KNOWLEDGE SCORES AS A FUNCTION OF PRIOR EXPERIENCE WITH MILITARY PERSONNEL

Performance on the knowledge test was analyzed as a function of prior experience with military personnel. Prior experience with military personnel was determined by an affirmative response to the descriptive item “*I have met military people before coming to DoD STARBASE.*” Those with prior military exposure had significantly higher mean knowledge scores, both prior to the program (8.63 vs. 10.04; $F(1,348) = 22.06, p < .001$) and after the program (12.13 vs. 13.21; $F(1,348) = 7.25, p < .01$; Table 15).

The knowledge test gap score from pre- to post-program is significant for both military experience groups. Students with no exposure to military personnel had a larger mean score gap and percentage change than students with exposure to military personnel. This suggests that, while scoring lower on the test both pre- and post-program than their counterparts with military exposure, students with no prior exposure were still impacted favorably by the program; they made up more ground in knowledge test scores comparatively as a function of their participation in the program than those students with prior exposure.

Table 15: Pre/Post Knowledge Test Mean Scores as Function of Exposure to Military Personnel

Military Exposure	Sample Size	Pre-Program Score	Post-Program Score	Gap Score
Yes	205	10.04 (50.20%)	13.21 (66.05%)	+3.17 (15.85%) ^{***}
No	145	8.63 (43.15%)	12.13 (60.65%)	+3.50 (17.50%) ^{***}

^{***} $p < .001$ (significant difference between pre- and post-program scores).

³¹ The 2020 average total knowledge scores in Table 14 were re-computed using only the 275 5th graders. The results indicated that the pre-program mean was 9.19 (original = 9.46), and the post-program mean was 12.41 (original = 12.76), so not including students in other grades did have an impact on the mean test scores. Additionally, an analysis of item difficulties for 2019 and 2020 indicated that the mean 2019 item difficulty was 35.84 percent, whereas the mean 2020 item difficulty level was 47.29 percent, indicating that the 2020 items were somewhat easier for this sample of students. Thus, it appears that the combination of somewhat easier items and a larger number of 6th and 7th graders in the sample may have contributed to the higher pre-program mean scores in Table 14.

GENDER DIFFERENCES ON KNOWLEDGE TEST

Performance on the knowledge test was examined as a function of gender. Table 16 shows that, although boys scored somewhat higher than girls on the pre-program assessment, this difference was not significant (9.65 vs. 9.27; $F(1,348) = 1.57$, NS). The same was true for the post-program assessment (13.04 vs. 12.51; $F(1,348) = 1.74$, NS). By contrast, knowledge score increase from pre- to post-program was statistically significant for boys and girls, indicating that both groups benefited from their program participation.

Table 16: Pre/Post Knowledge Test Mean Scores by Gender

Gender	Sample Size	Pre-Program Score	Post-Program Score	Gap Score
Boys	168	9.65 (48.25%)	13.04 (65.20%)	+3.39 (16.95%) ^{***}
Girls	182	9.27 (46.35%)	12.51 (62.55%)	+3.24 (16.20%) ^{***}

^{***} $p < .001$ (significant difference between pre- and post-program scores).

The differences in gap scores between girls and boys from 2016 to 2020 in Table 17 range from .08 in 2016 to .26 in 2017. With the exception of 2020, girls over the years demonstrated greater improvement and obtained larger gap scores than boys, consistent with the conclusion that both genders were inspired to improve their knowledge of STEM concepts as a function of their program participation. This table also shows that the 2020 gaps for both boys and girls were smaller than found in the previous four years, though the current gaps are still significant as pointed out above. This is consistent with the higher pre-program knowledge test scores seen in 2020.

Table 17: Pre/Post Gender Performance Gap Scores on Knowledge Test (2016 to 2020)

Gender	2016	2017	2018	2019	2020
# of Items	17	18	17	20	20
Boys	+4.25	+4.84	+5.02	+5.19	+3.39
Girls	+4.33	+5.10	+5.26	+5.34	+3.24
Difference (G-B)	+.08	+.26	+.24	+.15	-.15



“Thank you STARBASE for showing me that curiosity should always be part of your hypothesis.”

- STEPHANIE BROYLES, STUDENT AT MERRITT ACADEMY,
ATTENDING STARBASE ONE

A LETTER OF SUPPORT FROM DENISE RUTHERFORD, 3M



As a science-based company, 3M is all about innovation. It drives our business, fuels our passions, and allows us to improve lives. That's why we recognize the importance of inspiring the next generation of scientists, innovators, and inventors. And it's why so many of 3M's community outreach activities focus on encouraging careers in STEM to support a diverse workforce for generations to come. Additionally, the value of diversity in STEM cannot be overstated. Put simply, diverse experiences and perspectives enhance the innovative process and lead to better outcomes.

Like STARBASE, 3M is also committed to social justice and is focused on advancing economic equality for communities of color by facilitating participation and advancement in STEM careers. Today, the outreach provided by organizations like DoD STARBASE is more important than ever before. Science is key to solving some of the world's greatest challenges, and we need scientists from diverse backgrounds now more than ever because we need more innovation and better outcomes. The opportunities for STEM careers are there, with the U.S. Bureau of Labor Statistics projecting STEM jobs are likely to grow at twice the speed of the rest of the labor market between 2014 and 2024.

With STARBASE and our other STEM partnerships, 3M is able to help pave a path toward equity by sponsoring programs that provide access to high-quality STEM educational opportunities for underrepresented groups. Our goal is to support students throughout their journey on the STEM continuum. Through our partnership with DoD STARBASE, we're able to do just that by providing support to hands-on STEM experiences to hundreds of thousands of students each year. The innovative approach taken by STARBASE has captured the imagination of students for more than 25 years and is still highly engaging today. As a former STEM professional turned business leader, I can attest to the importance of science-based problem-solving skills no matter one's career path. STARBASE is an excellent example of building these exact skills in our next generation of STEM leaders.

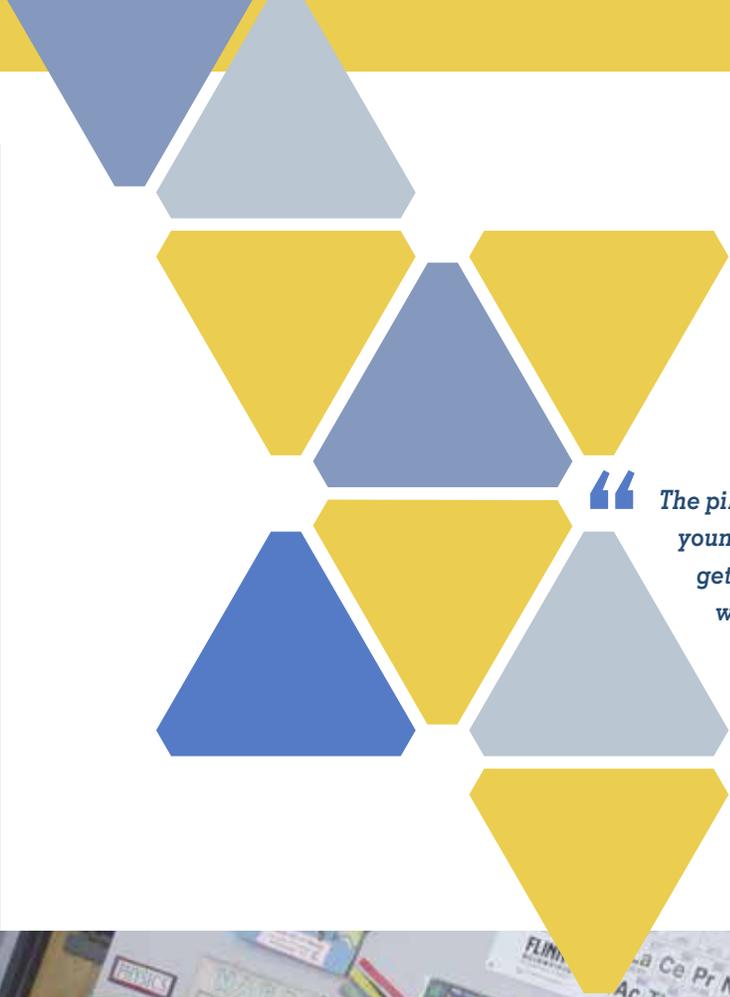
As you'll see in this year's report, the work done by DoD STARBASE in 2020 to engage and inspire the next generation of scientists is incredible, and it's even more impressive given it took place amid a global pandemic. I have no doubt that the passion for science STARBASE programs have instilled in young students this year will improve lives for decades to come.

DENISE RUTHERFORD
Senior Vice President, Corporate Affairs
3M



...the work done by DoD STARBASE in 2020 to engage and inspire the next generation of scientists is incredible, and it's even more impressive given it took place amid a global pandemic."

- DENISE RUTHERFORD



The pilot portion of STARBASE has been effective at inspiring the younger generations to reach for their goals and to not let anything get in their way of achieving them. I have personally met students who work for the Air National Guard that years before had gone through the STARBASE program. This can be an avenue in order to shed light on a subject as being attainable that may not otherwise be seen as an option. Bringing the various curriculum to the students and relating it to military functions can inspire future generations to come."

- LT COL STEVE "TUTTLE" SCHULTZ,
STARBASE SOUTH DAKOTA-NOVA COURAGE



STEM JOB AWARENESS: PERCEPTIONS OF STEM USE IN JOBS

A unique type of item first used in 2015 asks students, “Who uses science, technology, engineering, and mathematics concepts in their jobs? (Select all that apply).” A total of 30 jobs were listed in 2020, including several “distractor” jobs, such as poet, dog walker, historian, language translator, and social worker (Table 18). The average number of jobs nominated pre-program as STEM-related was 12.64, whereas the average number nominated post-program was 17.99, a statistically significant 42 percent increase ($t(349) = 13.58, p < .001$). Thus, students gained a greater awareness of the variety of jobs in which STEM concepts may play a part as a result of their exposure to the STARBASE program. Students even saw the potential importance of STEM in jobs that seemingly were not STEM-related, suggesting that students began looking at jobs in a different way following their participation in the program.

Table 18: STEM Job Awareness (Pre-Test to Post-Test)

Accountant 43%-63%***	Crime Scene Investigator 43%-71%***	Hair Designer/ Barber 26%-45%***	Maintenance Worker 42%-60%***	Police Officer 56%-74%***
Actor/Actress 15%-37%***	Construction Worker 71%-80%***	Historian 30%-50%***	Manager 34%-56%***	School Counselor 33%-53%***
Animal Breeder 24%-48%***	Cook 37%-59%***	Housekeeper 15%-36%***	Mechanic 79%-88%***	Social Worker 36%-53%***
Architect 55%-70%***	Dog Walker 8%-27%***	Language Translator 35%-52%***	Military Personnel 62%-75%***	Sports Athlete 21%-39%***
Camera Operator 56%-74%***	Farmer 37%-60%***	Lawyer 47%-62%***	Nurse 57%-73%***	Teacher 68%-83%***
Car Designer 77%-88%***	Fireman 46%-63%***	Mail Carrier 19%-42%***	Poet 9%-28%***	Video Game Designer 81%-90%***

*** $p < .001$.

STARBASE program participants were most likely to recognize that a car designer, mechanic, and video game designer use STEM concepts in their jobs; they were least likely to make that connection for a dog walker, poet, housekeeper, actor/actress, and mail carrier. Jobs that showed a large jump in participants’ recognition of their use of STEM include crime scene investigator (+28 percent), animal breeder (+24 percent), mail carrier (+23 percent), actor/actress (+22 percent), farmer (+23 percent), and manager (+22 percent).

The statistically significant increase in STARBASE participants’ recognitions of the use of STEM in a wide range of professions, including military service, provides further indication that the STARBASE program is accomplishing its mission of heightening awareness of the relevance of STEM in occupations and careers.

STEM ATTITUDE SURVEY RESPONSES

This section summarizes analyses involving the pre- and post-program attitudinal surveys. Attitudinal items were rated by students using a Likert scale that had response options ranging from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*). This response scale was anchored by a smiling face for *Strongly Agree* and by a frowning face for *Strongly Disagree*. Two of the 33 attitudinal survey items were reverse scored. That is, disagreeing was the more favorable response for those two items.

For students responding to both the pre- and post-program attitudinal surveys, many of their pre-program responses started out positive and increased in favorability in the post-program assessment. This indicates that students entered the STARBASE program with generally positive attitudes about STEM, the military, and technology-related careers, and that these attitudes were reinforced throughout the program.

PRE- AND POST-PROGRAM ATTITUDE SURVEY MEANS

To provide a 5-year comparison, the STARBASE pre- and post-program attitude survey total mean scores are presented in Table 19, beginning in 2016. Total mean scores are a composite averaged value of all the survey items, so it also has a possible range from 1 (Strongly Disagree, or least favorable) to 7 (Strongly Agree, or most favorable). The pre-program means include the 28 core items. Post-program means include the 28 core items plus five post-program STARBASE program evaluation items. Using mean scores controls for the difference in the total number of items administered.

As in the previous four years, there was a significant increase ($p < .001$) in post-program mean score as compared to pre-program score, indicating that students responded even more favorably to the survey following STARBASE program participation. The total mean scores for the pre- and post-program are generally typical of recent years, although somewhat higher. As noted, the 2020 attitude survey did not include four previous items dealing with teachers, interest in a STARBASE club at school, and talking with family about future plans.

Table 19: Pre/Post Attitude Survey Means (2016 to 2020)

Survey	2016 Mean*	2017 Mean*	2018 Mean*	2019 Mean*	2020 Mean*
Pre-Program	5.56	5.62	5.62	5.53	5.66
Post-Program	5.77	5.85	5.84	5.65	5.86

* Pre- and post-program means are significantly different, $p < .001$.

Table 20 rank-orders the attitudinal items, based on post-program means, from most to least favorable. A total of 82 percent of the items show some degree of increase in favorability from pre- to post-program. Sixteen of the items (57 percent of the 28 items assessed pre- and post-program) show a statistically significant increase in favorability from pre- to post-program. Importantly, a number of the items show what is called a *ceiling effect*; pre-program responses were so high that there was little room for increase. For example, for the item “*People who work for the military do lots of different things,*” the pre-program mean of 6.33 represents 90 percent of the maximum mean possible. Although the higher post-program mean of 6.43 was not a statistically significant increase, it was 92 percent of the maximum, which clearly reflects positively on the value that students are getting from the STARBASE program. Other items also started out at a very high level and remained so at the end of the program.

Two attitudinal items declined slightly: “I want to learn more about technology.” (5.89 to 5.71; down 3.2 percent) and “I like technology.” (6.27 to 6.15; down 2.0 percent). Each decline was small, and each mean remained well above the scale midpoint of 3.5. The slight declines may reflect a sentiment among some students of getting as much exposure to STEM as they are ready to handle, with somewhat lower interest to actively pursue additional STEM activities right away. Other items with similar content showed increases, such as “I enjoy learning about science, technology, math, and engineering topics.” (5.42 to 5.61; up 3.5 percent), indicating sustained interest in STEM on the part of students. These differences serve as a reminder that each student likely has a unique motivation and appetite for STEM that should be nurtured according to their readiness. STARBASE opens a door to new vistas on STEM and students can proceed at their own pace. Overall, small declines of a few attitudes from pre- to post-program are not in themselves cause for undue concern about the value and impact of the STARBASE program.

Table 20: Pre/Post Rankings and Mean Scores of Student Attitude Survey Responses

Pre-Program N=350		Attitudinal Item	Post-Program N=350		
Mean	Rank		Mean	Sig.	Rank
6.40	1	I will remember enjoying my time at DoD STARBASE.	6.51	+	1
6.38	2	I like doing science experiments.	6.48	+	2
6.33	3	People who work for the military do lots of different things.	6.43		3
	post only	At DoD STARBASE, I learned a lot of things that I can use.	6.34		4
	post only	DoD STARBASE Instructors made learning about science, technology, engineering, and math topics fun.	6.27		5
5.97	8	Engineers help solve challenging problems.	6.25	***	6
5.97	7	Scientists work on things that make life better.	6.24	***	7
	post only	DoD STARBASE is boring. (Reverse Scored)	6.18		8
6.27	4	I like technology.	6.15	*	9
5.88	11	Most people use science, technology, math, or engineering skills every day.	6.15	***	10
5.92	9	Math is important for developing new technology.	6.13	**	11
5.73	17	People who work for the military use technology in their jobs.	6.11	***	12
5.87	13	Math is really useful for solving engineering problems.	6.10	**	13
5.87	12	Learning about science, engineering, technology, and math will help me in my daily life.	6.07	**	14
5.98	5	Military bases are exciting.	6.06		15
	post only	I think almost any kid would have fun learning at DoD STARBASE.	6.05		16
5.66	18	I am aware of some jobs that use math, science, engineering, or technology.	6.05	***	17

The ranks for means that appear equal were resolved at the third or higher decimal point. (Reversed Scored) This item was reverse scored; therefore, a higher mean average value reflects a more positive attitude.

+ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

TABLE CONTINUED ON NEXT PAGE

Table 20: Pre/Post Rankings and Mean Scores of Student Attitude Survey Responses, Continued

Pre-Program N=350		Attitudinal Item	Post-Program N=350		
Mean	Rank		Mean	Sig.	Rank
	post only	I will tell others about my DoD STARBASE experience.	6.05		18
5.98	6	I do not think DoD STARBASE will help me do better in school. (Reverse Scored)	5.99		19
5.81	14	A lot of good jobs use math to solve problems.	5.93		20
5.81	15	I like learning how technology works.	5.83		21
5.78	16	I would like to know more about science.	5.75		22
5.89	10	I want to learn more about technology.	5.71	*	23
5.37	22	I like engineering.	5.61	**	24
5.42	20	I enjoy learning about science, technology, math, and engineering topics.	5.61	*	25
5.36	23	Jobs that use math, engineering, technology, and science are exciting.	5.57	**	26
5.54	19	A military base is a good place to work.	5.48		27
5.01	25	I am good at science.	5.40	***	28
5.39	21	I want to learn more about engineering.	5.28		29
5.19	24	I am good at math.	5.22		30
4.84	26	Learning about science is easy for me.	5.04	**	31
4.77	27	When I finish school, I would like to get a job that has something to do with math, science, technology, or engineering.	5.04	**	32
4.19	28	I am interested in being a scientist or engineer.	4.26		33

The ranks for means that appear equal were resolved at the third or higher decimal point. (Reversed Scored) This item was reverse scored; therefore, a higher mean average value reflects a more positive attitude.

+ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.



“This program is of great strategic value to the United States of America. It truly ‘lights the spark’ and ‘shows the path’ which can energize young Americans to pursue science, technology, engineering, and math careers.”

- COL AKSHAI GANDHI, STARBASE SWAMP FOX

DoD STARBASE 2020 HIGHLIGHTS

Delivering STEM Education During a Pandemic

STARBASE-ON-WHEELS/VIRTUAL STARBASE

As schools across the country began to close in March 2020 due to the COVID-19 pandemic, the legion of DoD STARBASE directors and staff started thinking about different ways they could continue to deliver this important STEM program to their students. One solution became known as “STARBASE-On-Wheels” – a concept where staff members from DoD STARBASE would take their program directly to the schools. The stories below show how two locations implemented that idea.

STARBASE EDWARDS

On March 13, 2020, all California schools were closed in response to COVID-19, and it was a devastating day for STARBASE Edwards. As with other STARBASE locations, they had a full schedule for the 2019-2020 school year. Suddenly, all 20 remaining STARBASE Edwards academies were cancelled as 5.7 million K-12 California children were sent home based on Governor Newsom’s shelter-in-place orders.

How could STARBASE Edwards continue their mission to increase STEM knowledge, creativity, and collaboration when their traditional classroom is closed? Thinking outside the “brick and mortar” they had at Edwards, they adopted an alternative option to deliver the program to schools and students via “STARBASE-On-Wheels.” Through the “On Wheels” program, the Edwards STARBASE staff learned how to convert their program to a mobile platform, choosing lessons that could be easily transported while still maintaining high levels of student engagement and excitement.

Change is always difficult, but the sea of challenges did not stop their effort and desire to deliver first-class instruction to historically under-represented students. The unanticipated benefit of STARBASE-On-Wheels was that it actually helped them reach an even greater number of these students. Students in Kern and Los Angeles counties, who would not normally have had the resources to participate at STARBASE Edwards, could now be visited at their home school. Being able to be part of the STARBASE experience along with the excitement of a hands-on STEM special program provided students with renewed hope during an otherwise difficult time.

STARBASE Edwards Director Amira Flores said, “Education is the passport for the future, and the STARBASE Edwards team strives for progress despite the global pandemic by overcoming educational barriers that prevent our students from learning. STARBASE-On-Wheels has helped us do that. We firmly believe in the power of education and that all children can achieve personal and educational success through applied positive actions.”

STARBASE WRIGHT-PATT

Applying the “STARBASE-On-Wheels” concept was natural at STARBASE Wright-Patt in Ohio. The STARBASE program is one of the many parts of the overall Wright-Patterson Air Force Base Educational Outreach Office program. Back in 2010, the “Wizards of Wright!” (WOW!) program that took volunteer scientists and engineers directly to classrooms for a variety of activities evolved into a support service called “WOW! on Wheels.” The program was geared to allow teachers to borrow equipment and materials to support their classrooms that might not be normally accessible due to school budgets. Resources include lessons, educational activities, STEM Lab ideas, Children’s Literature, and loans of Classroom DVDs. This one-stop shop provides free resources to teachers, schools, as well as home school groups.

In March 2020, the Ohio Governor announced that all schools were being converted from in-person to on-line classrooms for the remainder of the school year, effective immediately. As the 2020-2021 school year approached, the DoD STARBASE Wright-Patt Leadership Team discussed



all the potential scenarios it could use to serve the many school districts within their five-county service area. A DoD STARBASE version of “WOW! On Wheels” emerged as the best option for program delivery. The problem was that no persons other than school staff were allowed in any of the school buildings. Enter the video-teleconferencing experience and broadcasting equipment from the Wright-Patterson AFB Educational Outreach office and a workable plan began to develop. The current STARBASE lessons were reviewed, and associated materials for the most transportable lessons were gathered and converted to “kits” that could be delivered to the participating schools. Items were packed in mesh bags for each individual student. Single-use items could be disposed of after the lesson and more durable goods could be returned in the mesh bags sanitized for reuse. Sanitized equipment and materials were then delivered to the participating school. The classroom teacher, working in partnership with the STARBASE staff, set the stage for the lessons for the day and readied the hands-on lessons. At the appointed time, it was “Lights, Camera, Action” for the “live from STARBASE Wright-Patt” broadcast for the day. The initiative has been very well received and has been welcomed by local schools during a time where basic

education itself has been extremely difficult. This modified approach to delivery of the STARBASE program provides quality and exciting supplemental STEM education opportunities for area schools. A side benefit is the opportunity to increase partnerships and foster working relationships with participating teachers, whether they have been through STARBASE before or not.

“It’s not in our nature to just roll over and give up,” said STARBASE Wright-Patt Director Dann Andrews. “Instead of saying, ‘Ok, they won’t let us in - there’s nothing we can do,’ we became more determined and asked ourselves, ‘What CAN we do?’”

Through this experience, STARBASE Wright-Patt re-confirmed that flexibility, adaptability, and versatility are necessary in an ever-changing environment like the current pandemic. Said Andrews, “STARBASE-On-Wheels with the virtual twist is a way we can continue to provide students a high-quality DoD STARBASE experience during these unprecedented times. In-person instruction is still the best, though. We can’t wait for the students to come bursting back through our doors!”

ATTITUDE CHANGES FOLLOWING DoD STARBASE

Table 21 provides the top 10 significant pre- to post-program attitudinal shifts. All of these changes were in the positive direction. For example, there was a 7.78 percent increase in favorability of attitudes about being good at science. Additionally, there was also a 5.66 percent increase in students' intentions to get a job that has something to do with math, science, technology, or engineering. Such results suggest that the program is having its intended impact on student attitudes and self-confidence about STEM.

Supporting the community relations goals for STARBASE, there was a 6.63 percent increase in recognition that people who work for the military use technology in their jobs. There was also a 6.89 percent increase in reports of being aware of positions that utilize math, science, engineering, or technology, and a 4.59 percent increase in agreement that people use science, technology, math, or engineering skills every day. Such results show the value of the STARBASE program as an effective STEM occupational awareness program of the DoD and its influence on reinforcing student excitement about STEM.

Table 21: Top 10 Ranking of Attitudinal Item Shifts from Pre- to Post-Program in 2020

Attitudinal Item	Pre-Program Mean	Post-Program Mean	Percent Positive Shift Pre- to Post-Program
I am good at science.	5.01	5.40	7.78%***
I am aware of some jobs that use math, science, engineering, or technology.	5.66	6.05	6.89%***
People who work for the military use technology in their jobs.	5.73	6.11	6.63%***
When I finish school, I would like to get a job that has something to do with math, science, technology, or engineering.	4.77	5.04	5.66%**
Engineers help solve challenging problems.	5.97	6.25	4.69%***
Most people use science, technology, math, or engineering skills every day.	5.88	6.15	4.59%***
Scientists work on things that make life better.	5.97	6.24	4.52%***
I like engineering.	5.37	5.61	4.47%**
Learning about science is easy for me.	4.84	5.04	4.13%**
Math is really useful for solving engineering problems.	5.87	6.10	3.92%**

** $p < .01$; *** $p < .001$.

“STARBASE provides a critical STEM educational platform for our urban youth, with the added benefit of interaction and role modeling with citizen airmen who utilize STEM skills in their professional military careers. It is now more than ever critical, for both the airmen and the students, that this interaction continue in order to build and sustain trust, understanding, and empathy between the guard members and the urban communities they may be called upon to support.”

- BRIGADIER GENERAL DAN GABRIELLI, AIR NATIONAL GUARD, STARBASE MINNESOTA-ST. PAUL

MATH AND SCIENCE ATTITUDINAL RATINGS

Similar to prior years, students' mean attitudes on science and math in Table 22 are more positive post-program compared to pre-program. Specifically, students showed a statistically significant shift in their self-perception of being good at science, indicating that exposure to STEM in the STARBASE program added to students' self-confidence in their science ability. As noted, there was only a small, marginally significant change in students' attitude toward doing science experiments because that pre-program mean was already very high. There was a significant increase after attending STARBASE in the appreciation of math as a tool for solving engineering problems. Lastly, students' self-perception of their math ability did not change in a significant way from their exposure to STARBASE, at least for the 2020 student sample.

Table 22: Science and Math Attitudinal Item Mean Scores (2020)

Math and Science Attitudinal Item	Pre-Program Mean	Post-Program Mean	Gap Score*
I am good at science.	5.01	5.40	+0.39*** (7.78%)
I am good at math.	5.19	5.22	+0.03 (0.58%)
I like doing science experiments.	6.38	6.42	+0.10+ (1.57%)
Math is useful for solving engineering problems.	5.87	6.10	+0.23** (3.92%)

+ $p < .10$; ** $p < .01$; *** $p < .001$.

Table 23 presents historical means for the science and math items beginning in 2016. Attitudes across the years remain consistently favorable, with small fluctuations. The 2020 mean for "I am good at math" (5.22) is the lowest of the means for 2020, as well as the lowest over the past five years. The means for "I like doing science experiments" (6.48) and "Math is really useful for solving engineering problems" (6.10) are quite high and fully consistent with the previous three years. Finally, the mean for "I am good at science" is fully consistent with the previous four years.

Table 23: Post-Program Science and Math Attitudinal Item Mean Scores (2016 to 2020)

	2016	2017	2018	2019	2020
Post-Program Attitude	Mean	Mean	Mean	Mean	Mean
I am good at science.	5.44	5.33	5.45	5.30	5.40
I am good at math.	5.54	5.44	5.48	5.42	5.22
I like science. I like doing science experiments. (2017-2020)	5.74	6.46	6.48	6.42	6.48
I like math. Math is really useful for solving engineering problems. (2017-2020)	5.26	6.11	6.10	5.99	6.10

* Based on 7-Point Likert Scale

A LETTER OF SUPPORT FROM STEPHEN C. FLOYD

October 23, 2020

Mr. Michael J. O'Toole, Director, Civil-Military Programs
Office of the Assistant Secretary of Defense for Manpower & Reserve
Affairs 1400 Defense Pentagon, Room 2E565
Washington, DC 20310



Dear Mr. O'Toole,

I am writing this letter of support for the STARBASE Goodfellow Program, hosted by the 17th Training Wing, Goodfellow Air Force Base, Texas. This program serves and directly benefits our schools, students, teachers, and our local and military families in Tom Green County, Texas, by fostering ingenuity, creativity and exposing students of all socioeconomic backgrounds with 25 hours of minds-on, hands-on Science, Technology, Engineering and Math (STEM) education, comprised of 35 lab and activity objectives.

Since its inception in September 2017, this program has proven to be an educational force multiplier in our local communities by working with 30 public, private, and rural elementary schools to include home schools every year and successfully graduating over 4,500 students to-date in hopes they will continue into a STEM career path and serve their communities and nation. With 65% of schools attending the program being Title I (low-income student areas) the positive impact of this program cannot be overstated and serves as an extension to our surrounding school districts on a daily basis.

I have had the fortunate opportunity to have my child attend the program and to witness the program's staff in action. I can attest to the success of this program at providing world class STEM instruction and leadership, surpassing all available local opportunities. We are a very active community dedicated to the well-being of families and the education of our children. This program has been an inspirational force in educating our youth early and getting them interested to pursue a STEM education at higher institutions or serving in a STEM related military career field. Additionally, Goodfellow is spot-on for such a program as it has all the right professions and joint-service subject matter experts in Intelligence, Cryptologic, and the Fire Sciences which are able to share their expertise in the classroom and on base tours with visiting schools and students through STARBASE Goodfellow's Volunteer and Guest Speaker Programs. Furthermore, professors and instructors from Angelo State University and Howard College also share their knowledge of Science, Civil Engineering, Health and Nursing professions with the students throughout the year.

As the Judge of Tom Green County, I am proud to have such a program in our own community and to be one of only four attached to a military installation in the State of Texas and one of sixty-nine in the thirty-three states and U.S. territories. We are very proud of the partnership between Goodfellow Air Force Base, the San Angelo Museum of Fine Arts, STARBASE and our local schools for their teamwork and flawless execution of this program. It is critical that congress continue funding this program in order to grow our future scientist, engineers, and health and space professionals for tomorrow and keeping a strong STEM workforce for our nation's defense, security and most importantly to remain competitive in the global economy.

I look forward to seeing STARBASE Goodfellow continue to grow and impact the youth of the San Angelo, Tom Green County, and Goodfellow Air Force Base areas in building strong foundations for STEM literacy for years to come.

A handwritten signature in blue ink that reads "Stephen C. Floyd". The signature is fluid and cursive, with the first name being the most prominent.

STEPHEN C. FLOYD
County Judge
Tom Green County, Texas

MILITARY-RELATED ATTITUDES

ATTITUDE SCORES AS A FUNCTION OF PRIOR EXPERIENCE WITH MILITARY PERSONNEL

Prior experience with military personnel was determined by an affirmative response to the descriptive item “I have met military people before coming to DoD STARBASE.” Those with prior military exposure had significantly more favorable attitudes, both prior to the program (5.78 vs. 5.50; $F(1,348) = 11.24, p < .001$) and after the program (5.96 vs. 5.71; $F(1,348) = 9.10, p < .01$). This difference is evident for the 19 items presented in Table 24, including a greater appreciation for math, engineering, military bases, and STEM.

Table 24: Significant Differences in Attitudinal Items Based on Prior Military Contact

Attitudes More Favorable with Prior Military Contact
I am good at science. (pre & post)
Learning about science is easy for me. (pre & post)
Military bases are exciting. (pre only)
I want to learn more about technology. (pre & post)
I like technology. (post only)
Engineers help solve challenging problems. (pre & post)
A military base is a good place to work. (pre & post)
I like engineering. (pre & post)
I want to learn more about engineering. (post only)
Math is really useful for solving engineering problems. (pre & post)
Math is important for developing new technology. (post only)
Jobs that use math, engineering, technology, and science are exciting. (post only)
I am aware of some jobs that use math, science, engineering, or technology. (pre & post)
Most people use science, technology, math, or engineering skills every day. (pre & post)
I enjoy learning about science, technology, math, and engineering topics. (pre only)
People who work for the military do lots of different things. (pre & post)
Scientists work on things that make life better. (pre & post)
People who work for the military use technology in their jobs. (post only)
Learning about science, engineering, technology, and math will help me in my daily life. (pre only)

Note: All attitudes were more positive among students with prior military contact. Group mean values are omitted for simplicity. They are available upon request. All items were significant to at least the $p < .05$ level.

COMPARISONS BASED ON PRIOR KNOWLEDGE OF DoD STARBASE

Prior knowledge of STARBASE was established by an affirmative response to the item *“I heard about DoD STARBASE before I knew I was coming here.”* Those students familiar with the program did not respond in a more favorable way to the pre-program attitudinal items (5.68 vs. 5.65; $F(1,348) = 0.18$, NS) or the post-program attitudinal items (5.84 vs. 5.88; $F(1,348) = 0.26$, NS) than did those students who had not heard of the program. This suggests that students who had or had not heard of STARBASE started the program with comparably favorable attitudes on the whole.

However, inspection of the individual attitudinal items reveals that those students who had heard about the program had more favorable attitudes about military bases (pre-), learning about engineering (pre-), people in the military utilizing technology in their jobs (pre-), engineers solving challenging problems (post-), and having fun learning at STARBASE (post-) as shown by Table 25. Note that the five items in the table are marginally significant at the $p < .10$ level.

The lack of post-test differences on the other items suggests that the STARASE program generally moved all students a commensurate degree so that the pre-program attitudinal differences were ameliorated.

Table 25: Significant Differences on Attitudinal Items Based on Prior Knowledge of STARBASE

Pre- and Post-Program	Pre-Program Only	Post-Program Only
	Military bases are exciting.	Engineers help solve challenging problems.
	I want to learn more about engineering.	I think almost any kid would have fun learning at DoD STARBASE
	People who work for the military use technology in their jobs.	

Note: All attitudes were more positive among students with prior knowledge of the STARBASE program. Group mean values are omitted for simplicity. They are available upon request. All items are marginally significant at the $p < .10$ level.

SHIFTS IN MILITARY-RELATED ATTITUDES

Table 26 shows the four items in the attitudinal survey related to perceptions surrounding the military. A significant positive change was observed for the post-test item *“People who work for the military use technology in their jobs”* (mean = 6.11). This change is consistent with the past three years. The other three items did not show significant pre-post shifts, but one of the items *“People who work for the military do lots of different things”* had a pre-program value that was very high at 6.33 out of 7, so there was a ceiling effect, with little room for improvement. The positive sentiment was still maintained at post-test (mean = 6.43).

The other two military-related survey items *“Military bases are exciting”* and *“A military base is a good place to work”* did not demonstrate significant improvements, but the post-program value for each (6.06 and 5.48, respectively) were above the 3.5 midpoint of the scale. Perhaps STARBASE sites could be encouraged to take participants on a tour of the more interesting areas of the installation.

Overall, with the exception of the *“A military base is a good place to work”* item in the 2020 program year, there has been a consistent and often significant trend over the years for students’ attitudes about the military to be positively influenced by their STARBASE experiences. There was slight non-significant decrease in pre- to post-program attitudes around a military base being a good place to work in 2020.

Table 26: Pre- to Post-Program Attitudinal Shifts on Military-Related Items (2016 to 2020)

Military Attitudinal Item	2016	2017	2018	2019	2020
People who work for the military do lots of different things.	+ .07*	+ .13**	+ .14** 6.21-6.35	+ .05 6.23-6.28	+ .10 6.33-6.43
Military bases are exciting.	+ .09*	+ .12**	+ .14*** 5.88-6.02	+ .04 5.81-5.84	+ .08 5.98-6.06
A military base is a good place to work.	+ .22***	+ .22***	+ .26*** 5.31-5.57	+ .17*** 5.16-5.32	- .06 5.54-5.48
People who work for the military use technology in their jobs. (2017)		+ .24***	+ .34*** 5.76-6.10	+ .29*** 5.68-5.97	+ .38*** 5.73-6.11

* $p < .05$; ** $p < .01$; *** $p < .001$.

GENDER DIFFERENCES ON ATTITUDINAL SURVEY

Two sets of analyses compared responses to the attitudinal survey of boys and girls, focusing both on mean total scores and item-level differences. Table 27 shows the overall differences in responses to both the pre- and post-program surveys by gender. The boys' attitudinal mean score was significantly higher than the girls' mean on the pre-program survey (5.76 vs. 5.57; $F(1,348) = 5.50$, $p < .05$). Although an attitudinal difference favoring boys remained at the post-program survey (5.93 vs. 5.80), this mean difference was not significant ($F(1,348) = 2.37$, NS). In addition, the favorability of girls' attitudes at the end of the program was comparable to that of the boys at the start of the program (5.76 vs. 5.80). These results suggest that the STARBASE curriculum not only reinforces boys' favorable disposition towards STEM but can serve as a valuable countermeasure for somewhat less favorable attitudes about STEM that girls may acquire elsewhere.

Table 27: Gender Differences on Pre/Post Attitude Survey Mean Total Scores

	Sample Size	Pre-Program Mean (28 items)	Pre-Program Mean (33 items)	Pre-Post Attitude Gap Score
Boys	168	5.76 (82.29%)	5.93 (84.71%)	0.17 (2.95%) *
Girls	182	5.57 (79.57%)	5.80 (82.86%)	0.23 (4.13%) *

* The difference between mean gap scores was not significant ($F(1,348) = 0.86$, NS) further suggesting the comparability of girls and boys post-program in terms of STEM attitudes. Values in parentheses next to the mean scores express the attitude in terms of the percent of maximum attainable scale score.

It should also be noted that boys and girls did not significantly differ on nearly 70 percent of the post-program items measuring favorable attitudes about STEM and the STARBASE program (23 of 33). Boys displayed more positive attitudes toward STARBASE and STEM than girls on the 10 items in Table 28. These 10 include three items related to science (e.g., “I am good at science.”), five items related to technology (e.g., “I want to learn more about technology.”), four items related to engineering (e.g., “I like engineering.”), three items related to mathematics (e.g., “I am good at math.”), and two items related to the full scope of STEM (e.g., “I enjoy learning about science, technology, math, and engineering topics.”). Boys also scored higher on one item relating to the military (“Military bases are exciting.”). In these counts, several items mention more than one aspect of STEM, which is why the total exceeds 10.

Girls expressed more positive attitudes than boys on 13 survey items, although none of these differences were statistically significant. This result is likely a function, to at least some extent, of the smaller student sample size for the 2020 STARBASE program year. Overall, these outcomes suggest that both genders are deriving useful life lessons from the STARBASE program, as indicated by means that are consistently above the midpoint of the scale.

Table 28: Gender Gap Score Differences in Post-Program Attitude Survey Mean Item Scores

Attitude Item	Boys' Mean	Girls' Mean	B - G Difference*
Boys More Favorable Than Girls			
I want to learn more about technology.	6.00	5.45	0.55***
I like learning how technology works.	6.08	5.61	0.47**
I want to learn more about engineering.	5.51	5.08	0.43*
I like technology.	6.37	5.95	0.42***
When I finish school, I would like to get a job that has something to do with math, science, technology, or engineering.	5.26	4.84	0.42*
I am good at math.	5.43	5.03	0.40*
I like engineering.	5.82	5.42	0.40*
Military bases are exciting.	6.25	5.88	0.37*
I enjoy learning about science, technology, math, and engineering topics.	5.77	5.46	0.31*
I am good at science.	5.55	5.26	0.29*
Girls More Favorable Than Boys			
N/A^	N/A	N/A	N/A

* $p < .05$; ** $p < .01$; *** $p < .001$. ^None of the differences in which girls scored higher than boys were significantly different in 2020.

PRIOR MILITARY EXPOSURE AND GENDER EFFECTS ON ATTITUDES

Gender differences in attitudes were examined in terms of differential experience with military personnel in Table 29. The positive impact of prior exposure to military personnel described earlier did not interact with gender on pre-program attitudes ($F(1,346) = 0.49$, NS) or post-program attitudes ($F(1,346) = 0.88$, NS). Although boys had more favorable attitudes than girls, and those with prior exposure to the military had more favorable responses than those who did not have prior exposure to the military, the impact of gender did not influence the impact of exposure to military personnel.



I cannot think of an experience so profoundly rewarding and relevant than STARBASE MAXWELL's mission. As humans, we develop over decades, and for those who contribute most to our way of life and security, I believe all are the product of the investment, connection, and confidence between adult leaders and our youth, regardless of background. I'm proud to have been a part of it; it's the unseen badge of honor across this already respected uniform."

- MAJOR AXEL GONZALEZ, AIR FORCE, STARBASE MAXWELL

Table 29: Prior Experience with Military Personnel and Attitudinal Differences by Gender

	No Prior Experience with Military		Prior Experience with Military		Difference Between Post-Program Means
	Pre-Program Mean	Post-Program Mean	Pre-Program Mean	Post-Program Mean	
Boys	5.57	5.73	5.90	6.06	+ .33
Girls	5.45	5.70	5.66	5.87	+ .17

EMPIRICAL CONFIRMATION OF ATTITUDE DIMENSIONS

Beginning in 2015, the post-program attitude items were subjected to principal components analysis (PCA), a standard data reduction method with student response data. In a PCA analysis, items are correlated with statistically derived factors or dimensions (groups of test items) that provide the simplest description of the patterns of interrelationships among the test items observed in the data.

The 2019 dimensions (Future Planning, STEM Behavior & Motivation, STARBASE Program Evaluation, Science Confidence, STEM Concept Awareness, Military Setting Endorsement, and Teacher Support) were replicated in 2020 with two exceptions. First, the Teacher Support dimension was not realized because the items that comprised this dimension were removed from the 2020 attitude survey. Second, the nine items that comprise the STEM Behavior & Motivation dimension were separated into two sub-dimensions. However, given the substantially smaller 2020 sample size, that the sub-dimensions were more interpretable together than apart (based on previous research beginning in 2015), and to facilitate better year-to-year comparisons, the sub-dimensions were used as a single dimension in the analyses that follow. The very high reliability for the nine-item STEM Behavior & Motivation dimension supports a single dimension. The correlation between the item loadings across the comparable 2019 and 2020 dimensions was $r = .65$, $p < .01$, indicating solid structural stability.

Similar to prior years, each of the six attitude dimensions in 2020 is sufficiently reliable for the purpose of program evaluation based on Cronbach’s α , a statistical index of measurement consistency and coherence. The reliability of the Military Setting Endorsement dimension is lower than the other dimensions because this composite score is based on a small number of heterogeneous items. However, an alpha reliability of .67 for this dimension’s scale is adequate evidence of item cohesion upon which to make general outcome comparisons. In summary, the six 2020 attitudinal dimensions are:

- **Future Planning** – Expression of interest in future careers and taking relevant classes, especially in STEM. (6 items; α = .87)
- **STEM Behavior & Motivation** – Identification with the importance of STEM and the roles of engineers and scientists in solving problems and improving life. (9 items; α = .86)
- **STARBASE Program Evaluation** – Positive rating of the impact of the STARBASE program on learning and enthusiasm to convey that to others. (7 items; α = .81)
- **Science Confidence** – Appreciation for science and a positive view of one’s capacity for learning science. (5 items; α = .74)
- **STEM Concept Awareness** – Recognition of the value of technology in everyday life. (3 items; α = .82)
- **Military Setting Endorsement** – Positive impressions about enjoying military facilities and the diversity of work activities done by people on military bases. (3 items; α = .67)

Contrast analyses were performed between the six pre- and post-program assessments of the 2020 attitude dimensions (Table 30). As with the trends observed for the individual attitude items presented in Table 20, there were increases in favorability on three of the dimension scores from pre- to post-program: STEM Behavior & Motivation, Science Confidence, and Future Planning. No significant changes were realized for STEM Concept Awareness, Military Setting Endorsement, and STARBASE Program Evaluation, which is most likely attributable to the fact that the pre-program means were already so high at 5.99, 5.95, and 6.19, respectively, that there was little room for improvement. Thus, the outcomes on most attitude dimensions further substantiate the impressions suggested by the earlier item-level analyses; namely, that the program continues to succeed in its mission to have a positive, beneficial impact on student attitudes toward STEM learning activities, their interest in a career in STEM, and their appreciation of the activities observed in a military setting.

Table 30: Pre- and Post-Program Mean Attitudinal Dimension Scores and Score Gaps

Attitude Dimension	Pre-Program Mean	Post-Program Mean	Gap Score
STEM Concept Awareness	5.99	5.90	-0.09
Future Planning	5.08	5.23	0.15**
Science Confidence	5.44	5.58	0.14***
STEM Behavior & Motivation	5.85	6.11	0.26***
Military Setting Endorsement	5.95	5.99	0.04
STARBASE Program Evaluation (2 items pre-program, 7 items post-program)	6.19	6.20	0.01

** $p < .01$; *** $p < .001$.

Analyses assessing gender differences were conducted on post-program attitude dimension scores (Table 31). At the end of the STARBASE program, boys' scores exceeded girls' scores significantly on just two of the dimensions: STEM Concept Awareness and Future Planning. Perhaps more noteworthy is the finding that girls were not significantly different than boys on Science Confidence, STEM Behavior & Motivation, Military Setting Endorsement, and STARBASE Program Evaluation. That girls scored similarly to boys on the STARBASE Program Evaluation dimension indicates that both believed that they derived a great deal of value from their participation.

Table 31: Gender Gap Score Differences in Post-Program Attitude Dimension Scores

Attitude Dimension	Girls' Meanw	Boys' Mean	B - G Difference
STEM Concept Awareness	5.67	6.15	0.48***
Future Planning	5.07	5.40	0.33*
Science Confidence	5.49	5.67	0.18
STEM Behavior & Motivation	6.14	6.09	-0.05
Military Setting Endorsement	5.91	6.07	0.16
STARBASE Program Evaluation	6.21	6.18	-0.03

* $p < .05$; *** $p < .001$.

RELATIONS OF ATTITUDE COMPONENTS TO KNOWLEDGE TEST SCORE

The correlations between the pre- and post-program attitude dimension scores and the pre- and post-program knowledge test scores (and score gap) were calculated. The six attitude dimensions are moderately correlated with each other, as would be expected, yet are distinct enough to reflect clear aspects of student attitudes toward STEM, future career, the military, and STARBASE. Among the pre-program attitudes in Table 32, STEM Behavior & Motivation ($r = .30$, $p < .01$), Science Confidence ($r = .22$, $p < .01$), and Future Planning ($r = .16$, $p < .01$) were the strongest predictors of post-program knowledge test scores (and of pre-program knowledge test scores).

Table 32: Correlations of Pre/Post Attitudinal Dimension Scores with Pre/Post Knowledge Scores

Attitude Dimension	Pre-Program Attitude with Pre-Program Knowledge	Pre-Program Attitude with Post-Program Knowledge	Post-Program Attitude with Post-Program Knowledge	Pre-Program Attitude with Pre- to Post-Program Knowledge Gap Scores
STEM Concept Awareness	.06	.04	.15**	-.02
Future Planning	.20**	.16**	.12*	.01
Science Confidence	.22**	.22**	.26**	.06
STEM Behavior & Motivation	.27**	.30**	.29**	.12*
Military Setting Endorsement	.15**	.05	.07	-.08
STARBASE Program Evaluation	.16**	.11*	.10	-.02

* $p < .05$; ** $p < .01$.

DRIVERS OF TARGET STUDENT ATTITUDES

Multiple regression analyses were conducted to identify a set of non-overlapping statistical predictors of six target attitudes (e.g., “At DoD STARBASE, I learned a lot of things that I can use.” and “I will tell others about my DoD STARBASE experience.”). Results suggest that if conditions in each list are present (i.e., if favorable attitudes are expressed), it is likely the target attitude also will be present and operative in student tendencies.

Adjusted R^2 values indicate the cumulative amount of the variance, or variability, across students in their attitudes about STARBASE and STEM-related topics that the drivers explain. That is, these attitude items predict student feelings about particular aspects of the STARBASE program with an increasing degree of accuracy. Each of the individual predictors is statistically significant in its own right. Thus, they provide a condensed model toward understanding what makes students more enthusiastic about the program and about STEM. These lists can be used as prioritized action items for improving a particular target attitude.

Considerations Based on Drivers

Below are repeating drivers that appear to have a broad impact on the target attitudes.

1. Three drivers each impacted three of the six target attitudes:

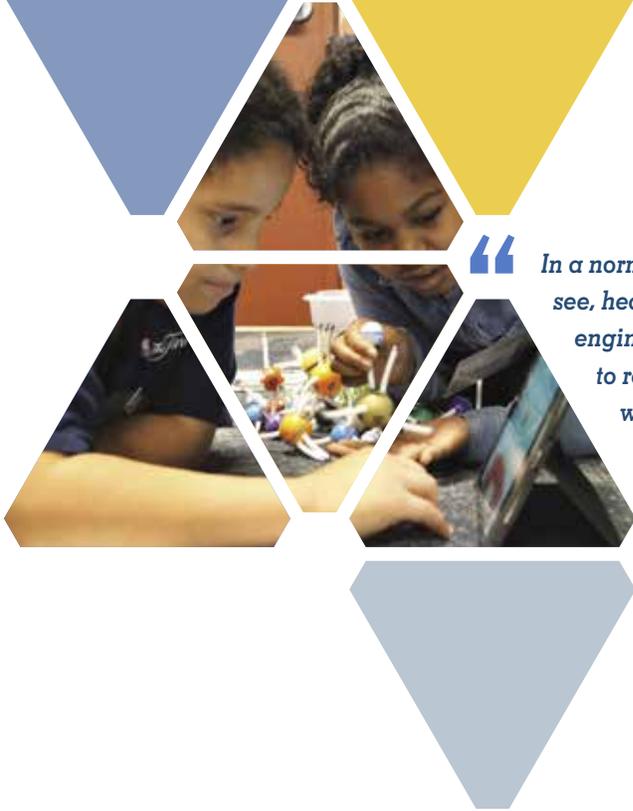
- *I will remember enjoying my time at DoD STARBASE.*
- *I would like to know more about science.*
- *A military base is a good place to work.*

2. Six drivers each impacted two of the six target attitudes:

- *Scientists work on things that make life better.*
- *DoD STARBASE Instructors made learning about science, technology, engineering, and math topics fun.*
- *I like technology.*
- *I want to learn more about engineering.*
- *When I finish school, I would like to get a job that has something to do with math, science, technology, or engineering.*
- *Engineers help solve challenging problems.*

These repeating drivers suggest that STARBASE instructors should continue to make learning fun, stress the value of STEM, and emphasize the positive features of military bases. Other attitudinal drivers, such as believing that jobs that use math, engineering, technology, and science are exciting and telling others about their STARBASE experience, are valuable predictors, too, but may follow from the more potent predictors (i.e., those that predict more than one target attitude). To the extent that STARBASE academies are able to build stimulating, rewarding, and supportive learning environments, positive attitudes can be enhanced and reinforced, which may pay continuing dividends after program attendance. These outcomes include:

- Word of mouth endorsement,
- Further pursuit of learning about technology,
- STEM career motivation, and
- Support for the military, such as possible future enlistment.



In a normal classroom setting students can ask questions, see, hear, and sometimes even do science, technology, engineering, and math. But at DoD STARBASE, they come to really understand what they are learning about and why it matters in the world around them. Great ideas can die on the vine if they are not stimulated. It is great to watch kids leave invigorated and with a new passion to pursue those ideas, which can help drive success in their future lives.”

- CW5 CHRISTOPHER JENNINGS,
STARBASE INDIANA-INDIANAPOLIS

CONCLUSION

Even with the changes to the 2020 STARBASE program brought about by the COVID-19 pandemic, the truncated program was successful in achieving its major goals as measured by the student assessment of STEM-related knowledge and attitudes before and after attending the program:

1. The program yielded solid gains in students' understanding of STEM concepts as demonstrated by their pre- and post-program knowledge test performance.
2. The program yielded solid gains in students' attitudes toward science, technology, engineering, and mathematics as demonstrated by their pre- and post-program attitudinal survey responses. Those increased favorable attitudes are likely to be helpful in encouraging student learning about STEM topics throughout their academic careers.

The STARBASE program also appears to have supported the DoD's community outreach objective by the creation of favorable impressions of the military and people who work for it among many of the students.

Overall, many students completed the program with an increase in STEM knowledge, awareness of STEM importance, and interest in STEM-related careers. This broader appreciation should be of benefit in their continuing school learning about STEM.

DoD STARBASE 2020 HIGHLIGHTS

DoD STARBASE

Native American Outreach

It's no secret that education and industry leaders have been attempting to tackle the racial and gender disparities among young people entering STEM professions arguing that young people are not equipped for future jobs. While most are good at encouraging more female, black, and Latino students to take STEM courses and enter STEM careers, Native American students are often left out of these discussions. In regard to Native American educational attainment³² :

DID YOU KNOW?

- Native American students have the **lowest graduation rate** among any minority group.
- Only **7 of 100 Native American kindergarten students** will earn a bachelor's degree.
- Native American students have **less access to rigorous mathematics and science coursework** in high school compared to other race/ethnicity groups.

The DoD STARBASE program recognized this inequity, and for the past 20 years has conducted programs in several states to specifically address the STEM educational needs of Native American students.



SOUTH DAKOTA

South Dakota has one of the largest populations of Native Americans. According to the World Population Review, the South Dakota Native American population was estimated at 9.9 percent of their total population, making them fourth in the United States.³³ DoD STARBASE sites in South Dakota were established at Sioux Falls in 1994 and Rapid City in 2002. Both stationary sites also have a traveling team that focuses on Native American and rural students in over 200 public, non-public and Tribal/Bureau of Indian Education schools and school districts in South Dakota. These programs, STARBASE NOVA Courage and STARBASE NOVA Honor, began in 1999 and 2008, respectively. “NOVA” stands for “New Opportunities, Visions and Attitudes” and they are distinguished using the words “Courage” and “Honor,” both of which are strong parts of Native American heritage.

The traveling teams each deliver the full DoD STARBASE curriculum to more than 30 classrooms each school year, adhering to all of the DoDI guidelines and core program expectations. Native American students make up an average of 30 percent of the population served by the

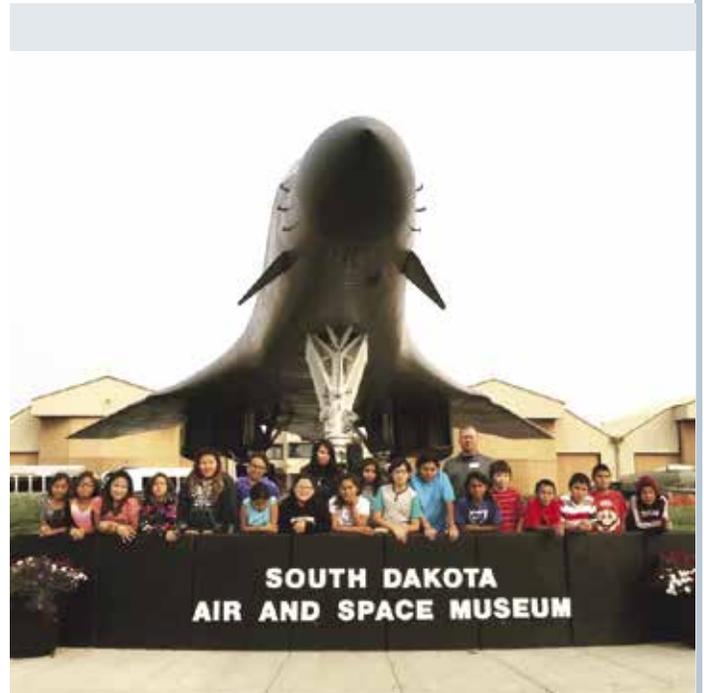
³² Sources: U.S. Dept. of Education, Senate Committee on Indian Affairs. (2014). “Indian Education Series: Examining Higher Education for American Indian Students.” | National Center for Education Statistics, Table 219.80. (2011). | National Caucus of Native American State Legislators (2008) “Striving to Achieve: Helping Native American Students Succeed.

³³ <https://worldpopulationreview.com/state-rankings/native-american-population>

STARBASE NOVA programs. The teams have been trained to respect the customs, culture, and traditions of the Native American schools and students. In one school, this includes only speaking the Native language in the hallways and only speaking English in the classrooms or other public areas such as the lunchroom. During the week, the STARBASE team typically stays in the local area, usually two to three hours from home, and returns home on Friday to repack for the next week and new location. In spite of the COVID-19 pandemic, the NOVA programs have not only a full schedule, but also a waiting list.

Each year, the DoD STARBASE instructor teams travel over 40,000 miles to serve Native American and rural students ensuring that those schools too far away to bus to Sioux Falls or Rapid City are able to get the full STARBASE experience. When the programs first started, they were housed in double-wide trailer homes that were renovated into classrooms and moved by a semi several times a year to a host school. Over the years, the mobile classrooms were retired and have been replaced by donated vehicles with a pull-behind trailer, which is driven to each school. STARBASE South Dakota's not-for-profit support organization, STARBASE of South Dakota, Inc., works diligently to raise funds to keep the programs on the road because federal funds do not cover the full cost of the travelling program. Local businesses such as Raven Industries and Schulte Subaru have joined as partners to ensure the STARBASE NOVA staff are able to travel safely through the extreme driving conditions of South Dakota that can include blinding snowstorms, flooding, and tornadoes.

Since their inception, the STARBASE NOVA teams have become an exceptional STEM education and enrichment option for South Dakota rural and reservation schools. The STARBASE NOVA teams continually receive positive feedback from their schools, including principals, teachers, and parents. Comments from students often state it to be one of the most memorable experiences during 5th grade. The entire STARBASE South Dakota program takes great pride in the work they do to inspire students that would not otherwise have access to STEM programs like STARBASE and look forward to continuing their important mission.



CONTINUED

NATIVE AMERICAN OUTREACH, CONTINUED

OREGON

Drawn by the success of the South Dakota STARBASE NOVA programs, Oregon is preparing to address the needs of their Native American population. During FY 2020, DoD funding was received to begin the set up of STARBASE Camp Umatilla in northern Oregon. This will be the fourth DoD STARBASE program in the state.

Plans are underway to stand-up STARBASE Camp Umatilla at the beginning of 2021 with plans to serve 43 5th grade classes from four school districts each year. Fourteen of the 5th grade classes, involving approximately 380 students, are predominately Native American. The Oregon Military Department has a relationship with the nine federally recognized tribes within the state and believes STARBASE Camp Umatilla will greatly support the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and their children.

The CTUIR is a union of three tribes, the Cayuse, Umatilla, and Walla Walla, and has over 3,100 tribal members. Thirty percent (30 percent) of the membership is composed of children under the age of 18.

The STARBASE program, through its relationship with Camp Umatilla, has plenty to offer students and families from the surrounding area. This includes:

- The Pendleton Unmanned Aerial System Test Range with airspace overlying Camp Umatilla. This industry is currently attracting unmanned aerial system companies from around the world. This will be a source of STEM mentors and potential future employment opportunities for STARBASE students.
- Camp Umatilla hosts the Smithsonian-funded Burrowed Owl Project. The Project Director, David Johnson, has already expressed a keen interest in mentoring the STARBASE students, providing hands-on research and data collection.
- The Oregon Military Department is in the process of transferring 7,000 acres of Camp Umatilla land to the Confederated Tribes to be developed as a Nature Reserve. This will provide further educational and employment opportunities to the local Native American community.

The presence of this new STARBASE Academy at Camp Umatilla will further foster collaborations and bolster relationships in the Columbia River Basin. The addition of this important STEM curriculum to a traditionally underserved student population can help facilitate and encourage Native American involvement, which is fundamental to proactive management of tribal land and resources and overall economic success in the area.



Participating Teacher Survey

INTRODUCTION

The annual DoD STARBASE program's Teacher Survey is an important component of the program evaluation and stewardship strategy, which assesses a wide range of outcomes of the DoD STARBASE program. The survey supports the program by gathering opinions from teachers who accompany the classes of elementary students attending DoD STARBASE academies. While the Student Assessment provides direct measures of student STEM knowledge and attitudes, the Teacher Survey provides another perspective of experiences and attitudes formed as a result of participation in DoD STARBASE. The Teacher Survey captures feedback from teachers throughout the school year, representing many, if not all, of the classes and schools that attend a DoD STARBASE academy.

The survey data provides teachers' perspectives on the immediate and long-term implications of DoD STARBASE. Analyses also reveal important trends when observed in a historical context. DoD STARBASE Teacher Survey results monitor and strengthen the program's effectiveness in promoting youth familiarity with, and interest in, STEM-based topics and careers.

The Teacher Survey analytics evaluate outcomes indicative of effective DoD STARBASE programs including:

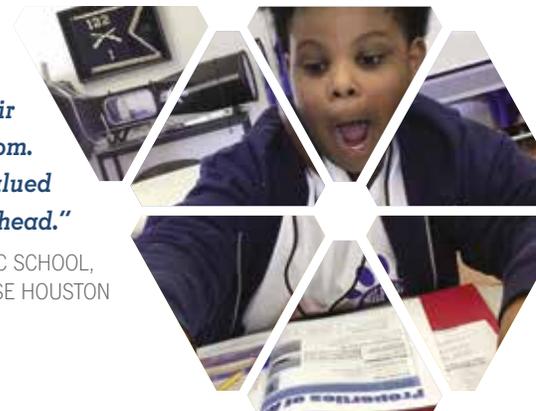
- Improved personal characteristics of students (e.g., STEM confidence, academic interest, motivation, cooperation level)
- Future planning of students (e.g., awareness of, and desire to pursue, career opportunities within STEM fields)
- Key stakeholder program support (e.g., principals, teachers, school board, and parents)

This year 64 of 70 STARBASE Academies were active in collecting responses from 2,045 teachers who completed the survey between July 2019 and June 2020. There was very limited activity during March 2020 through June 2020 due to school closures because of the nationwide COVID-19 pandemic. There were no teacher responses for STARBASE Vandenburg (California), STARBASE Patrick (Florida), STARBASE Nellis (Nevada), STARBASE Umatilla (Oregon) and STARBASE MCAS Beaufort (South Carolina) due to their limited operational status during FY 2020. There were also no responses from STARBASE Portland (Oregon). Each of the other academies received ratings from at least eight teachers, with 36 of the academies attaining a sample of 30 or more. One academy reached 80 teacher responses. Despite a few high-volume locations, the representativeness of teacher responses in the database is well dispersed. No single academy represents more than 4 percent of the Teacher Survey database, with most academies representing 2 percent or less of the total database.

Each academy received a summary report of its teacher responses twice during the program year, once in February that included responses to date and again in July that included the entire academic year. The data provided feedback to help academies gauge program performance, identify improvement areas, and set operational goals.

“ Each and every activity was beneficial to the students. It is always eye-opening for me to observe reactions of the students. It is especially enlightening to observe our somewhat reserved students transform into enthusiastic learners during their STARBASE experience and then take their new found confidence back to the classroom. Who knows...this could be the impetus that gives them needed direction and valued realization of the connections between choices today and life goals ahead.”

- CATHY GRAHAM, EDUCATOR AT ST. ROSE OF LIMA CATHOLIC SCHOOL,
ATTENDING TEXAS STARBASE HOUSTON



ACADEMY REPRESENTATION

The 64 active academies with teachers participating in the survey were affiliated with five military components across the United States. The Space Force is a new military component sponsor with one academy this year (STARBASE Peterson in Colorado).

The National Guard hosted the majority of academies and naturally had the largest number of teachers, 1,574 (77%), responding to the survey from 50 academies. The Air Force sponsored nine academies and yielded 291 (14%) completed surveys. Air Force Reserve sponsored three actively participating academies that generated 148 (7%) survey responses. The Army also sponsored one academy which produced 22 (1%) of returned surveys. There were no teacher responses for the academy affiliated with the Marines (STARBASE MCAS Beaufort).

Table 33: Academy Representation

MILITARY COMPONENT	ACADEMIES REPRESENTED (N = 64)	NUMBER OF RESPONSES (N = 2,045)
National Guard	50	1,577 (77%)
Air Force	9	301 (15%)
Air Force Reserve	4	148 (7%)
Army	1	22 (1%)
Space Force	1	10 (Less than 1%)

Percentages are rounded and may not sum to 100% precisely.

TEACHER CHARACTERISTICS

For the 2019-2020 academic year, 2,045 school personnel completed the online DoD STARBASE Teacher Survey. As noted previously, response rate was lower with 775 fewer teachers responding compared to the total responses from last year (N=2,820). Table 34 and figures 2 and 3 provide an overview of the teacher characteristics for this sample of teachers including years taught, participation in STARBASE, age range, grade taught, gender, and STEM experience.

- As with past years, the vast majority of respondents are female, most teach the 5th grade, about 57 percent of the respondents are between the ages of 30 and 50 years, with about 20 percent being under 30, and about 23 percent stating they are over 50. Over 50 percent of teachers have more than 10 years of teaching experience.
- Only 4 percent of respondents indicated that they are in their first year of teaching, however, this translates into 83 teachers exposed to DoD STARBASE this year who are new-to-the-profession.
- There were 701 teachers that went to STARBASE for the first time this year.
- Results in Table 34 are similar to those seen in recent years, suggesting there is stability in the metrics that describe the flow of the STARBASE teacher population from year to year. Big shifts in proportions of participating teacher demographics would be unexpected if teacher recruitment and attrition rates are fairly stable.



While participating in the STARBASE Program I acquired skills that I can use with my students in the classroom. All the lessons were enriching, but the Eggbert activity, Newton's Laws, measurements (grams, meters), were the most applicable to my class. All the activities were very complete, instructions very clear and had attractive materials for my students. The instructors were very dynamic and captured the attention of my students through many techniques. I would love the program to be extended to bring workshops to schools or continuing education to teachers."

- VALMARIS RIVERA, EDUCATOR AT PUERTO RICO GIFTED SCHOOL, ATTENDING STARBASE PUERTO RICO

Table 34: Teacher Characteristics

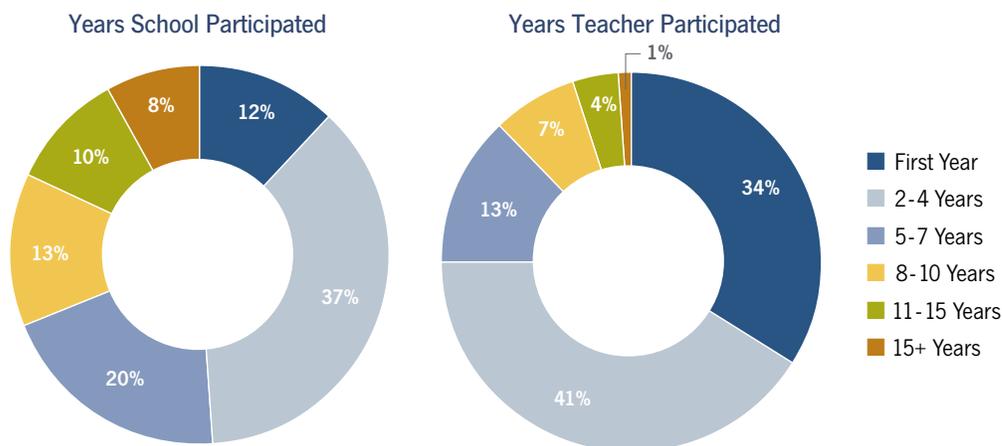
Years Taught	Experience with DoD STARBASE	Grade Taught	Age Range	Gender
4% First year 16% 2-4 Years 14% 5-7 Years 11% 8-10 Years 17% 11-15 Years 39% Over 15 Years	34% First year 41% 2-4 Years 13% 5-7 Years 7% 8-10 Years 4% 11-15 Years < 1% Over 15 Years	2% Grade 4 93% Grade 5 < 1% Grade 6 5% Other response <i>(e.g., Special class, assistant, multiple grades, administrator)</i>	20% Under 30 Years 28% 31-40 Years 29% 41-50 Years 18% 51-60 Years 5% Over 60 Years	85% Female 15% Male

Percentages are rounded and may not sum to 100% precisely.

YEARS EXPERIENCE WITH STARBASE

- About 1 percent of teachers report having participated for 15 years or more in the program, while 34 percent indicated it was their first year participating in a DoD STARBASE program.
- This year and the last two years had more representation in the “first year” and “2-4 years” experience categories at 75 percent compared to 51 percent in 2017. The influx of teachers new to DoD STARBASE offers a chance to engage the next generation of program proponents through positive interactions and useful information.
- Figure 2 shows that approximately half of the schools (50 percent) have participated in the program for less than five years. The other portion (50 percent) of the schools have had five or more years with DoD STARBASE.
- The “years of school participation” item had an option for “I don’t know,” which was selected by 28 percent of the respondents. (Note: The “I don’t know” response option was not used in calculating response option percentages in order to better represent the proportions from teachers who **were** aware of how long their school has participated.)
- Most (85 percent) of the teachers who do not know how many years their school has participated in DoD STARBASE have less than five years of experience in the program.

Figure 2: Years Participating in the DoD STARBASE Programs



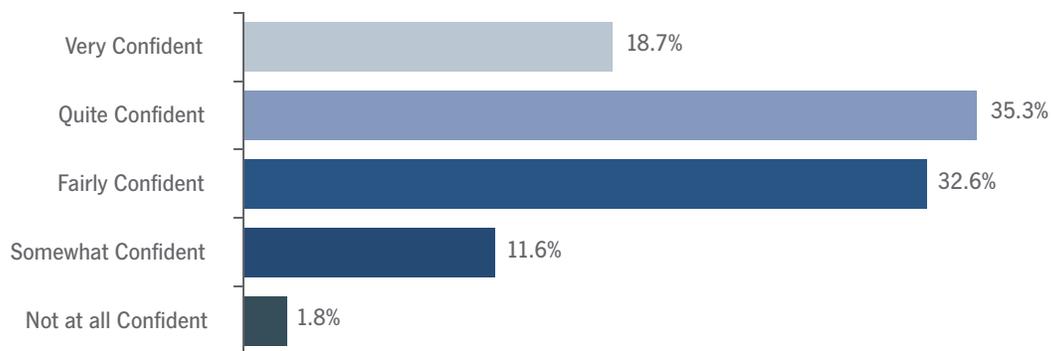
*Note: “I don’t know” responses to this question were not included in the figure.

STEM-RELATED TEACHER EXPERIENCE/CONFIDENCE

Overall, teachers are confident teaching STEM-related topics to their students in the classroom. Only 2 percent of the respondents revealed that they are not confident teaching STEM-related topics. Even so, about one out of eight teachers who attend STARBASE are not very comfortable in their own STEM knowledge; for them DoD STARBASE offers an alternative way to convey basic STEM concepts to their students in a credible and fun atmosphere (Figure 3).

- Eighty-six percent (N=1,752) of the teachers reported that their college major and/or minor was **not** in a STEM-related discipline. Of the remaining 14 percent of responses, 8 percent said their major was in a STEM-related discipline, and 6 percent reported that they minored in a STEM-related discipline.
- The survey results confirm that many teachers, whether in their first year or more experienced, say they gain knowledge, motivation, and insights about teaching STEM-related topics when they escort their classes to DoD STARBASE. For example, nearly 91 percent of all teachers agree that the DoD STARBASE experience has influenced them to become skilled in STEM instruction. The rate is similar for both new and experienced teachers (95.2 percent vs. 90.7 percent, respectively).

Figure 3: Confidence with Teaching STEM-Related Topics in the Classroom



TEACHER ATTITUDINAL RATINGS

OVERALL ATTITUDE INDEX

Survey results show most participating teachers understand and embrace the mission of the STARBASE program as evidenced by favorable attitudinal shifts, and in overall high approval ratings of DoD STARBASE. Teachers rated 44 attitudinal items on a 7-point Likert scale from Disagree (1) to Agree (7) based on their experience with the DoD STARBASE program. Ten items reference changes in student behavior *after* STARBASE; therefore these 10 items were not posed to teachers in their first year of DoD STARBASE participation.

The 44 items were aggregated into an Overall Index³⁴ that covered the students' and teachers' attitudes about program concepts such as grasping and enjoying the STEM program content, displaying confidence and motivation in classroom settings, and planning for future goals and careers. The Overall Index composite favorability was a little lower than what has been obtained by the attitude score for previous years (Table 35). The analyses in this report provide more detailed information to help understand the teachers' attitudes. Although the content has been modified over the years, the underlying concepts and themes remain consistent from year to year.

³⁴ For teachers in their first year, the Overall Index included 34 items.

Table 35: Mean Overall Attitudinal Index Scores for the Teacher Survey (2016-2020)³⁵

Overall Index	2016	2017	2018	2019	2020
Summative Mean Ratings	6.21	6.15	6.14	6.06	6.04

TEACHER SURVEY MEASUREMENT AREAS

The Teacher Survey content aligns with the stated DoD STARBASE program goals by incorporating measurement elements of the program's impact on both teachers and students during and after attendance. The following table (Table 36) provides the concepts and definitions for each area measured. Student/Teacher Engagement is a composite of 32 items based on teachers' self-report of their own attitudes and their perceptions of students' attitudes during the DoD STARBASE program. Engagement attitudes were further grouped into subsets according to topic area (e.g., STEM Concepts, Program Support) to illustrate the aggregate ratings of most favorable to least favorable measurement area. As reflected in the Overall Attitudinal Index, teachers responded favorably across all measurement topics, with the most favorable responses (presented in rank order) occurring in the areas of: STEM Concepts, Program Support, Confidence, and Post-Program Impact. The mean scores on many of the measurement areas were slightly lower than the means last year, which may help explain why the overall score in Table 35 is slightly lower than in previous years.

The analyses also examined the outcomes of DoD STARBASE on student STEM and academic motivation beyond the immediate effects of attendance. The Post-program Impact scale uses responses to 10 items completed by those teachers who have more than one year of experience with the DoD STARBASE program (N = 1,344). These teachers are in a good position to observe how much their students continued to exhibit STEM relevant pursuits after their DoD STARBASE experience. Items included a broad range of post-program measures including students' interest in STEM topics, their career choice options, classroom attendance, and participation in STEM-related activities. Some of these differences will be addressed in more detail in the upcoming sections of this report.

Table 36: Teacher Survey Measurement Areas

Measurement Area	Definition	Number of Items*	Mean
Student/Teacher Engagement	Engagement shown while attending DoD STARBASE	32	6.08
STEM Concepts	Student interest in and understanding of STEM concepts	6	6.33
Program Support	Support and resources provided to the teachers	6	6.25
Confidence	Students' confidence with abilities and capabilities	3	6.14
Behavioral-Motivational	Effort shown by teachers in reinforcing positive behaviors	5	6.09
Teamwork	Students working with and supporting each other	3	6.00
Future Planning	Students seeing future possibilities and opportunities	4	5.80
Military and Career	Teacher's personal opinions on military personnel and career options, and their perceptions of student opinions on same	5	5.77
Post-Program Impact	Lasting impact of DoD STARBASE after the program ends	10	5.99

*Thirty-two of the 34 attitudinal items responded to by the entire sample of teachers were spread across the seven rationally derived engagement sub-categories. These 32 items formed the overall Student/Teacher Engagement Composite.

³⁵ The calculations included in this table are the total mean responses for all attitudinal items.

DoD STARBASE'S IMPACT ON THE SCHOOL SYSTEM

The DoD STARBASE program influences students and teachers, yet also impacts the school system, both formally and informally. As part of the Teacher Survey, teachers shared their knowledge of specific practices based on their participation in the program. Table 37 provides the trends in favorable responses to five items dating back to 2016 and one newer item. The trends show generally more favorable responses since 2016 for some items and sustained high favorability rates for others.

Table 37: DoD STARBASE Impact on the School System

Item	Positive (Yes) Responses				
	2016	2017	2018	2019	2020
Is there formal communication from your school that raises community awareness of the DoD STARBASE program (e.g., letters to parents, overview at parent open house meetings, etc.)?	66.1%	65.6%	67.5%	64.9%	65.8%
Will you recommend DoD STARBASE to other teachers, principals, or school educators/administrators?	99.5%	99.6%	99.1%	99.5%	99.3%
To the best of your knowledge, did your DoD STARBASE provide you and/or your school with information about how STARBASE curriculum is related to your state education standards?	NA	NA	NA	90.0%	90.5%
In your view, does the DoD STARBASE curriculum help you reach your state education standards?	94.8%	98.0%	87.0%	85.2%	85.1%
Do you or will you use DoD STARBASE materials/applications in your own classroom?	86.1%	90.9%	91.5%	90.7%	90.0%
Do you or will you use DoD STARBASE take home activities beyond your classroom?	67.4%	71.3%	70.8%	70.7%	68.6%

RECOMMENDING DoD STARBASE TO OTHER SCHOOL OFFICIALS

- Recommending DoD STARBASE to other school officials has had sustained high favorability over time with 99.3 percent favorability in 2020.
- Formal communications to raise awareness about DoD STARBASE remained high in 2020 at 65.8 percent as it has for the past five years. Schools that communicate about the value and excitement of STARBASE are likely committed to continuing to support the program.

CLASSROOM AND TAKE HOME MATERIALS

- The majority of teachers plan to use the materials in the classroom (90 percent) and/or take-home activities (69 percent).
 - o The percentage of teachers who said they did NOT receive classroom materials remains lower than a few years ago (11.2 percent in 2015) and is similar to 2019, with 5.4 percent of teachers in 2019 saying they did not receive materials.
 - o For take home activities, approximately 19 percent of teachers reported no materials were available, which is slightly lower than 2015 (20.6 percent).
 - o For teachers who have received STARBASE materials, 95.3 percent agreed when asked if they plan to use the STARBASE materials in their classroom.
 - o For those who received take home activities for their students, 84.3 percent plan to use them.
- Further, the survey included another item that asked teachers if they prefer the DoD STARBASE supplemental materials over other similar resources, to which 61 percent of teachers that received DoD STARBASE materials agreed.

Improving the communication about where to find the materials may help to reduce the number of teachers reporting they did not receive the materials. There were a few academies with higher rates of teachers saying they didn't receive materials including: Arizona, California (Los Alamitos), Connecticut (Waterbury), Indiana (Gary and South Bend), Kansas (Salina), Louisiana (Bayou State), Michigan (Alpena and Battle Creek), Montana (Great Falls), Ohio (Wright-Patt), South Dakota (Rapid City), Wisconsin, and Wyoming.

MEETING STATE STANDARDS

As discussed above, this year the results continue to be very favorable in general, although the item assessing whether the STARBASE curriculum helps teachers meet their state education standards or not has had recent shifts. In the past this item has seen responses in the high 90's percentages for teachers stating the curriculum helps teachers meet state standards directly. This year and for the last two years, there was a decrease in that percentage, with 87 percent selecting this response in 2018 and 85 percent in 2019 and 2020. It is important to note that almost ALL the responses that moved away from the "helps reach standards *directly*" choice moved instead to the next statement: "Yes, the curriculum *indirectly* helps reach state standards."³⁶ The "directly" or "indirectly" meets responses were selected by 99.2 percent of teachers. This is noteworthy because there are two other responses that could be selected if a teacher wanted to express more distance between the STARBASE curriculum and their state standards.

In 2017 about 2 percent of all the teachers said the curriculum helped them "indirectly" in meeting state standards. In the past three years, the responses jumped to about 10 percent (2018) and 14 percent (2019 and 2020). This increase suggests that academies in some regions or states may have a more urgent need to examine the current state standards with respect to the STARBASE curriculum. An examination of the data shows the highest rates of response for "curriculum indirectly helps" came from teachers at academies in Arizona, Colorado, Connecticut (Waterbury), Florida, Georgia, Indiana, Louisiana (Bayou State and Pelican State), Massachusetts, Michigan, Ohio, Oklahoma (Fort Sill and Tulsa), South Carolina, Texas, Virginia, Wisconsin, and Wyoming. Another very important aspect of this feedback is to point out that response rates to the two most critical answer choices, which assert that the curriculum is not well aligned to state standards at all, did not increase. In fact, only 16 respondents out of 2,045 chose one of the two least favorable answers. While it appears the DoD STARBASE curriculum is still quite relevant to state standards, it is vital to continually examine and re-evaluate changes in state standards in order to ensure STARBASE continues to receive positive feedback about the program's relevance.

³⁶ The wording of this response was changed in 2018 to "Yes, the curriculum *indirectly* helps reach state standards" from "No, the curriculum *indirectly* helps reach state standards."

An item added to the survey last year asked teachers whether the DoD STARBASE academy provided the school with information about how the STARBASE curriculum is related to state education standards. Most teachers (90 percent) responded “Yes” they were provided this information. While communication of the DoD STARBASE curriculum’s relevance to state standards could be improved, generally it is well-communicated. Locations where communication might need more focus are those in Arizona, California, Colorado, Connecticut, Idaho, Indiana, Louisiana, Michigan, Montana, Ohio, Utah, and Wyoming.

IMPACT OF SCHOOL AND TEACHER SUPPORT ON ATTITUDINAL RATINGS

Program support includes support and advocacy of DoD STARBASE by teachers themselves as well as the resources and support provided to the teachers in the school environment. Table 38 presents mean values on the 7-point rating scale of teacher responses to six items that reflect on school and community support. A school’s plan to continue participation in the DoD STARBASE program next year (mean = 6.89) indicates that participating schools perceive value from having students attend the program. Additionally, it is evident that parents are delighted their children are participating (6.35), and that principals are strong advocates for the program (6.01).

Teachers indicated that they would like to bring more supplemental resources from the DoD STARBASE program back to their classrooms (mean = 6.33), and that they plan to incorporate some of the teaching techniques they observed there into their classroom activities (6.19). There was a 90 percent agreement rate regarding intention to use materials from DoD STARBASE in the classroom, shown in Table 37, which also reinforces the desire for more STEM resources. As in the past, some teachers prefer DoD supplemental resources over other similar resources (5.79).

Table 38: Program Support Ranked from Most to Least Favorable

	Mean
My school plans to participate in the DoD STARBASE program again next year.	6.88
Parents are delighted that their children are participating in DoD STARBASE.	6.35
I would like more DoD STARBASE supplemental resources to take back to my classroom.	6.33
I plan to incorporate DoD STARBASE teaching techniques into my daily classroom activities.	6.19
My principal is a strong advocate of DoD STARBASE.	6.01
I prefer the supplemental resources DoD STARBASE provides to teachers over other similar resources.	5.79

“ My class loved STARBASE and it was inspiring to see the excitement throughout the week. The program has a lot of hands-on activities that engage all students and encourage group work and make real-world connections. Parents said that STARBASE is all they heard about all week and were also happy that the curriculum hit on many of the 5th grade curriculum standards.”

- MS. BRAINARD, EDUCATOR AT CASTLE HAYNE ELEMENTARY,
ATTENDING STARBASE FORT FISHER



ANALYSIS OF PROGRAM SUPPORT AND OVERALL INDEX

The Overall Index is an aggregate scale score based on the mean value, or average, of the 44 attitudinal items that were rated by teachers. The Overall Index score was compared between subgroups of teachers based on their responses to other items ascertaining the level of support provided to the teachers. In all instances, those teachers who received support from the school and resource materials expressed more favorable attitudes toward the DoD STARBASE program compared to those teachers with little or no perceived support.

- Teachers that use or plan to use DoD STARBASE resource material and take home activities have more favorable attitudes as measured by the Overall Index (6.09 and 6.19, respectively) compared to those that do not utilize these resources (5.23 and 5.51, respectively).
- Those teachers reporting that the DoD STARBASE curriculum directly helped them reach state education standards have more favorable overall attitudes (6.13) compared to those reporting only an indirect relationship (5.55).
- Schools with formal communication processes in place had higher teacher ratings (6.13) on the Overall Index than those with no formal communication (5.80) processes in place.
- Teachers that would recommend the DoD STARBASE program responded with higher overall ratings (6.05) as compared to those that would not recommend the program (3.94). Note, the number of teachers that would not recommend the program was quite small (N=15); nonetheless, the result suggests strong overall approval of the program motivates teachers to share information about the program with other adults in school administration.

MILITARY EXPOSURE AND CAREER OPPORTUNITIES

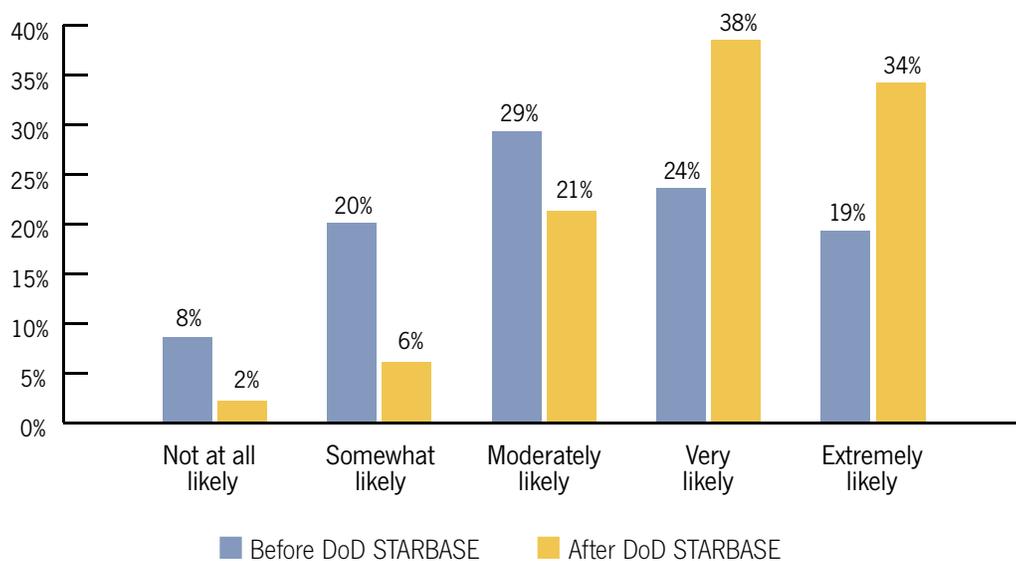
Teacher experience with military bases is similar to what has been seen in recent years (Table 39). The majority of teachers (77.5 percent) involved in the DoD STARBASE program this year have had some type of exposure to a military base. There is a small increase in the percentage of teachers returning to STARBASE (20.3 percent) from the past few years. This trend is also reflected in the higher percentage of teachers who report a combination of both STARBASE and non-STARBASE reasons behind their previous visits to a military base (23.1 percent). The percentage of teachers who visited a military base solely for other activities has increased slightly (34.1 percent) this time. Approximately one quarter of the teachers (22.5 percent) reported that this is their first experience with a military base and the DoD STARBASE program.

Table 39: Experience with a Military Base

	2016 (N=2,296)	2017 (N=2,639)	2018 (N=2,630)	2019 (N=2,820)	2020 (N=2,045)
Response	%	%	%	%	%
Never visited a military base before the current DoD STARBASE Program	25.7%	23.9%	26.3%	24.7%	22.5%
Yes, for prior DoD STARBASE programs only	14.3%	15.1%	15.5%	18.9%	20.3%
Yes, for activities not related to DoD STARBASE	36.0%	35.2%	36.3%	33.6%	34.1%
Yes, for DoD STARBASE and non-DoD STARBASE activities	19.3%	21.2%	18.6%	22.8%	23.1%
Other	4.8%	4.5%	3.2%	NA	NA

For teachers, attending DoD STARBASE prompts some meaningful changes in perspective. For instance, 90 percent (N=1,839) of the teachers reported that they became more aware of career opportunities (both military and civilian) within the Department of Defense because of their participation in the DoD STARBASE program. Teachers also indicated how likely they were to recommend DoD or the military as a career option both prior to and after attending a DoD STARBASE program. The results show a 67 percent relative increase (from 43 percent to 72 percent overall) in teachers who say they are Very likely (38 percent) or Extremely likely (34 percent) to recommend the military or DoD civilian careers after the program. Before the program only a total of 43 percent overall were so inclined (24 percent Very likely and 19 percent Extremely likely). Figure 4 displays the change in favorability based on percentage of responses within each of the response categories.

Figure 4: How Likely Are You to Recommend the DoD or the Military as a Career Option to Your Students?



These results reinforce an important aspect of the program in showing how participating teachers consistently report positive shifts in perspectives on STEM-related activities and education for students that helps to drive the mission of DoD STARBASE. Even in years when a DoD-STARBASE experienced teacher does not take part in a program, they are likely to pass along their pro-STEM perspectives (enhanced by DoD STARBASE) to their students for the rest of their careers.



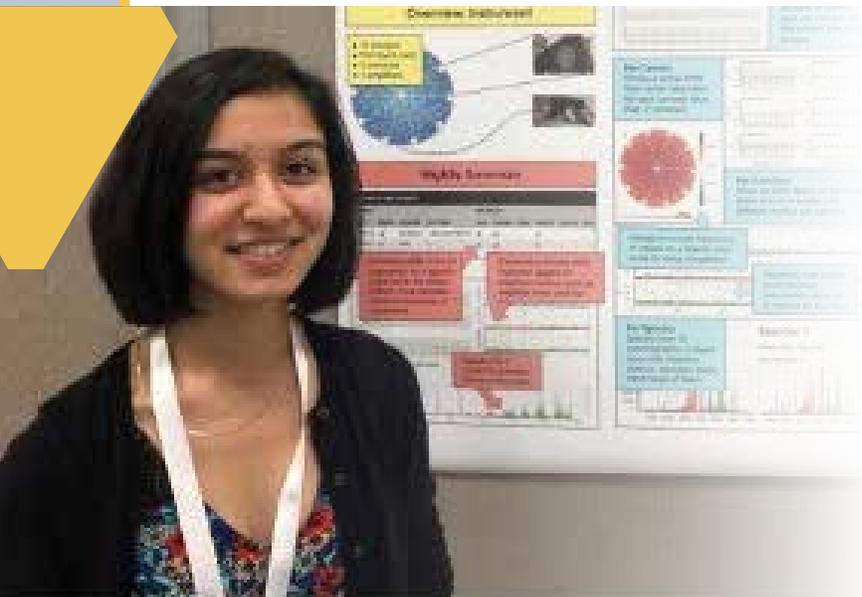
“The use of stem principles and experiments have built not only their background knowledge but also their confidence. Students have gotten more comfortable as the week has progressed and are willing to take chances now with their learning.”

- JOHN STEWART, EDUCATOR AT CREC INTERNATIONAL MAGNET SCHOOL, ATTENDING STARBASE CT-WINDSOR LOCKS



DoD STARBASE GRADUATE: RUHI DOSHI, CALLSIGN LILY

Growing up, Ruhi Doshi had a passion for science and math, but often felt frustrated being the only girl in the room at most STEM camps. On the first day of a robotics camp, Ruhi walked into a room full of boys who made decisions without her and told her to sit and watch. “I almost ran out crying.” Ruhi recalls. “I remember feeling so frustrated. Just because I may not have had the exposure beforehand didn’t mean I wasn’t capable. It just sucked the fun out of all these supposedly fun summer camps.”



Ruhi was ready to give up on math and science, but then she attended STARBASE Minnesota’s Next Generation summer program in 2011. “The first thing I noticed was that I could make friends with other girls. It was so refreshing to be able to do that and I felt empowered. I wasn’t the only person who felt that way. STARBASE gave me the confidence to keep pursuing my passion,” said Ruhi. This pivotal moment in her STEM journey was only the beginning. Today, Ruhi studies data science at the University of California (UC) - Berkeley, pursuing her dream job as an astro-informatics scientist. She contributes to dark energy research, participates in the statistics association, and even helps teach a data science course.

While at STARBASE Ruhi used a 3D printer for the first time and solved problems like an engineer. Working with her teammates, she tested the strength of shapes to solve a design challenge of building a bridge capable of holding significant weight. After completing the challenge, the team learned that engineers use trusses to build strong structures in real life. “I was just mind blown.” said Ruhi. “That’s the kind of problem solving that was really appealing to me about STEM, about creating new solutions...I’m never going to forget that.” At STARBASE, they also learned PTC Pro/Engineer computer-aided design modeling software to design and “print” their 3D rocket fins. “It was just absolutely fascinating to see all of the different shapes my friends and I designed,” she recalls.

That positive week at STARBASE not only revived Ruhi’s self-efficacy and interest in STEM, but also propelled her into more advanced STEM learning experiences. The very next year, Ruhi’s Engineering Technology and Design teacher offered her more complex projects because of her experience using Pro/Engineer while at STARBASE. Ruhi continued to pursue STEM outside of the classroom by joining Science Olympiad, where she found a community

CONTINUED

“ Stay involved and keep trying new experiences...STARBASE is a great launching point, being able to talk to other students and not feel shy about asking them what their rocket design looks like, how it’s different from yours, and what shape they think is best to support a bridge. Those are the ways you grow, learn, and keep staying interested in STEM.”

- RUHI DOSHI

of like-minded STEM enthusiasts. Over the years, her role has transitioned from that of an avid participant to a leader and mentor for student participants. “Now I help write textbooks and test questions and help proctor the Science Olympiad tournaments. It’s definitely one of the communities that I really enjoy being a part of.” she said.

While attending high school in the Twin Cities, Ruhi had the chance to conduct research alongside professors at the University of Minnesota, an experience that led her to declare a data science major at the UC - Berkeley. As a student, she takes classes like Data Inference and Decisions Statistics, and also contributes to STEM research as an intern with the Dark Energy Spectroscopic Instrument (DESI) Survey. As a member of this specialized software team, she works on creating a data quality monitoring application that astronomers use to make sure incoming data is of good quality. In early 2020, Ruhi and her undergraduate teammates had the opportunity to present at the 235th meeting of the American Astronomical Society in Hawaii.

Ruhi was asked which activities at STARBASE were most memorable and why. “I distinctly remember the activity about building the best structure to support a bridge using marshmallows and sticks.” Ruhi replied. “It was my first introduction to ‘engineering thinking’ and I had a lot of fun learning about new and creative ways to solve problems. I also remember using the Pro-E software to design the fins and tail for my rocket. I got to get hands-on experience with some pretty fancy tools; I later learned it was even

used in the real world. I was fascinated by the virtual visualization come to life in a 3D printer. It showed me how boundless technology was. I also remember talking to my friends and classmates about what the best design would be for the rocket. We could have real discussions about what shape would encounter the least air resistance and be most aerodynamic. It was really cool to be solving problems that real engineers did, even at a smaller scale. It was especially empowering that we were doing it the same way professionals do—collaborating with each other, building from new ideas, and using technology and software to achieve it! The STARBASE program shaped my career path in STEM by really pushing me to pursue my interest in STEM. I had always been interested in space, but at this program I found a whole community of my peers who wanted to explore it too, especially with other girls. I had fun, learned new skills, and felt empowered that this was something real I could do. I look back and I think of it as a defining first experience for me that set the trajectory for my future.”

When asked to share advice with current STARBASE students, she advocates for students to communicate with and support fellow classmates. “Stay involved and keep trying new experiences.” she said. “STARBASE is a great launching point, being able to talk to other students and not feel shy about asking them what their rocket design looks like, how it’s different from yours, and what shape they think is best to support a bridge. Those are the ways you grow, learn, and keep staying interested in STEM.” Great advice, Ruhi!!

POST-PROGRAM IMPACT

This section examines results from items that were posed only to teachers who have had at least one year of experience with DoD STARBASE (N=1,344). These items asked the experienced teachers to rate the degree of beneficial post-program impacts on students they noticed after students have a DoD STARBASE experience. The means for the post-program impacts are presented in Table 40 in rank order. Students talking about STARBASE long after it has ended is the highest rated impact item and perhaps the easiest outcome for teachers to observe. While most of the item means closely approximate magnitudes and ranking from 2019, interest in using computers for class-related learning showed the biggest increase (+.23) and change in rank (7th to 4th).

Table 40: Means for Post-Program Impact Items

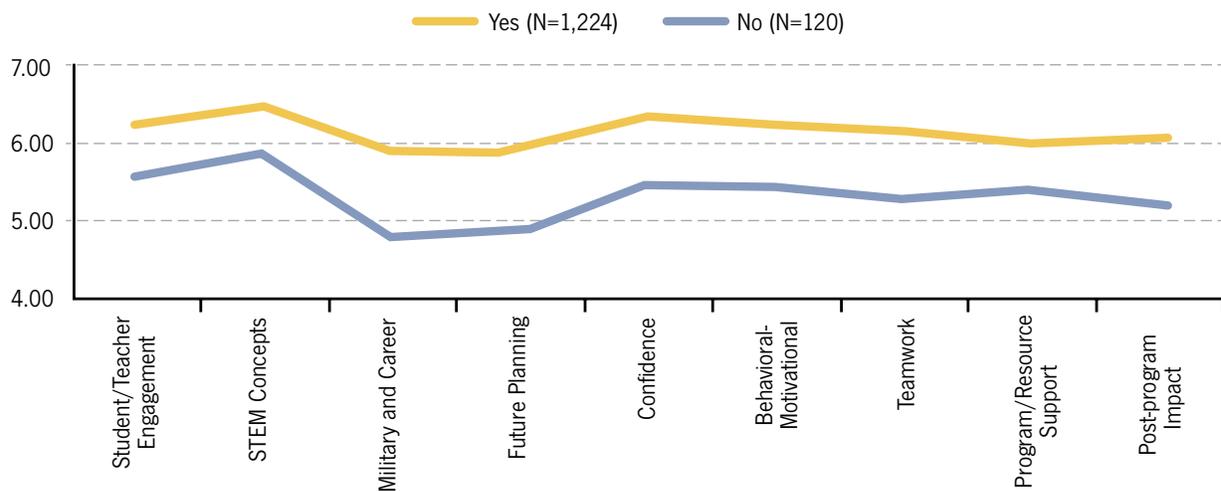
Post-Program Impact Item	2020 Mean
The students talk about DoD STARBASE long after the program has ended.	6.47
Attending DoD STARBASE helps students understand better how STEM skills/abilities fit job requirements for certain career fields.	6.35
Attending DoD STARBASE helps students understand better that developing their current STEM skills/abilities is necessary to have good future career choices.	6.33
After DoD STARBASE, students are more interested in using computers for class-related learning activities.	6.10
DoD STARBASE helps to improve cooperative learning in the classroom even after the program ends.	6.10
Attending DoD STARBASE helps students link their experience to careers in both military and non-military positions.	6.08
After the DoD STARBASE program, the students ask more questions about technology.	5.91
Students that have attended DoD STARBASE seem to perform better on standardized state assessments.	5.62
After DoD STARBASE attendance, there is increased participation in the Science Fair and other STEM-related challenge programs (e.g., FIRST LEGO League, Odyssey of the Mind, Team America Rocket Competition, etc.).	5.54
After DoD STARBASE, students have better school attendance.	5.15

These post-program impact attitudes, along with all survey measurement areas, were compared based upon whether experienced teachers reported increased awareness of DoD career opportunities. All of the post-program impact items were rated significantly higher for teachers who reported increased awareness of DoD career opportunities (t-tests were used to determine significance). The items with the largest magnitude of differences between mean item ratings for the group that gained a greater awareness of DoD STEM careers at STARBASE and those who said attending STARBASE did not expand their awareness of STEM-related careers in both military and non-military settings are listed below.

- Attending DoD STARBASE helps students link their experience to careers in both military and non-military positions.
- Students that have attended DoD STARBASE seem to perform better on standardized state assessments.
- After DoD STARBASE, students have better school attendance.
- After DoD STARBASE attendance, there is increased participation in STEM-related challenge programs (e.g., FIRST LEGO League, Odyssey of the Mind, Team America Rocket Competition, etc.).
- After DoD STARBASE, students are more interested in using computers for class-related learning activities.

The average group means for the “Post-Program Impact” composite scale and the other student/teacher engagement measures are presented in Figure 5. The differences between the composite measures means were significantly lower for teachers who did not have increased awareness of DoD career opportunities. This suggests an opportunity to build greater awareness among more teachers who have experienced DoD STARBASE before about career opportunities in DoD. Approximately 68 percent of teachers who responded “No” have participated in STARBASE for two to four years.

Figure 5: Teacher Perceptions of Student Behavior Based on Teachers Becoming More Aware of Department of Defense Career Opportunities After Attending DoD STARBASE



STIMULATING STEM AWARENESS IN STUDENTS

Teacher attitudes toward students’ STEM awareness was measured by six items: four items focused on student level of *interest* in learning about each of the four STEM areas; two items assessed *improvement* in student appreciation and understanding of science and math (Table 41). Concepts related to science were rated higher than math, which has been the trend over previous years. Specifically, students were viewed as more interested in technology (6.46) and science (6.44) compared to math (5.85) according to teacher perceptions. Teachers also saw more improved understanding of science (6.68) compared to appreciation of how math can be applied (6.39).

Examining Table 41 closely reveals that the mean favorability ratings on these items are slightly lower than in 2019. While the results this year are slightly lower than the last few years, they are still quite good. As in the past, only the item assessing student interest in learning about *math* has an average favorability rating under 6.00. The current trend is toward more observed interest by teachers of students in learning about technology and science, followed by engineering and math, in that order.



“The North Dakota STARBASE Program exposes Minot students to real-life DoD professional role-models who introduce them to exciting hands-on military technology and activities that cannot be replicated in the regular classroom.”

- LT COL (RET) PAUL VON OSTERHELDT, STARBASE NORTH DAKOTA

“STARBASE is an invaluable experience granted to the students in my small rural community. The CAD program, robotics, rockets, and other amazing activities that my students were able to take part in sparked engagement and helped my students realize areas of interest that they may want to pursue in the future.”

- ERIN NORTHCUTT, EDUCATOR AT BONANZA ELEMENTARY SCHOOL,
ATTENDING STARBASE KINGSLEY



Table 41: STEM Awareness Historical Comparisons

	2016	2017	2018	2019	2020
DoD STARBASE has helped to improve the students' understanding of science.	6.69	6.72	6.72	6.69	6.68
More interested in learning about technology.	6.55	6.53	6.50	6.47	6.46
More interested in learning about science.	6.54	6.54	6.48	6.47	6.44
DoD STARBASE has helped to improve students' appreciation of how math can be applied to a variety of situations.	6.49	6.48	6.45	6.44	6.39
More interested in learning about engineering.	6.26	6.28	6.23	6.20	6.18
More interested in learning about math.	5.97	5.97	5.92	5.90	5.85

DEVELOPING CONTINUED STEM INTEREST

Teachers are a good source for identifying additional development activities that are best suited to their students' learning styles. Teachers provided their opinion on the best way to continue developing their students' interest in STEM-related activities. Seventy-four percent of respondents indicated that the best way to sustain interest is to promote an existing program (36.3 percent) or a new program (38.5 percent) in the school system (Table 42). They felt the least likely ways to maintain STEM interest were by promoting a new program at the national, state, or community level (15.5 percent) or through an existing community-based program (9.7 percent). These results continue the trends seen since 2015, when these questions were first posed. DoD STARBASE provides a unique opportunity for students and teachers to access DoD/military personnel and civilian instructors who have specialized training in STEM-related topics. The program can continue to encourage and extend youthful interest in STEM-related activities by cultivating relationships with the teachers and the school systems.

Table 42: Developing Interest in STEM-Related Activities

Best way to develop continuing interest in STEM-related activities	Frequency	Percent
Promoting a new program in the school system	788	38.5%
An existing school-based program	743	36.3%
Promoting a new program at the national, state, or community level	316	15.5%
An existing community-based program	198	9.7%

AVAILABILITY OF ADDITIONAL STEM PROGRAMS AND ACTIVITIES

Teachers also provided information regarding access to school or community programs and extra-curricular activities to promote student access and interest in STEM concepts (Table 43). More than 30 percent of teachers report that there are “many” (13 percent) or “several” (21 percent) relevant STEM-awareness programs available to their students within their school and/or community. In contrast, approximately 13 percent said there were no other programs available. The most common response (52 percent) was teachers indicating they know of only a couple of relevant programs. These results are comparable to previous years; however, there was a slight decrease in the percentage of teachers picking the least favorable response of “No other” available STEM-relevant programs, which decreased 3 percentage points from 2019 to 13 percent in 2020. Trends are even more favorable on results of asking whether there are community extra-curricular STEM programs aimed at middle school aged students: 48 percent of the teacher respondents could confirm the existence of such programs in the community (same as 2019), while just 13 percent report their community offers no extra-curricular programs for middle school aged students, about the same as in recent years. Thus, teachers are becoming more informed about available STEM programs, as perhaps more STEM-related programs and activities are in fact being introduced into their schools and communities.

Table 43: STEM-Related School or Community Resources and Extra-Curricular Programs/Activities

Other resources in the school or community to further develop my students' STEM awareness beyond DoD STARBASE include...	Does your community have extra-curricular programs and/or activities for stimulating STEM interest aimed at middle school aged students?
13% many relevant STEM awareness programs	48.3% Yes
21% several relevant programs	13.3% No
52% only a couple of relevant programs	38.4% Not Sure
13% no other relevant programs	

Percentages are rounded and may not sum to 100% precisely.

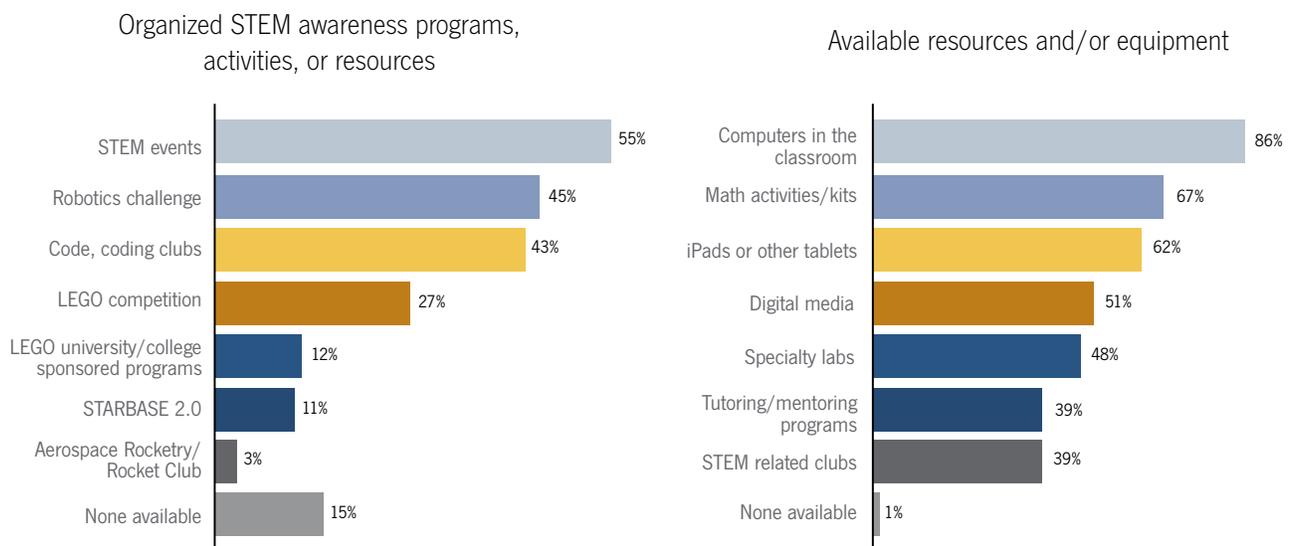
Teachers were asked to identify specific STEM awareness programs, activities, resources, and equipment available to students within the school system and the community at large. Fifteen percent of the teachers indicate that organized STEM awareness programs, activities, or resources are not available for their students after attending the DoD STARBASE program (Figure 6). Four hundred ninety-eight teachers (24 percent) wrote in other STEM programs or activities, and 80 teachers (4 percent) wrote in other resources or equipment.

- Eighty-five percent of the responding teachers (N=1,732) were able to identify at least one organized activity, program, or other resource for their students after DoD STARBASE has ended (e.g., Science Fair, Robotics challenge).
- In a repeat of last year’s results, 99 percent of responding teachers (N=2,041) report there are resources and/or equipment available in school for students to use (e.g., Math activities, Specialty labs). Last year’s results were replicated once again when teachers were asked about the availability of computers in the classroom dedicated to student use: 86 percent of teachers report computers are available for students in the classroom.

These findings are consistent with those obtained in the last couple years. STEM-related team challenge events such as Robotics challenge and coding club were two of the three most frequently identified programs. There was a sharp increase in frequency of Robotics challenge, increasing to 45 percent from 29 percent in 2019. In this changing STEM education environment, STARBASE 2.0 is on a par with local university and college STEM programs, though still relatively limited in availability. This information could be relevant when planning development of new curriculum and/or take away resources from DoD STARBASE, especially computer-based STEM learning modules or games.

As cited above, teachers were asked about the availability of PCs in the classroom, and 86 percent of teachers say they have a PC in the classroom for student activities, making it the most common answer four years running. Perhaps most interesting, however, is the dramatic shift in STEM education priorities over the past several years. With the advent of ubiquitous PCs in many classrooms, the reported availability of most other resources has fallen by 5 to 10 percent since 2016 (Figure 6). An exception is STEM-related clubs, which has increased by 10 percentage points in that period and are now widely available according to more than one third of teachers.

Figure 6: Organized STEM Programs and Available Resources for Students



I loved the DoD STARBASE program and believe it had a tremendous positive impact on my students. Many of them benefited from exposure to different kinds of technology that they normally wouldn't have the opportunity to explore. They also had a lot of great practice collaborating with their peers. I believe some of my students will now consider a career involving STEM and pursue STEM hobbies and interests following the program."

- TIM CINCOSKI, EDUCATOR AT RALEIGH EDISON CHARTER SCHOOL, ATTENDING STARBASE MINNESOTA-DULUTH

It is important that teachers and educators have post-DoD STARBASE programs available to continue to engage the students after the program has ended. Referring students to additional STEM-related programs or resources after DoD STARBASE is dependent upon availability and appropriateness to the student population. Ninety-six percent of the teachers plan to always (43 percent), often (35 percent), or sometimes (18 percent) refer students to additional STEM-related programs or resources after the DoD STARBASE program has ended (Table 44). Interestingly, these intentions have changed little or even been static for the past five years.

The high percentage of teachers who plan to refer students to additional STEM-related programs suggests that, whether or not they formed their opinion as a direct result of DoD STARBASE, nearly all the teachers who have attended a STARBASE academy understand the importance of fostering continued STEM-related interest in their students, even beyond the classroom. In what seems to be a variation on the 80-20 rule, roughly 80 percent of teachers are proactive on fostering continued student STEM involvement, and about 20 percent of teachers are lukewarm to the idea. The teachers that were less likely to refer students were also less confident teaching STEM topics. Of the teachers that do not plan to refer students or refer once or twice, 24 percent were not at all confident or only somewhat confident teaching STEM, while among teachers who plan to refer students sometimes or more often, only 12 percent were not at all confident or somewhat confident.

Table 44: Percent of Teachers Likely to Refer Students to STEM-related Programs or Resources

I plan to refer students to additional STEM-related programs or resources after DoD STARBASE.	2016	2017	2018	2019	2020
Always	49%	46%	46%	47%	43%
Often	33%	36%	35%	33%	35%
Sometimes	13%	15%	16%	16%	18%
Once or twice	2%	3%	2%	3%	3%
Not at all	1%	1%	1%	1%	1%
Other	3%	NA	NA	NA	NA



“In the six years that I’ve been teaching in Helena, the only activity every student is thrilled about is STARBASE. The activities are rigorous and, no matter what interests or learning style, students are always engaged. I also love using STARBASE to segue seamlessly through our science lessons in the classroom.”

- TONY NAPOLETANO, EDUCATOR AT CENTRAL ELEMENTARY SCHOOL, ATTENDING STARBASE FORT HARRISON

DRIVERS OF SELECTED TARGET RATINGS

Stepwise multiple regression analyses were performed to determine the important drivers of key teacher attitudes and ratings about DoD STARBASE³⁷. The key teacher ratings focus on broad program impact and on students' STEM and career engagement attitudes. The first regression analysis evaluated the post-program impact based on student and teacher engagement attitudes. Post-program impact is a composite scale calculated using 10 items completed by teachers with more than one year of experience participating in the DoD STARBASE program. This composite scale was regressed using the core items administered to all teachers evaluating their attitudes in relation to the 32 engagement survey items.

The drivers provide a comprehensive listing for identifying actions that most influence program effectiveness. The drivers listed for the post-program impact aggregate scale explain approximately 70 percent of the variance, or variability, across teachers in their perceptions of DoD STARBASE impact (as indicated by an R^2 value of .695). That is, these items predict individual teacher opinion about the program's impact on students with a high degree of efficiency. Thus, they provide a condensed model from which to tell how teachers feel about the program. The more drivers that are answered favorably or affirmatively, the more likely it is that a teacher holds a strongly positive viewpoint of the program's impact.

The results have some similarities and some differences from the driver model of post-program impact derived in 2019 with 55 percent overlap of the contributing teacher attitude items (*five overlapping items are highlighted below*). A more scaled down regression using just those five drivers that are in common with last year also resulted in a significant model ($R^2 = .64$), though not quite as strong as the one derived from the current survey. This year, teacher perceptions of students' focus on their future potential, confidence in what they can accomplish, and appreciation of application of math, along with teacher's preference for STARBASE supplemental resources together with teacher's plans to incorporate STARBASE teaching techniques, are key factors in positive post-program attitudes.

Student's better school attendance, student's interest in engineering, teacher's motivation to become more skilled in STEM instruction, and parent's delight that children are participating in DoD STARBASE are also important factors in determining positive opinions of DoD STARBASE impact.

DRIVERS OF POST-PROGRAM IMPACT³⁸ ($R^2 = .695$; $P < .05$)

- While attending DoD STARBASE, students appear to focus more on their future potential.
- Teachers plan to incorporate DoD STARBASE teaching techniques into daily classroom activities.
- DoD STARBASE has helped to improve students' appreciation of how math can be applied to a variety of situations.
- Teachers prefer the supplemental resources DoD STARBASE provides to teachers over other similar resources.
- While attending DoD STARBASE, students appear more confident about what they can accomplish.
- After DoD STARBASE, students appear more interested in learning about engineering.
- During DoD STARBASE, students have better school attendance.
- The DoD STARBASE experience has influenced me to become more skilled in STEM instruction.
- Parents are delighted that their children are participating in DoD STARBASE.

³⁷ Multiple regression analysis data is available upon request.

³⁸ The items making up this scale were not included in the regression analysis to maintain independence between predictor and outcome measures.

The DoD STARBASE program helps students understand their potential. Specifically, the regression analyses identified several areas that had the most impact across many of the target attitudes including, but not limited to, the following:

- Helping students understand better that developing their current skills/abilities is necessary to have good future career choices.
- Have more questions about DoD and other non-military career opportunities.
- More interested in learning about military careers.
- More excited about their futures.
- Focus more on their future potential.
- More interested in learning about engineering.

CONCLUSION

The value of the DoD STARBASE program is evident in its impact on the students and teachers who participate. The program has influenced and imbued a growing population of elementary and middle school teachers with the mission of providing students with STEM awareness activities that support student achievement overall, but especially in STEM related concepts, topics, and careers. For some participating schools, DoD STARBASE is the primary STEM program that is available to students.

The teachers report that participation in this DoD program appears to create an excitement within the students about their careers and future potential. Specifically, teachers attending the DoD STARBASE program report that the students³⁹:

- Have improved understanding of science (mean = 6.68), improved appreciation of applying math (6.39), more interest in learning technology (6.46), and more interest in learning engineering (6.18)
- More willing to try new things (6.42)
- Talk about DoD STARBASE long after the program ended (6.47)
- Understand better how STEM skills/abilities fit job requirements for certain career fields (6.35)
- Understand better that developing their current skills/abilities is necessary to have good future career choices (6.33)
- DoD STARBASE helps to improve cooperative learning in the classroom even after the program ends (6.10)

Students at DoD STARBASE participate in activities with DoD sponsored instructors that have specialized training in STEM concepts. The DoD STARBASE program enables the students to link these concepts to “real-world” applications. Based on analyses of the teacher survey and comments, it is evident that teachers value the DoD STARBASE program’s ability to provide awareness of and hands on experience in STEM concepts that can reinforce positive attitudes and behaviors. Additionally, the program emphasizes the importance of setting goals and looking forward to career opportunities that students in elementary grades might not be exposed to otherwise.

Although STARBASE is a youth program, the teachers who attend also benefit from exposure to the topics and the teaching methods, which is particularly important for the teachers who may not have the background or formal education and training in STEM fields (only 14 percent of the teachers indicated having a major or minor college degree in a STEM-related field). The DoD STARBASE program also provides teachers with additional resources and support. The survey data reveals that about 91 percent of participating teachers are influenced to become skilled in STEM instruction, about 92 percent of respondents say they plan to incorporate DoD STARBASE techniques in their classrooms, and 92 percent are at least “moderately likely” to suggest military or civilian DoD career opportunities to their students. Results like these strongly suggest that most teachers will continue to support the mission of DoD STARBASE by introducing their students to STEM-related activities and career paths, even if those students or teachers cannot participate in the DoD STARBASE program every year.

³⁹Likert scale based on response options from 1 (Disagree) to 7 (Agree).

DoD STARBASE Directory 2020





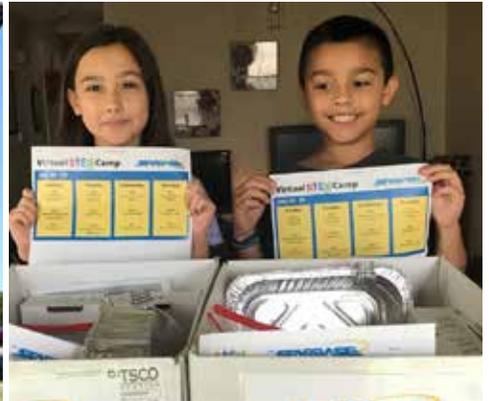
ALABAMA

MONTGOMERY

STARBASE Maxwell, *Established 2004*

SERVICE COMPONENT: Air Force

MILITARY LOCATION: Maxwell Air Force Base



NUMBER OF CLASSES HELD: 53

FY 2020 ANNUAL BUDGET: \$660,000

NUMBER OF STUDENTS SERVED:

Basic Program: 1,273

Supplemental Programs: 60

STARBASE 2.0 PROGRAM:

7 Middle School Clubs (Grade 6)

SCHOOL DISTRICTS SERVED:

Autauga Public Schools

DODEA School

Elmore County Public Schools

Montgomery Public Schools

Pike Road Schools

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

Montgomery Education Foundation

STARBASE Maxwell, located in Montgomery, Alabama opened in 2004 and has continued to provide quality STEM education for students from the River Region for the past 17 years. Beginning with only one classroom, the program has expanded to four classrooms, increasing their capacity from

28 to 112 students per day. Their goal is to provide the STARBASE program to all students from Montgomery, Autauga, and Elmore Counties. While the COVID-19 pandemic has impacted program operations, they continue to educate students via the STARBASE-on-Wheels and Virtual STARBASE programs.

They also offer a variety of outreach activities. This summer they successfully implemented virtual STEM summer camps and have a robust STARBASE 2.0 program, which includes a specialized “Girls Who Code” program for 6th-8th grade girls at Wetumpka Middle School. They look forward to engaging with their local students and exposing them to all that STARBASE Maxwell has to offer.

CONTACT INFORMATION:

60 W. Maxwell Blvd, Building 835

Montgomery, AL 36112

TELEPHONE: 334.953.4072

DIRECTOR: Katheryn Ganster

EMAIL: SB.Maxwell@dodstarbase.org

WEBSITE: www.starbasemaxwell.org



ARIZONA

TUCSON

STARBASE Arizona, *Established 2006*

SERVICE COMPONENT: Air Force

MILITARY LOCATION: Davis-Monthan Air Force Base



NUMBER OF CLASSES HELD: 24

FY 2020 ANNUAL BUDGET: \$281,708

NUMBER OF STUDENTS SERVED:

Basic Program: 692

SCHOOL DISTRICTS SERVED:

Amphitheater Unified School District
Sunnyside Unified School District
Vail Unified School District

STARBASE Arizona is housed on Davis-Monthan Air Force Base in Tucson, Arizona, being one of the few in the nation located on an active military installation. Since launching in 2006, they have been proudly sponsored by the 355th Fighter Wing, responsible for training and deploying the A-10 pilots.

A key strength of their program is the valuable relationships held within the Davis-Monthan military community. Military personnel provide a variety of STEM tours to acquaint students with the many military career opportunities.

They also visit the STARBASE classroom for a “working lunch” where they speak to students about their jobs and the importance of STEM to their daily activities. This “up close and personal” approach provides valuable insight into the diversity of military personnel stationed at the base and how STEM skills are part of everyday life.

CONTACT INFORMATION:

5355 E Granite Street, Building 2441
Tucson, AZ 85707
TELEPHONE: 520.228.0912
DIRECTOR: Kristine Impellezzeri
EMAIL: SB.Arizona@dodstarbase.org



CALIFORNIA

EDWARDS

STARBASE Edwards, *Established 2019*

SERVICE COMPONENT: Air Force

MILITARY LOCATION: Edwards Air Force Base



NUMBER OF CLASSES HELD: 40

FY 2020 ANNUAL BUDGET: \$414,500

NUMBER OF STUDENTS SERVED:

Basic Program: 1,108

Supplemental Programs: 280

SCHOOL DISTRICTS SERVED:

- Acton-Agua Dulce
- Eastside School District
- Lancaster School District
- Mojave Unified
- Muroc Joint Unified
- Palmdale School District
- Tehachapi Unified
- Westside Union School

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

STARBASE Edwards, Inc.

STARBASE Edwards is sponsored by the 412th Test Wing. They are known for raising public awareness of the need for scientific and

engineering literacy and providing exemplary teaching practices in STEM education. They have graduated over 1,700 students and established a strong presence in the Antelope Valley. Because of their commitment to educators and students, their program has been successful in establishing close ties with NASA, AFRL, and California State University, Monterey Bay to provide STEM outreach opportunities beyond Edwards Air Force Base. They work with their STARBASE Edwards, Inc. 501(c)(3) and industry partners.

CONTACT INFORMATION:

1535 Bailey Avenue

Edwards AFB, CA 93523

TELEPHONE: 661.277.1501

DIRECTOR: Amira Flores

EMAIL: SB.Edwards@dodstarbase.org

WEBSITE: <http://www.starbase-edwards.org>



CALIFORNIA

LOS ALAMITOS

STARBASE Los Alamitos, *Established 2013*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Los Alamitos Joint Forces Training Base



NUMBER OF CLASSES HELD: 58

FY 2020 ANNUAL BUDGET: \$965,000

NUMBER OF STUDENTS SERVED:

Basic Program: 1,801

Supplemental Programs: 350

STARBASE 2.0 PROGRAM:

1 Middle School Club (Grades 6-8)

STARBASE 3.0 JROTC PROGRAM: Yes

SCHOOL DISTRICTS SERVED:

Cypress Unified School District

Fullerton Unified School District

Los Angeles Unified School District

Santa Ana Unified School District

Charter & Independent Private Schools

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

California Military Department

STARBASE Los Alamitos

Since opening their doors in 2013, STARBASE Los Alamitos has served school districts in Los

Angeles, Santa Ana, Cypress, Long Beach, Fullerton, Huntington Beach and Westminster. They average about 3,500 students in their basic STARBASE program each year. STARBASE Los Alamitos also has an active 2.0 program which competes in the annual The American Rocketry Challenge (TARC) – the world's largest rocket contest with nearly 5,000 student participants nationwide. In 2019, their team made it to the TARC finals, and their goal is to do it again in 2021. They are currently developing a STARBASE 3.0 initiative which is planned for the summer of 2021.

STARBASE Los Alamitos believes that they have the future scientists and engineers in their programs and want to give them all the tools they need to be a success.

CONTACT INFORMATION:

11525 Freedom Way, Building 262

Los Alamitos, CA 90720

TELEPHONE: 562.795.1473

DIRECTOR: Stacey Hendrickson

EMAIL: SB.LosAlamitos@dodstarbase.org WEB-

SITE: <http://www.starbaselosal.org>



CALIFORNIA

SACRAMENTO

STARBASE Sacramento, *Established 1994*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Okinawa Street Armory



NUMBER OF CLASSES HELD: 38

FY 2020 ANNUAL BUDGET: \$680,000

NUMBER OF STUDENTS SERVED:

Basic Program: 1,102

Supplemental Programs: 380

STARBASE 2.0 PROGRAM:

2 Elementary School Clubs (Grade 6)

SCHOOL DISTRICTS SERVED:

- Elk Grove Unified Schools
- Folsom-Cordova Unified Schools
- Galt Joint Union Elementary Unified Schools
- River Delta Joint Unified Schools
- Robla Unified Schools
- Sacramento City Unified Schools
- San Juan Unified Schools

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

STARBASE Sacramento Academy Inc.

STARBASE Sacramento has been a proud and proven leader in introducing STEM concepts

since 1994. Currently, seven area school districts and homeschool groups are served with the on-site and 2.0 off-site programs. The support of the California Military Department allows STARBASE Sacramento to continue to thrive despite the challenges of teaching during the pandemic. This enabled the building of a robust learning platform centered around a weather balloon launch. The event successfully reached 1,700 participants through experiments, GPS tracking, and data analysis. STARBASE Sacramento shows that for over 26 years, nothing can stand in the way of its dedication to engaging underprivileged youth in STEM activities.

CONTACT INFORMATION:

8400 Okinawa Street, Suite 1
Sacramento, CA 95828

TELEPHONE: 916.854.1265

DIRECTOR: Jon Herrera

EMAIL: SB.Sacramento@dodstarbase.org

WEBSITE: <http://www.starbasesac.org>



CALIFORNIA

LOMPOC

STARBASE Vandenberg, *Established 2020*

SERVICE COMPONENT: Space Force

MILITARY LOCATION: Vandenberg Air Force Base



FY 2020 ANNUAL BUDGET: \$450,000

ANTICIPATED SCHOOL DISTRICTS SERVED:

Lompoc United School District
Manzanita Public Charter School

After waiting for almost a year, STARBASE Vandenberg has finally opened its doors. The staff was hired, and the building was furnished during 2020. Despite COVID-19 being ever present, smaller classes of scholars sat at the tables individually.

The welcome from the community has been overwhelming as outreach has begun and more events are scheduled around COVID-19 protocols. All the kids love the program and they are eager to see what is happening the very next day! STARBASE Vandenberg will continue to seek out safe opportunities to provide the program to the community of Lompoc, Vandenberg AFB, and surrounding areas.



CONTACT INFORMATION:

16135 Korina Street
Vandenberg AFB, CA 93437
TELEPHONE: 805.865.7199
DIRECTOR: Tonya Troup-Spurlock
EMAIL: SB.Vandenberg@dodstarbase.org



COLORADO

COLORADO SPRINGS

STARBASE Peterson, *Established 2014*

SERVICE COMPONENT: Space Force

MILITARY LOCATION: Peterson Air Force Base



NUMBER OF CLASSES HELD: 37

FY 2020 ANNUAL BUDGET: \$680,000

NUMBER OF STUDENTS SERVED:

Basic Program: 850

Supplemental Programs: 68

SCHOOL DISTRICTS SERVED:

Calhan School District

Colorado Charter School Institute

Colorado Springs School District #11

Ellicott School District #22

Harrison School District #2

Falcon School District #49

Widefield School District #3

Independent Private Schools

STARBASE Peterson is the only STARBASE in Colorado, averaging about 1,300+ students during a “normal” school year. They are part of the Peterson-Schriever Garrison, US Space Force Support Command, where Col James Smith is the commander. Their team of six has successfully reached their goal of reaching as many students as possible during the pandemic. They have hosted three summer camps, two summer enrichment programs, six academies, and deployed their “STARBASE-on-Wheels” program to two schools, with more requests coming in.

CONTACT INFORMATION:

710 Loring Street, Building 850

Colorado Springs, CO 80914

TELEPHONE: 719.556.9500

DIRECTOR: Patty Smathers

EMAIL: SB.Peterson@dodstarbase.org

WEBSITE: <https://starbasepeterson.com/>



CONNECTICUT

WATERBURY

STARBASE Waterbury, *Established 2003*

SERVICE COMPONENT: National Guard

LOCATION: Naugatuck Valley Community College



NUMBER OF CLASSES HELD: 21

FY 2020 ANNUAL BUDGET: \$326,000

NUMBER OF STUDENTS SERVED:

Basic Program: 551

Supplemental Programs: 27

STARBASE 2.0 PROGRAM:

4 Middle School Clubs (Grades 6-8)

SCHOOL DISTRICTS SERVED:

Children's Community Schools

Waterbury Parochial Schools

Waterbury Public Schools

Since 2003, STARBASE Waterbury has served the students of Waterbury. In that time, 12,000+ students have participated in the program housed at Naugatuck Valley Community College. The use of immersive, hands-on education has been a major focus of the program as well as STEM mentoring through collaboration with groups like the CT National Guard, Groton Naval Base, Civil Air Patrol (CAP), etc.

In a unique effort, STARBASE Waterbury and CAP have created STARBASE 2.0 programming that focuses on the flight basics and a trip to the Oxford Airport. They are also co-producing a weekly YouTube web series, in partnership with STARBASE CT-Windsor Locks, focused on student-submitted questions.

CONTACT INFORMATION:

750 Chase Parkway, Ekstom 307

Waterbury, CT 06708

TELEPHONE: 203.575.8271

DIRECTOR: Ted Garner

EMAIL: SB.CT-Waterbury@dodstarbase.org

WEBSITE: <http://www.starbase-ct.com/>



CONNECTICUT

HARTFORD

STARBASE Windsor Locks, *Established 2000*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Windsor Locks Readiness Center



NUMBER OF CLASSES HELD: 17

FY 2020 ANNUAL BUDGET: \$489,800

NUMBER OF STUDENTS SERVED:

Basic Program: 343

STARBASE 2.0 PROGRAM:

5 Clubs (Grades 4-8)

SCHOOL DISTRICTS SERVED:

Capital Region Education Council
Hartford Public
Jumoke Academy District
Windsor Locks School District
Windsor Parochial Schools

STARBASE Windsor Locks was established in 2000. Since then 13,300+ students in the Greater Hartford Area have participated in the program. Focused on student-driven, immersive education, STARBASE Windsor Locks strives to engage students and teachers in new and exciting ways.

Supported by the CT National Guard and housed at the Windsor Locks Readiness Center, STARBASE has grown and produced unique interactions with military personnel and opportunities for students through partnerships with groups like the Civil Air Patrol. These partnerships have challenged students to grow and engage with STEM. Most recently we have started co-producing a web series on YouTube focused on answering student STEM questions.

CONTACT INFORMATION:

85 Light Lane, Unit 300
Windsor Locks, CT 06096
TELEPHONE: 860.292.4678
DIRECTOR: Ted Garner

EMAIL: SB.CT-WindsorLocks@dodstarbase.org

WEBSITE: <http://www.starbase-ct.com/>



FLORIDA

JACKSONVILLE

STARBASE Florida, *Established 1994*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Jacksonville Air National Guard Base



NUMBER OF CLASSES HELD: 43

FY 2020 ANNUAL BUDGET: \$412,000

NUMBER OF STUDENTS SERVED:

Basic Program: 993

STARBASE 2.0 PROGRAM:

5 Clubs (Grades 4-8)

SCHOOL DISTRICTS SERVED:

Duval County Public Schools
St. Augustine Diocese

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

STARBASE Florida Inc.

Known for its sunny weather, amazing beaches, and worldwide tourist attractions, Jacksonville is also the home of STARBASE Florida. Located at the 125th Fighter Wing, Florida Air National Guard Base, STARBASE Florida has been in operation and serving the Duval County Public Schools (DCPS) since 1994.

Using a two-classroom setup, the STARBASE Florida program has served over 25,000 students and 118 schools in the Duval County and St. Augustine communities, enriching minds using STEM. Through their mind-blowing engineering, robotics, and science activities, Duval County Public Schools considers the STARBASE Florida program as a pivotal component to their schools' increased success.

CONTACT INFORMATION:

14300 FANG Drive
Jacksonville, FL 32218
TELEPHONE: 904.741.7320
DIRECTOR: Bruce A. Griner Jr.
EMAIL: SB.Florida@dodstarbase.org



FLORIDA

COCOA BEACH

STARBASE Patrick, *Established 2020*

SERVICE COMPONENT: Space Force

MILITARY LOCATION: Patrick Space Force Base



FY 2020 ANNUAL BUDGET: \$450,000

ANTICIPATED SCHOOL DISTRICTS SERVED:

Brevard Public Schools

STARBASE Patrick was founded in February 2020, in a state-of-the-art facility located in Satellite Beach, Florida. STARBASE Patrick targets at-risk 5th grade students from area public, private, and online schools located in Brevard County. They are proud to announce that they are affiliated with the active 45th Space Wing, and work with the Aldrin Family Foundation, which provided giant Moon and Mars maps for their summer space program. They are one of the few STARBASE programs that can see rockets being launched in their backyard.



CONTACT INFORMATION:

805 Harrier Avenue
Satellite Beach, FL 32937
TELEPHONE: 321.610.1457
DIRECTOR: Carol Taecker-Sluzky
EMAIL: SB.Patrick@dodstarbase.org



GEORGIA

MARIETTA

Peach State STARBASE, *Established 2001*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Clay National Guard Center



NUMBER OF CLASSES HELD: 42

FY 2020 ANNUAL BUDGET: \$612,000

NUMBER OF STUDENTS SERVED:

Basic Program: 895

Supplemental Programs: 35

STARBASE 2.0 PROGRAM:

6 Middle School Clubs (Grades 6-8)

SCHOOL DISTRICTS SERVED:

Cobb County School District

Marietta City Schools

Homeschool & Independent Private Schools

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

Peach State STARBASE Foundation Inc.

Peach State STARBASE (PSS) has been in operation for 19 years and has graduated almost 14,000 students in both its STARBASE 1.0 and 2.0 programs. Through that time, they have become a highly sought after partner in alternative STEM education among the metro Atlanta school

systems. PSS has become particularly noted for its unique aerial robotics based STARBASE 2.0 and summer camp programs, including a popular ground and air drone training institute for participating teachers each June. The Georgia National Guard provides a superb facility and logistical support to house these programs at the Clay National Guard Center. The Georgia Army National Guard's 78th Aviation Troop Command and 201st Regional Support Group both provide invaluable direct manpower assistance, and the U.S. Air Force Reserve's 94th Airlift Wing and its component commands have been overwhelming in their assistance with both academic year and summertime programs.

CONTACT INFORMATION:

1000 Halsey Avenue, Building 53
Marietta, GA 30060

TELEPHONE: 678.569.3565

DIRECTOR: John McKay

EMAIL: SB.PeachState@dodstarbase.org

WEBSITE: <http://www.peachstatestarbase.com>



GEORGIA

SAVANNAH

STARBASE Savannah, *Established 2012*

SERVICE COMPONENT: Army

MILITARY LOCATION: Hunter Army Airfield



NUMBER OF CLASSES HELD: 25

FY 2020 ANNUAL BUDGET: \$462,000

NUMBER OF STUDENTS SERVED:

Basic Program: 561

Supplemental Programs: 50

SCHOOL DISTRICTS SERVED:

Savannah Chatham County Public Schools

Candler County Public Schools

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

STARBASE Savannah Foundation

STARBASE Savannah started on March 20, 2012 with its first class from Pulaski Elementary School. From the first class until this present time, STARBASE Savannah has seen over 5,200 students. The teachers and students have participated in all of the experiments and activities that STARBASE has to offer.

STARBASE Savannah is the only STARBASE hosted by an active duty Army Unit and is located at Hunter Army Air Field, Savannah, Georgia. They partner with the Savannah-Chatham County Public School System and also the STARBASE Savannah Foundation to help achieve and accomplish the goals of the program. In addition, STARBASE Savannah is in the process of expanding to a two classroom a day set-up beginning school year 2021-2022.

CONTACT INFORMATION:

134 MacArthur Circle, Building 617
Savannah, GA 31409

TELEPHONE: 912.315.3749

DIRECTOR: Betty L. G. Morgan

EMAIL: SB.Savannah@dodstarbase.org



GEORGIA

WARNER ROBINS

STARBASE Robins, *Established 1996*

SERVICE COMPONENT: Air Force Reserve

MILITARY LOCATION: Robins Air Force Base



NUMBER OF CLASSES HELD: 88

FY 2020 ANNUAL BUDGET: \$675,000

NUMBER OF STUDENTS SERVED:

Basic Program: 2,082

Supplemental Programs: 140

STARBASE 2.0 PROGRAM:

24 Middle School Clubs (Grades 6-8)

STARBASE 3.0 JROTC PROGRAM: Yes

SCHOOL DISTRICTS SERVED:

Bibb County School District

Dooly County School System

Houston County Schools

Twiggs County Public Schools

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

Museum of Aviation Foundation

Throughout its 25 year history, STARBASE ROBINS has been supplementing Middle Georgia STEM

Education. STARBASE ROBINS was one of the first STARBASE sites to pilot the STARBASE 2.0 afterschool STEM Mentoring Program. This led to the program becoming a key player in the Central Georgia FIRST LEGO League (FLL). The program received its Level III Certification in Fiscal Year 2019. Since 2012, STEM Methods course students from Ft. Valley State University observe in the STARBASE classroom, assisting STARBASE personnel while learning in a non-traditional classroom setting. These teacher candidates benefit from exposure to real-life inquiry-based STEM teaching methods along with actual classroom experience in a monitored environment.

CONTACT INFORMATION:

1942 Heritage Blvd, PO Box 2469

Warner Robins, GA 31098

TELEPHONE: 478.926.1769

DIRECTOR: Wesley Fondal, Jr.

EMAIL: SB.Robins@dodstarbase.org

WEBSITE: <http://www.starbaserobins.org>



HAWAII

KEAAU

STARBASE Hawaii, *Established 2008*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Keau Armorey



NUMBER OF CLASSES HELD: 21

FY 2020 ANNUAL BUDGET: \$393,000

NUMBER OF STUDENTS SERVED:

Basic Program: 509

SCHOOL DISTRICTS SERVED:

Hawaii Department of Education

STARBASE Hawaii is located at the Keau National Guard Armory and is sponsored by the Hawaii Air National Guard. This location, which is part of the Keau Shipman Recreational Complex was selected because it is central to the school districts in most need of the STARBASE program. STARBASE Hawaii serves two school complexes - Kau-Keau-Pahoa (KKP) and Hilo-Waiakea, as well as two charter and two private schools.

After a state-mandated school closure due to COVID-19, STARBASE Hawaii implemented appropriate bio-safety protocols and partnered with the National Guard Youth Challenge

Academy at Hilo to deliver the 25-hour STEM curriculum to Youth Challenge cadets – serving six cadets at a time. STARBASE Hawaii will serve six groups of Youth Challenge cadets between September to December 2020.

Each group will also have a full day of Robotics – Claw-bot assembly. Instructors have also developed online lessons dealing with Meteorology, Astronomy, Robotics, and “Magic of Science.”

CONTACT INFORMATION:

16-512 Volcano Road, PO Box 256
Keau, HI 96749

TELEPHONE: 808.982.4298

DIRECTOR: Diana Kelley

EMAIL: SB.Hawaii@dodstarbase.org

WEBSITE: <https://sites.google.com/dodstarbase.org/starbase-hawaii/home>

STARBASE Idaho, *Established 2017*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Gowen Field



NUMBER OF CLASSES HELD: 53

FY 2020 ANNUAL BUDGET: \$502,000

NUMBER OF STUDENTS SERVED:

Basic Program: 1,300

Supplemental Programs: 365

SCHOOL DISTRICTS SERVED:

Boise School District

Caldwell School District

Kuna School District

Middleton School District

Nampa School District

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

Idaho Youth Challenge Foundation Inc.

Established in 2017, DoD STARBASE Idaho is in their third year of STEM instruction with the Idaho National Guard as their faithful sponsor. This year, they have found great success in remotely teaching the web based 3-D design

OnShape modules to 5th grade students who are creating 3-D models from their classroom desks.

They are fully scheduled for the 2020-2021 school year with On-Shape and launched their initial 2.0 program in November 2020. They are excited at the future possibility of getting students back into our STARBASE classrooms and plan to use all of their new supplies and equipment including trebuchets and Spheros.

CONTACT INFORMATION:

4040 W. Guard Street
Boise, ID 83705

TELEPHONE: 208.258.6534

DIRECTOR: Jim Heuring

EMAIL: SB.Idaho@dodstarbase.org

WEBSITE: <https://www.imd.idaho.gov/starbase/>



INDIANA

FORT WAYNE

STARBASE Indiana-Fort Wayne, *Established 2012*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Fort Wayne Air National Guard Base



NUMBER OF CLASSES HELD: 45

FY 2020 ANNUAL BUDGET: \$417,000

NUMBER OF STUDENTS SERVED:

Basic Program: 1,135

Supplemental Programs: 75

STARBASE 2.0 PROGRAM:

3 Middle School Clubs (Grade 6)

SCHOOL DISTRICTS SERVED:

- East Allen County Schools
- Fort Wayne - South Bend Diocese
- Fort Wayne Community Schools
- Fort Wayne Lutheran Schools
- Huntington Community School Corporation
- Lutheran Schools Partnership
- Independent Private Schools

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

STARBASE Indiana Inc.

STARBASE Indiana-Fort Wayne was founded at the 122nd Fighter Wing, Fort Wayne Air National Guard Base. They welcomed their first class on February 14, 2012. Their second classroom opened in the fall of 2015, and they have been serving two classes at a time from Northern Indiana and Western Ohio schools concurrently ever since. They see approximately 64 different 5th grade classes a year with three 2.0 afterschool programs. In addition, they offer students outreach opportunities through their three weeks of summer camps that take place in locations throughout the greater Fort Wayne area.

CONTACT INFORMATION:

3005 W. Ferguson Road

Fort Wayne, IN 46809

TELEPHONE: 260.478.3712

DIRECTOR: Evan Smith

EMAIL: SB.IN-FortWayne@dodstarbase.org

WEBSITE: <https://www.starbasein.org>



INDIANA

GARY

STARBASE Indiana-Gary, *Established 2018*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Indiana National Guard Armory



NUMBER OF CLASSES HELD: 24

FY 2020 ANNUAL BUDGET: \$352,000

NUMBER OF STUDENTS SERVED:

Basic Program: 601

STARBASE 2.0 PROGRAM:

1 Middle School Club (Grades 7-8)

SCHOOL DISTRICTS SERVED:

Gary Community School Corporation
Lake Station Community Schools
School City of East Chicago
Charter & Independent Private Schools

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

STARBASE Indiana Inc.

STARBASE Indiana-Gary is located at the Indiana Army National Guard Armory, with support from the 113th Engineer Battalion. Since inception, May 14, 2018, STARBASE

Indiana-Gary has successfully built partnerships with local public, private, charter, and home schools.

Connections and collaborations continue to be forged with professional and STEM based organizations and have resulted in impactful events such as: STEM at the Airport, quarterly STEM events at the Public Library, a partnership to implement coding for students, and participation on a Public School Project Based/STEM Curriculum Committee. STARBASE Gary continually seeks opportunities to share, ignite, and build excitement around STEM.

CONTACT INFORMATION:

2501 E. 15th Avenue
Gary, IN 46402

TELEPHONE: 317.247.3300 Ext. 85340

DIRECTOR: Ava R. Marshall-Ligon

EMAIL: SB.IN-Gary@dodstarbase.org

WEBSITE: <https://www.starbasein.org>



INDIANA

INDIANAPOLIS

STARBASE Indiana-Indianapolis, *Established 2015*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Indiana Joint Force Headquarters Stout Field



NUMBER OF CLASSES HELD: 37

FY 2020 ANNUAL BUDGET: \$352,000

NUMBER OF STUDENTS SERVED:

Basic Program: 850

Supplemental Programs: 70

STARBASE 2.0 PROGRAM:

1 Middle School Club (Grades 6-8)

SCHOOL DISTRICTS SERVED:

Concept Schools

Franklin Township Community School Corp.

Indianapolis Public School

MSD Decatur Township

Public Charter & Independent Private Schools

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

STARBASE Indiana Inc.

Opened in February 2015, DoD STARBASE Indiana-Indianapolis is located at the Indiana National Guard Joint Force Headquarters,

Stout Field. Since then, STARBASE Indianapolis has established relationships with school districts from the Greater Indianapolis area and surrounding townships, offering basic STARBASE and 2.0 programs. In addition, STARBASE Indiana-Indianapolis provides a range of high-quality programming directly to homeschool groups, military youth programs, and the wider community during the school year and summer camp sessions. Lastly, they are actively engaged with the community, working with partners like Ronald McDonald House, Conner Prairie, and Celebrate Science, among others, to provide STEM outreach.

CONTACT INFORMATION:

2002 S. Holt Road, Building 15

Indianapolis, IN 46241

TELEPHONE: 317.247.3502

DIRECTOR: Brande Morgan

EMAIL: SB.IN-Indianapolis@dodstarbase.org

WEBSITE: <https://www.starbasein.org>



INDIANA

SOUTH BEND

STARBASE Indiana-South Bend, *Established 2016*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: South Bend Army National Guard Armory



NUMBER OF CLASSES HELD: 39

FY 2020 ANNUAL BUDGET: \$352,000

NUMBER OF STUDENTS SERVED:

Basic Program: 835

STARBASE 2.0 PROGRAM:

1 Middle School Club (Grades 6-8)

SCHOOL DISTRICTS SERVED:

- Argos Community Schools
- Diocese of Fort Wayne South Bend
- School City Mishawaka
- South Bend Community School Corporation

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

STARBASE Indiana Inc.

STARBASE Indiana, located in South Bend, has been open since March of 2016 at the Indiana National Guard Armory. In the short four years of service to the Greater South Bend area, they have partnered with local entities such as:

South Bend Community School Corporation, AM General, Teachers Credit Union, and Bayer Corporation USA; several who have been financial donors to their program.

In 2019, Assistant Professor of Engineering, Dr. Pat Wensing, from the University of Notre Dame wrote into his approved National Science Foundation Grant a special Outreach partnership with STARBASE Indiana's South Bend Program. This will help expand STARBASE activities in Northern Indiana.

CONTACT INFORMATION:

1901 Kemble Avenue
 South Bend, IN 46613
 TELEPHONE: 317.247.3300 x. 8834
 DIRECTOR: Matt Bellina
 EMAIL: SB.IN-SouthBend@dodstarbase.org
 WEBSITE: <https://www.starbasein.org>



KANSAS

KANSAS CITY

STARBASE Kansas City, *Established 1999*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Olathe Armory



NUMBER OF CLASSES HELD: 24

FY 2020 ANNUAL BUDGET: \$412,000

NUMBER OF STUDENTS SERVED:

Basic Program: 808

Supplemental Programs: 81

STARBASE 2.0 PROGRAM:

3 Middle School Clubs (Grade 6)

STARBASE 3.0 JROTC PROGRAM: Yes

SCHOOL DISTRICTS SERVED:

- Basehor Linwood School District
- Easton Unified School District
- Kansas City Kansas Public Schools
- Lawrence Public Schools
- Leavenworth Unified School District
- Shawnee Mission School District
- Independent Private Schools

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

Kansas STARBASE Inc.

Sponsored by the Kansas National Guard and supported by Kansas STARBASE, Inc., STARBASE Kansas City's desire is to be a STEM-impactor in the Greater Kansas City area. They start with a STEM-passionate staff who present mind-engaging lessons with innovative technology, followed up by hands-on STEM investigations that challenge each student. These lessons complement curricular needs of their schools. They extend their reach in the community through outreach opportunities and 2.0 programs, partnerships with area universities, collaborative endeavors with like-minded STEM programs, and their own Kansas National Guard.

CONTACT INFORMATION:

18200 W. 87th Street

Lenexa, KS 66227

TELEPHONE: 785.646.7864

DIRECTOR: Karen Whitacre

EMAIL: SB.KansasCity@dodstarbase.org

WEBSITE: <https://www.kansasstarbase.org>



KANSAS

MANHATTAN

STARBASE Manhattan, *Established 2012*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Kansas National Guard Armory



NUMBER OF CLASSES HELD: 24

FY 2020 ANNUAL BUDGET: \$353,000

NUMBER OF STUDENTS SERVED:

Basic Program: 599

Supplemental Programs: 57

STARBASE 2.0 PROGRAM:

1 Middle School Club (Grade 6)

STARBASE 3.0 JROTC PROGRAM: Yes

SCHOOL DISTRICTS SERVED:

Kaw Valley School District #321

USD 113 Prairie Hills District

USD 320 Wamego Schools

USD 323 Rock Creek Schools

USD 329 Wabaunsee School District

USD 379 Clay Center School District

USD 380 Vermillion School District

USD 383 Manhattan-Ogden

USD 384 Blue Valley

USD 417 Morris County

USD 473 Chapman Schools

USD 475 Geary County Schools

SUPPORTING NOT-FOR-PROFIT

ORGANIZATION: Kansas STARBASE Inc.

STARBASE Manhattan has served Kansas students in the “Little Apple” since June 2012. With the Command sponsorship of the 130th Field Artillery Brigade of the Kansas National Guard, STARBASE Manhattan is well known for its connection with Fort Riley and Kansas State University. The program is also popular with small rural schools in the area. STARBASE Manhattan plays a vital role in Manhattan’s USD #383 Summer STEM Program. In addition, Fort Riley’s Child and Youth Services students are transported weekly to STARBASE Manhattan for summer STEM activities. Kansas State University provides great support with professors who serve as mentors in STARBASE 2.0 and talk about their STEM careers in the basic STARBASE program.

CONTACT INFORMATION:

721 Levee Drive

Manhattan, KS 66502

TELEPHONE: 785.646.4690

DIRECTOR: Becky Catlin

EMAIL: SB.Manahttan@dodstarbase.org

WEBSITE: <https://www.kansasstarbase.org>



KANSAS

SALINA

STARBASE Salina, *Established 1998*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Great Plains Joint Training Center



NUMBER OF CLASSES HELD: 20

FY 2020 ANNUAL BUDGET: \$353,000

NUMBER OF STUDENTS SERVED:

Basic Program: 665

Supplemental Programs: 28

STARBASE 2.0 PROGRAM:

3 Middle School Clubs (Grades 6-8)

STARBASE 3.0 JROTC PROGRAM: Yes

SCHOOL DISTRICTS SERVED:

- USD 112 USD 410
- USD 240 Twin Valley USD 419
- USD 305 USD 423
- USD 327 USD 444
- USD 334 USD 448
- USD 393 USD 473
- USD 408
- Independent Private Schools

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

Kansas STARBASE Inc.

STARBASE Salina has been offering STEM education since 1998. Located off Interstates 70 and 135 proves to be an ideal location for serving not only the students of Salina, but also a wide range of rural schools in a 60-mile radius.

Salina is the home of the National Guard Great Plains Joint Training Center, which supports the STARBASE Salina program. The training center is home of the 235th Regiment and Shadow Riders. These Blackhawk helicopter pilots and crew chiefs are heavily involved in the STARBASE program, providing tours of their facility and Blackhawk helicopters.

CONTACT INFORMATION:

2929 Scanlan Avenue, Building 365
Salina, KS 67401

TELEPHONE: 785.646.3313

DIRECTOR: Dixie Tipling

EMAIL: SB.Salina@dodstarbase.org

WEBSITE: <https://www.kansasstarbase.org>



KANSAS

TOPEKA

STARBASE Topeka, *Established 1994*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Armed Forces Reserve Center, Forbes Field



NUMBER OF CLASSES HELD: 21

FY 2020 ANNUAL BUDGET: \$369,000

NUMBER OF STUDENTS SERVED:

Basic Program: 750

Supplemental Programs: 196

STARBASE 2.0 PROGRAM:

6 Middle School Clubs (Grades 6-8)

STARBASE 3.0 JROTC PROGRAM: Yes

SCHOOL DISTRICTS SERVED:

Auburn-Washburn School District

Burlingame Public Schools

Jefferson West Public Schools

Kaw Valley Public Schools

Mission Valley Public Schools

Osage City Public Schools

Perry-Lecomptom School District

Seaman Public Schools

Topeka Public Schools

Independent Private Schools

SUPPORTING NOT-FOR-PROFIT

ORGANIZATION: Kansas STARBASE Inc.

STARBASE Topeka is now in its 27th year of operation. From its inception, demand for STARBASE Topeka has consistently exceeded the program's capacity for service. For the first 25 years STARBASE Topeka was hosted by the 190th Air Refueling Wing at Forbes Field. However, in 2019 STARBASE Topeka was relocated to the Armed Forces Reserve Center on the south end of Forbes Field, hosted by the 69th Troop Command and the Kansas Army National Guard. To date STARBASE Topeka has served over 31,000 students.

CONTACT INFORMATION:

7116 SE Forbes Avenue, Building 688

Topeka, KS 66619

TELEPHONE: 785.646.3990

DIRECTOR: Brent Mumford

EMAIL: SB.Topeka@dodstarbase.org

WEBSITE: <https://www.kansasstarbase.org>



KANSAS

WICHITA

STARBASE Wichita, *Established 1993*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: McConnell Air Force Base



NUMBER OF CLASSES HELD: 21

FY 2020 ANNUAL BUDGET: \$382,000

NUMBER OF STUDENTS SERVED:

Basic Program: 597

Supplemental Programs: 23

STARBASE 2.0 PROGRAM:

1 Middle School Club (Grade 8)

STARBASE 3.0 JROTC PROGRAM: Yes

SCHOOL DISTRICTS SERVED:

USD 259 Wichita Public Schools

USD 264 Clearwater Schools

USD 385 Andover Public Schools

USD 402

USD 440 Halstead and Bentley Schools

USD 462 Central Burden

USD 490 El Dorado School District

Independent Private Schools

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

Kansas STARBASE Inc.

STARBASE Wichita has been in operation for 27 years in Kansas and is supported by Kansas STARBASE Inc. (501c3). Since 1993, they have been a driving force for STEM education in grades 5-8.

Being located on McConnell Air Force Base and sponsored by the 184th Intelligence Wing has provided students with the opportunity to actively participate in STEM-related activities and meet military personnel to see how STEM is related to all military and civilian career fields. STARBASE Wichita strives to stimulate, encourage, and kindle a lifetime of learning through collaboration and STEM activities in order to empower tomorrow's problem solvers today.

CONTACT INFORMATION:

52870 Jayhawk Drive, Building 50

Wichita, KS 67221

TELEPHONE: 316.759.8911

DIRECTOR: G. Tony McDonald

EMAIL: SB.Wichita@dodstarbase.org

WEBSITE: <https://www.kansasstarbase.org>

Bayou State STARBASE, *Established 2015*

SERVICE COMPONENT: National Guard

LOCATION: North Iberville Parish High School



NUMBER OF CLASSES HELD: 23

FY 2020 ANNUAL BUDGET: \$378,000

NUMBER OF STUDENTS SERVED:

Basic Program: 735

SCHOOL DISTRICTS SERVED:

- East Baton Rouge Parish
- Iberville Parish
- Pointe Coupee Parish
- West Baton Rouge Parish

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

LANG Military Education and Training Fund

Bayou State STARBASE was opened as the third Louisiana National Guard (LANG) STARBASE program in 2018. It serves students from East Baton Rouge, West Baton Rouge, Pointe Coupee, and Iberville Parishes. It is sponsored by the LANG and supported by Iberville Parish Schools who provides a facility for the program in the North Iberville Parish High School building because there are no nearby military facilities. This unique STARBASE program

typically conducts about 30 academies each year to students of the Greater Baton Rouge Area.

Although scheduled for a record 33 academies during school year 2019-2020, the COVID-19 pandemic forced closure of the program in March 2020. They were still able to conduct 23 academies with an average of 32 students each for the year. During the shutdown, staff members worked diligently and productively to formally document all lesson scripts, review and document curriculum correlations to Louisiana state educational standards, and participate in on-line training. Once it became evident that schools would not return to “normal” in the fall, lessons were adjusted, and plans were made for alternative delivery of the STARBASE curriculum to keep local students engaged and excited about STEM.

CONTACT INFORMATION:

13770 Highway 77
 Rosedale, LA 70771
 TELEPHONE: 225.238.0250
 DIRECTOR: Regina Devillier Corcoran
 EMAIL: SB.BayouState@dodstarbase.org



LOUISIANA

BOSSIER CITY

STARBASE Louisiana, *Established 1999*

SERVICE COMPONENT: Air Force Reserve
MILITARY LOCATION: Barksdale Air Force Base



NUMBER OF CLASSES HELD: 66

FY 2020 ANNUAL BUDGET: \$832,000

NUMBER OF STUDENTS SERVED:

Basic Program: 1,651

STARBASE 2.0 PROGRAM:

28 Middle & High School Clubs
(Grades 6-8 & 9-12)

STARBASE 3.0 JROTC PROGRAM: Yes

SCHOOL DISTRICTS SERVED:

Bossier Parish Schools
Caddo Parish Schools
Independent Private Schools

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

STARBASE Louisiana, Inc.

For over 21 years, STARBASE Louisiana has been on the forefront of grade 5-12 STEM education in Northwest Louisiana. The program's continued exemplary performance resulted in the award of a Level III STARBASE status in 2019.

Sponsored by the 307th Bomb Wing of the Air Force Reserve Command and supported by STARBASE Louisiana Inc (501c3), STARBASE Louisiana inspires students and ignites a passion for learning through collaborative STEM experiences, empowering the innovators of tomorrow.

CONTACT INFORMATION:

827 Twining Drive, Building 4238
Barksdale AFB, LA 71110
TELEPHONE: 318.529.3521
DIRECTOR: Laurie Ilgenfritz
EMAIL: SB.Louisiana@dodstarbase.org
WEBSITE: <http://www.starbasela.org>



LOUISIANA

NEW ORLEANS

STARBASE Jackson Barracks, *Established 1999*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Jackson Barracks



NUMBER OF CLASSES HELD: 40

FY 2020 ANNUAL BUDGET: \$510,000

NUMBER OF STUDENTS SERVED:

Basic Program: 1,045

STARBASE 2.0 PROGRAM:

1 Middle School Club (Grades 6-8)

SCHOOL DISTRICTS SERVED:

Jefferson Parish
Orleans Parish
St. Bernard Parish

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

LANG Military Education and Training Fund

The STARBASE program in New Orleans actually began in 1999 as Pelican State STARBASE. It was closed and relocated to Pineville, LA after Hurricane Katrina devastated the New Orleans area in 2005. After seven years without a STARBASE program for their students, the resilient community of New Orleans and surrounding parishes provided

support to reopen the STARBASE program at the Jackson Barracks Military Base in the fall of 2012.

STARBASE Jackson Barracks services New Orleans, St. Bernard, and Jefferson Parishes, and is continually looking to reach out to new parishes in the metro area. In 2015, the program expanded to include a 2.0 program, which is conducted in partnering schools. In 2016, STARBASE Jackson Barracks increased to serving two academies simultaneously. Through the struggles of the recent pandemic, the STARBASE Jackson Barracks staff is working hard to continue to reach kids by traveling to schools that cannot leave their building and continue to provide opportunities in STEM in the community.

CONTACT INFORMATION:

6400 St. Claude Avenue

New Orleans, LA 70117

TELEPHONE: 504.278.8440

DIRECTOR: Annette Phillips

EMAIL: SB.JacksonBarracks@dodstarbase.org

Pelican State STARBASE, *Established 2006*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Camp Beauregard



NUMBER OF CLASSES HELD: 25

FY 2020 ANNUAL BUDGET: \$404,000

NUMBER OF STUDENTS SERVED:

Basic Program: 653

Supplemental Programs: 122

STARBASE 2.0 PROGRAM:

1 Middle School Club (Grade 6)

SCHOOL DISTRICTS SERVED:

Grant Parish School Board

Rapides Parish School Board

Homeschool & Independent Private Schools

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

LANG Military Education and Training Fund

The Pelican State STARBASE Program originally began operations at Jackson Barracks in New Orleans, LA. After the devastating floods of Hurricane Katrina in August 2005, the facility was basically totally destroyed with over four feet of water covering the entire post. With the help of Rapides Parish School Board, the staff of Pelican

State STARBASE reopened six months later on Camp Beauregard and was delivering the DoD STARBASE STEM curriculum by April 2006.

After serving the Central Louisiana Area (CENLA) to include public and private schools, Pelican State STARBASE has been operating at its current location for over 15 years. Running one classroom and one STARBASE 2.0 Program, Pelican State STARBASE provides full academy programs from August through June and provides enrichment programs year-round. Pelican State STARBASE has served over 15,000 students since its inception, becoming the foremost STEM provider in the CENLA area.

CONTACT INFORMATION:

609 F Street, Camp Beauregard
Pineville, LA 71360

TELEPHONE: 318.290.5252

DIRECTOR: Nancy L. Brinkerhoff-Force

EMAIL: SB.PelicanState@dodstarbase.org

WEBSITE: <https://www.facebook.com/Starbase-Jackson-Barracks-100430961462708/>



MASSACHUSETTS

BEDFORD

STARBASE Hanscom, *Established 2012*

SERVICE COMPONENT: Air Force

MILITARY LOCATION: Hanscom Air Force Base



NUMBER OF CLASSES HELD: 19

FY 2020 ANNUAL BUDGET: \$500,000

NUMBER OF STUDENTS SERVED:

Basic Program: 375

Supplemental Programs: 20

STARBASE 2.0 PROGRAM:

2 Middle School Clubs (Grades 6-7)

SCHOOL DISTRICTS SERVED:

Ayer-Shirley Regional School District

Leominster Public Schools

Lincoln Public Schools

Lowell Public Schools

Peabody Public Schools

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

Forward Position Inc.

Since opening their doors in 2012, the watchword at STARBASE Hanscom has been “community.” Their community consists of students, teachers,

administrators, interns, and professors. Collectively, they refine their skills and extend their reach to achieve the mission.

Throughout FY 2020, the STARBASE Hanscom team worked closely with participating teachers to mentor aspiring STEM teachers enrolled in the UTeach Program at UMass Boston. They also learned that an extensive three-year STEM teacher preparation project involving collaboration between Bridgewater State University and STARBASE Hanscom was funded by the National Science Foundation.

CONTACT INFORMATION:

98 Barksdale Street, Building 1530

Hanscom AFB, MA 01731

TELEPHONE: 781.862.8015

DIRECTOR: Peter Holden

EMAIL: SB.Hanscom@dodstarbase.org

WEBSITE: <https://www.starbasehanscom.live>



MICHIGAN

ALPENA

STARBASE Alpena, *Established 2012*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Alpena Combat Readiness Training Center



NUMBER OF CLASSES HELD: 17

FY 2020 ANNUAL BUDGET: \$370,000

NUMBER OF STUDENTS SERVED:

Basic Program: 561

Supplemental Programs: 20

STARBASE 2.0 PROGRAM:

2 Middle School Clubs (Grades 6-7)

SCHOOL DISTRICTS SERVED:

- Alcona Community Schools
- Alpena Public Schools
- Fairview Area School District
- Hillman Community Schools
- Posen Consolidated School District NO. 9
- Rogers City Area Schools
- West Branch-Rose City Area Schools
- Independent Private Schools

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

STARBASE Inc.

STARBASE Alpena is located at the Alpena Combat Readiness Training Center in northern Michigan's lower peninsula. In its eighth year, it attracts schools up to eighty miles away. Participants look forward to returning for STARBASE 2.0 and summer programs. Their most popular summer program is the trebuchet project. Students learn about STEM careers, Newton's forces, types of energy, and engineering by building a trebuchet with a 16-foot throwing arm. Under close supervision, they are able to launch small watermelons at their own cardboard buildings. Hitting these is fun but clearing them is a pure show of force...that is equal to mass times acceleration!

CONTACT INFORMATION:

5884 A Street, Building 04
Alpena, MI 49707

TELEPHONE: 989.354.6332

DIRECTOR: Steven Tezak

EMAIL: SB.Alpena@dodstarbase.org

WEBSITE: <https://www.starbasealpena.org>

STARBASE Battle Creek, *Established 2006*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Battle Creek Air National Guard Base



NUMBER OF CLASSES HELD: 40

FY 2020 ANNUAL BUDGET: \$435,000

NUMBER OF STUDENTS SERVED:

Basic Program: 1,042

Supplemental Programs: 50

STARBASE 2.0 PROGRAM:

2 Middle School Clubs (Grades 6-8)

SCHOOL DISTRICTS SERVED:

Battle Creek Public Schools

Colon Community Schools

Delton Kellogg Schools

Galesburg-Augusta Community Schools

Hastings Area Schools

Hopkins Public Schools

Lakewood Public Schools

Lawton Community Schools

Maple Valley Schools

Mar Lee Schools

Pennfield Schools

Thornapple Kellogg Schools

Three Rivers Community Schools

SUPPORTING NOT-FOR-PROFIT

ORGANIZATION: STARBASE Inc.

Opening in November 2006 with one classroom and adding a second classroom a year later, STARBASE Battle Creek reaches 1,500 students per year. With its tremendous success as a staple in the community, STARBASE Battle Creek has grown over the years, including collaborations with local higher education institutions for teacher development, extensive community outreach, including Spooky Science Saturday, 110th Wing Family Events, Patriot Challenge introduction, and STARBASE 2.0, an afterschool STEM initiative.

CONTACT INFORMATION:

3595 Mustang Avenue, Battle Creek ANG Base

Battle Creek, MI 49037

TELEPHONE: 269.969.3219

DIRECTOR: Bruce Medaugh

EMAIL: SB.BattleCreek@dodstarbase.org



MICHIGAN

MOUNT CLEMENS

STARBASE One, *Established 1993*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Selfridge Air National Guard Base



NUMBER OF CLASSES HELD: 41

FY 2020 ANNUAL BUDGET: \$1,006,000

NUMBER OF STUDENTS SERVED:

Basic Program: 1,049

SCHOOL DISTRICTS SERVED:

- Anchor Bay School District
- Armada Area Schools
- Detroit Public Schools Community District
- L'Anse Creuse Public Schools
- Lamphere Schools
- New Haven Community Schools
- Richmond Community Schools
- River Rouge Public Schools
- South Lake School District
- Public Charter & Independent Private Schools

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

STARBASE Inc.

STARBASE One has the distinction of being the first STARBASE Program. Beginning in 1991 as "Project STARS" under a W.K. Kellogg grant and

with the support of 127th Wing at Selfridge Air National Guard Base near Detroit, Michigan, the program transitioned to Department of Defense funding in 1993, thus launching the STARBASE concept across the United States.

STARBASE One has grown tremendously since its humble beginnings in a WWII era barrack slated for demolition. Today, its home is a 17,000 square foot facility that is an immersive educational playground, including a full-scale space shuttle nose simulator and a simulated Mars surface for robotics challenges.

CONTACT INFORMATION:

27310 D Street, Building 1051
Selfridge ANGB, MI 48045

TELEPHONE: 586.239.4884

DIRECTOR: Rick Simms

EMAIL: SB.One@dodstarbase.org

WEBSITE: <https://www.starbaseone.org>



MINNESOTA

DULUTH

STARBASE Minnesota-Duluth, *Established 2017*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Duluth Air National Guard Base



NUMBER OF CLASSES HELD: 38

FY 2020 ANNUAL BUDGET: \$715,450

NUMBER OF STUDENTS SERVED:

Basic Program: 924

SCHOOL DISTRICTS SERVED:

Carlton Public Schools
Duluth Edison Charter School
Duluth Public School District
Hermantown Public School District
Proctor Public School District
Independent Private Schools

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

STARBASE Minnesota, Inc.

STARBASE Minnesota-Duluth opened in 2017 with two classrooms serving approximately 1,400 students and reached capacity within one year. To meet exponential interest in the program, STARBASE expanded to a four-classroom operation in the fall of 2020. The state-of-the-art

facility is located with the 148th Fighter Wing at the Minnesota Air National Guard Base.

During the 2020-2021 school year, STARBASE Duluth plans to serve 2,300 5th grade students from Duluth and surrounding areas, including the Iron Range up to International Falls. STARBASE Minnesota-Duluth also hosts STARBASE Explorers, a summer camp for area students and youth organizations including YMCA and Boys & Girls Club.

CONTACT INFORMATION:

4680 Viper Street

Duluth, MN 55811

TELEPHONE: 218.788.7288

DIRECTOR: Charity Johnson

EMAIL: SB.MN-Duluth@dodstarbase.org

WEBSITE: <https://www.STARBASEmn.org>



MINNESOTA

ST. PAUL

STARBASE Minnesota-St. Paul, *Established 1993*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Minneapolis–Saint Paul Joint Air Reserve Station



NUMBER OF CLASSES HELD: 127

FY 2020 ANNUAL BUDGET: \$1,059,000

NUMBER OF STUDENTS SERVED:

Basic Program: 1,960

Supplemental Programs: 501

STARBASE 2.0 PROGRAM:

1 Middle School Club (Grade 6)

SCHOOL DISTRICTS SERVED:

- Anoka-Hennepin Schools
- Eden Prairie Public Schools
- Hopkins Public School District Public Schools
- Minneapolis Public Schools
- North St. Paul-Maplewood Oakdale Schools
- Osseo Schools
- Rosemount-Apple Valley-Eagan Schools
- St. Paul Public Schools
- Charter & Independent Private Schools

SUPPORTING NOT-FOR-PROFIT

ORGANIZATION: STARBASE Minnesota, Inc.

Since 1993, STARBASE Minnesota-St. Paul has educated and inspired over 70,000 Twin Cities

youth in STEM. Located at the Minneapolis-St. Paul Joint Air Reserve Station, they are supported by the 133rd Airlift Wing who provides state-of-the-art facilities, access to exciting technologies, and over 200 military and corporate volunteers to serve over 3,600 students each year. In addition to the military, STARBASE Minneapolis-St Paul partners with local STEM industries, universities, government, and other organizations in the advancement of STEM. STARBASE Minnesota-St Paul has a strong track of engaging the community in its mission, contributing to a STEM-skilled workforce, robust economy, and stronger communities. They received the Minnesota High Tech Association's Tekne Award for Community Impact in 2018.

CONTACT INFORMATION:

659 Mustang Avenue
St. Paul, MN 55111

TELEPHONE: 612.713.2530

DIRECTOR: Kim Van Wie

EMAIL: SB.MN-StPaul@dodstarbase.org

WEBSITE: <https://www.STARBASEmn.org>



MONTANA

HELENA

STARBASE Fort Harrison, *Established 2007*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Fort William Henry Harrison



NUMBER OF CLASSES HELD: 21

FY 2020 ANNUAL BUDGET: \$306,000

NUMBER OF STUDENTS SERVED:

Basic Program: 521

Supplemental Programs: 143

STARBASE 2.0 PROGRAM:

5 Middle School Clubs (Grades 6-7)

SCHOOL DISTRICTS SERVED:

East Helena Public School District

Helena Public School District

White Sulfur Springs School District

Wolf Creek School

Public Charter & Independent Private Schools

STARBASE Fort Harrison was founded in 2007 and is located on the Fort William Henry Harrison Army National Guard Base, which is just west of Helena. Since opening their doors, they have administered the full STARBASE curriculum to over 10,000 Montana students from 20 schools and 8 school districts.

Montana's rural population affords every 5th grade class from schools in the Greater Helena area to attend the STARBASE program. The STARBASE Montana team, consisting of personnel from STARBASE Fort Harrison and STARBASE Great Falls collaborate to run summer camps for military children. They also travel to area Indian reservations during the summer to serve Native American students through a variety of summer STEM outreach camps.

CONTACT INFORMATION:

121 Mitchell Way

Fort Harrison, MT 59636

TELEPHONE: 406.324.3727

DIRECTOR: Michael Vannatta

EMAIL: SB.FortHarrison@dodSTARBASE.org

WEBSITE: <https://sites.google.com/view/STARBASEhelena/home>



MONTANA

GREAT FALLS

STARBASE Great Falls, *Established 2011*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Great Falls Air National Guard Base



NUMBER OF CLASSES HELD: 26

FY 2020 ANNUAL BUDGET: \$493,000

NUMBER OF STUDENTS SERVED:

Basic Program: 578

Supplemental Programs: 76

STARBASE 2.0 PROGRAM:

4 Middle School Clubs (Grade 6)

SCHOOL DISTRICTS SERVED:

Great Falls Public School District

Rocky Boy Public School District

Ronan Public School District

Independent Private Schools

The Montana Air National Guard hosts the STARBASE program in Great Falls at the 120th Airlift Wing. Since inception in 2011, the program has served over 7,500 5th grade students. Montana's rural population demographics affords every 5th grade class from the district the opportunity to attend. The program serves

as many rural communities and private schools as the schedule can accommodate, ensuring a constant expansion of influence.

They continue to grow the STEM seed that was planted at STARBASE, by offering the STARBASE 2.0 afterschool mentoring program to middle school students. During the summer, the STARBASE Montana team, which includes STARBASE Great Falls and STARBASE Fort Harrison, collaborates to offer camps for military children and students in our Native American communities.

CONTACT INFORMATION:

2800 Airport Avenue B

Great Falls, MT 59404

TELEPHONE: 406.791.0806

DIRECTOR: Wendy Fechter

EMAIL: SB.GreatFalls@dodSTARBASE.org

WEBSITE: <https://sites.google.com/view/STARBASEhelena/home>



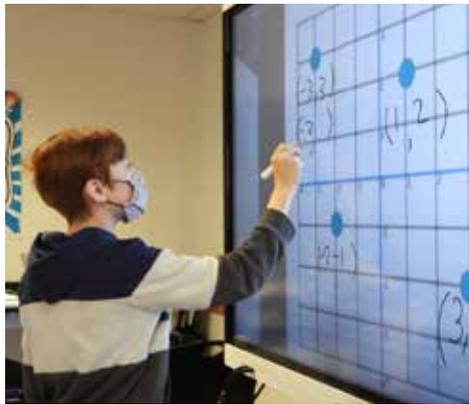
NEVADA

LAS VEGAS

STARBASE Nellis, *Established 2012*

SERVICE COMPONENT: Air Force Reserve

MILITARY LOCATION: Nellis Air Force Base



FY 2020 ANNUAL BUDGET: \$360,000

ANTICIPATED SCHOOL DISTRICTS SERVED:

Clark County School District

STARBASE Nellis opened in 2012 and served students through the 2018-2019 school year until contractual issues caused a temporary closure of the program. It had only been reopened a short time when the COVID-19 pandemic closed all Nevada schools.

The newly hired STARBASE Staff used the down time to renovate the building by adding new flooring and a second classroom. They also equipped the computer lab with new laptops and added exciting new graphics to the interior. The existing curriculum schedule was revamped to create more meaningful instruction and incorporate additional technology to each lesson. This new approach was tested and fine-tuned over the summer through three camps which served students from the Las Vegas valley. STARBASE Nellis is eagerly awaiting their restart as a full-DoD STARBASE program.



CONTACT INFORMATION:

2841 Kinely Drive, Building 1619

Nellis AFB, NV 89191

TELEPHONE: 702.340.0735

DIRECTOR: Tracy Clark

EMAIL: SB.Nellis@dodSTARBASE.org



NEW MEXICO

ALBUQUERQUE

STARBASE New Mexico, *Established 2013*

SERVICE COMPONENT: Air Force

MILITARY LOCATION: Kirtland Air Force Base



NUMBER OF CLASSES HELD: 40

FY 2020 ANNUAL BUDGET: \$447,000

NUMBER OF STUDENTS SERVED:

Basic Program: 1,012

Supplemental Programs: 60

STARBASE 2.0 PROGRAM:

1 Middle School Club (Grades 6-8)

SCHOOL DISTRICTS SERVED:

- Albuquerque Public Schools
- Grants-Cibola County Schools
- Los Lunas Public Schools
- Magdalena Municipal School District
- Moriarty-Edgewood School District
- Pueblo of Isleta
- Homeschool Groups

DoD STARBASE New Mexico was designated as an exemplary Level III STARBSAE program in 2019. Since opening their doors, they have served over 13,000 New Mexico students, mostly from Title I schools. Their partnership with the Air Force Research Laboratory and Kirtland Air Force Base,

and strong, positive relationships in the community, contribute to the success of their program.

In 2015, the University of New Mexico Center for Education Policy Research conducted a study that reported DoD STARBASE New Mexico student gains in both mathematics and language arts that persisted through middle and high school. The NM STARBASE 2.0 program, established in 2012, has competed twice in The American Rocketry Challenge National Finals.

CONTACT INFORMATION:

1401 Maxwell Street, Building 1900
Kirtland AFB, NM 87117

TELEPHONE: 505.846.2677

DIRECTOR: Esti Gutierrez

EMAIL: SB.NewMexico@dodSTARBASE.org

WEBSITE: <http://afrlnm.com/stem/missions/dod-STARBASE-nm/>



NORTH CAROLINA

CHARLOTTE

STARBASE Charlotte, *Established 1993*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Charlotte Air National Guard Base



NUMBER OF CLASSES HELD: 36

FY 2020 ANNUAL BUDGET: \$317,000

NUMBER OF STUDENTS SERVED:

Basic Program: 832

STARBASE 2.0 PROGRAM:

4 Middle School Clubs (Grade 6)

SCHOOL DISTRICTS SERVED:

Charlotte Mecklenburg Schools
Cleveland County Schools
Lincoln County Schools
Madison County Schools
Wake County Schools
Yadkin County Schools
Yancey County Schools

SUPPORTING NOT-FOR-PROFIT

ORGANIZATION: STARBASE NC Inc.

The North Carolina-Charlotte STARBASE program saw its first class of 22 students in late September 1993, but it did not happen easily. Earlier that year, their temporary classroom, which was almost ready to open, was damaged by the March “superstorm” tornado outbreak

that hit the east coast. They salvaged what they could and relocated with the 145th Airlift Wing to the Charlotte Air National Guard Base where they reside today. Their two dedicated classrooms and large computer laboratory effectively serve local students and an outreach initiative was started in October 1994 to ensure that students in remote counties would also get the opportunity to participate in the STARBASE program. STARBASE Charlotte instructors and military personnel routinely travel to these rural schools and deliver a concentrated, four-day program to all of their 5th grade students. To date, STARBASE Charlotte has reached over 76,000 students from 99 of the 100 counties in North Carolina.

CONTACT INFORMATION:

4930 Minutemen Way
Charlotte, NC 28208

TELEPHONE: 704.398.4819

DIRECTOR: Thomas Brown

EMAIL: SB.Charlotte@dodSTARBASE.org

WEBSITE: <http://facebook.com/STARBASEcharlotte/>



NORTH CAROLINA

WILMINGTON

STARBASE Fort Fisher, *Established 2004*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: North Carolina National Guard Training Center



NUMBER OF CLASSES HELD: 47

FY 2020 ANNUAL BUDGET: \$267,750

NUMBER OF STUDENTS SERVED:

Basic Program: 1,118

STARBASE 2.0 PROGRAM:

1 Middle School Club (Grade 6)

SCHOOL DISTRICTS SERVED:

Brunswick County Schools
New Hanover County Schools
Pender County Schools

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

STARBASE NC Inc.

STARBASE Fort Fisher was established as the second North Carolina STARBASE site in December 2004. Classes began that year at the North Carolina National Guard Training Center located at Fort Fisher, NC. This opened opportunities for students from the eastern part of the state to participate in the STARBASE program.

In September 2018, Hurricane Florence severely damaged the main STARBASE facility, destroying three of their classrooms in that building. A fourth classroom also sustained considerable damage and was rendered unusable. The STARBASE Fort Fisher staff worked tirelessly to save what they could, adapt to the new situation, and reschedule/conduct STARBASE classes at the individual school locations as an interim measure.

The Fort Fisher STARBASE program will be relocated to the Wilmington Carolina Beach Road Armory in Wilmington during Fiscal Year 2021 and looks forward to a new beginning.

CONTACT INFORMATION:

116 Air Force Way
Kure Beach, NC 28120
TELEPHONE: 704.398.4819
DIRECTOR: Thomas Brown
EMAIL: SB.FtFisher@dodSTARBASE.org
WEBSITE: <http://facebook.com/STARBASEfortfisher/>



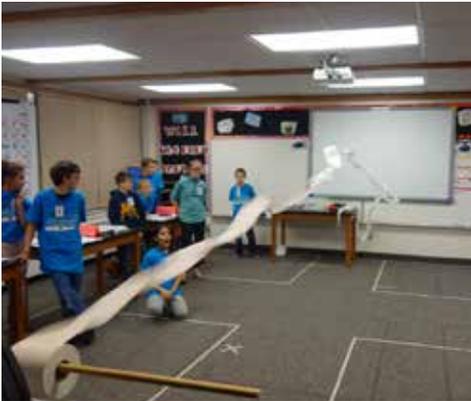
NORTH DAKOTA

MINOT

STARBASE North Dakota, *Established 2015*

SERVICE COMPONENT: Air Force

MILITARY LOCATION: Minot Air Force Base



NUMBER OF CLASSES HELD: 20

FY 2020 ANNUAL BUDGET: \$375,000

NUMBER OF STUDENTS SERVED:

Basic Program: 450

SCHOOL DISTRICTS SERVED:

Minot Public Schools
South Prairie School

STARBASE North Dakota is located on Minot Air Force Base and is hosted by the 5th Bomb Wing. The program opened in January 2015 and is located on base at the North Plains Elementary School. Students who attend STARBASE North Dakota have the unique opportunity to visit the only Department of Defense installation that has both B-52 bomber aircraft and a fleet of 150 Minuteman III intercontinental ballistic missiles (ICBM's). As such, students participating in the STARBASE program get to visit work centers with active-duty Air Force members who actively use STEM in both of these exciting career fields.

Student STEM tours typically include the B-52H Stratofortress Weapons System Trainer and the Missile Procedures Branch, which is part of only three operational ICBM units in the Air Force today. Through these tours and conversations with the military personnel who work the programs, students get glimpse into the diverse and incredible technology possibilities available with any future STEM Career.

CONTACT INFORMATION:

101 C Street
Minot AFB, ND 58704
TELEPHONE: 701.727.3439
DIRECTOR: Jon Dawson
EMAIL: SB.NorthDakota@dodSTARBASE.org
WEBSITE: <https://www.minot.k12.nd.us/STARBASE-f1cabf92>



OHIO

DAYTON

STARBASE Wright-Patt, *Established 2004*

SERVICE COMPONENT: Air Force

MILITARY LOCATION: Wright Patterson Air Force Base



NUMBER OF CLASSES HELD: 82

FY 2020 ANNUAL BUDGET: \$500,000

NUMBER OF STUDENTS SERVED:

Basic Program: 2,377

Supplemental Programs: 270

STARBASE 2.0 PROGRAM:

1 Middle School Club (Grade 6)

SCHOOL DISTRICTS SERVED:

- Beavercreek City Schools
- Dayton Public Schools
- Fairborn City Schools
- Greeneview Local Schools
- Huber Heights City Schools
- Jefferson Township Local
- Kettering City Schools
- Mad River Local Schools
- Yellow Springs Schools
- Independent Charter & Private Schools

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

Ohio Educational Outreach Foundation

Since its inception in 2004, STARBASE Wright-Patt has grown in many ways. From a modest start, they have evolved into a three-classroom operation that serves an average of 2,500 students from the Greater

Dayton Area each year. In addition to their basic STARBASE program, STARBASE Wright-Patt has also become an active leader and participant in many regional STEM events and activities. This includes annual events such as the Dayton Regional Science Festival, TechFest, and the NCAA STEM Hoopla. They also coordinate an afterschool STARBASE 2.0 program at Mad River Middle School.

These programs, along with essential industry and military partnerships to support summer camps and other outreach activities, earned STARBASE Wright-Patt the special designation of a Level III “Exemplary” DoD STARBASE program in 2019. They have recently developed a new “STARBASE-on-Wheels”/Virtual STARBASE program, with all safety protocols, to continue their STARBASE offerings during the COVID-19 pandemic.

CONTACT INFORMATION:

156 Spinning Drive
Dayton, OH 45431

TELEPHONE: 937.656.8673

DIRECTOR: Dann Andrews

EMAIL: SB.Wright-Patt@dodSTARBASE.org

WEBSITE: <http://wpafbstem.com/pages/k12-STARBASE-overview.html>



OKLAHOMA

ELK CITY

STARBASE Oklahoma-Burns Flat, *Established 2006*

SERVICE COMPONENT: National Guard

LOCATION: Western Technology Center



NUMBER OF CLASSES HELD: 10

FY 2020 ANNUAL BUDGET: \$172,600

NUMBER OF STUDENTS SERVED:

Basic Program: 237

STARBASE 2.0 PROGRAM:

1 Middle School Club (Grade 6)

SCHOOL DISTRICTS SERVED:

Arapaho/Butler Public Schools
Burns Flat - Dill City Public Schools
Canute Public Schools
Erick Public Schools
Hammon Public Schools
Mountain View-Gotebo Public Schools

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

STARBASE Oklahoma, Inc.

Located in the rural western part of Oklahoma, STARBASE Burns Flat is a small package with a lot to offer. STARBASE Burns Flat sits on the former Clinton Sherman AFB, which is now Western Technology Campus. The dynamic staff of two, offering one class, brings STEM alive and interesting. An advantage this STARBASE has – the Oklahoma Air and Space Port. The new director took a recent STARBASE class on a tour of the facility, provided activities, launching their paper aircraft, while viewing the “touch and goes” of a KC46. Canute is host to the 2.0 afterschool club, exploring energy, CO₂ cars, and more.

CONTACT INFORMATION:

501 Sooner Drive, PO Box 689

Burns Flat, OK 73624

TELEPHONE: 918.833.7757

DIRECTOR: Rita A. Miller

EMAIL: SB.OK-BurnsFlat@dodSTARBASE.org

WEBSITE: <http://www.STARBASEok.org>



OKLAHOMA

LAWTON

STARBASE Oklahoma-Lawton, *Established 2008*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Fort Sill



NUMBER OF CLASSES HELD: 44

FY 2020 ANNUAL BUDGET: \$517,800

NUMBER OF STUDENTS SERVED:

Basic Program: 1,103

Supplemental Programs: 101

STARBASE 2.0 PROGRAM:

2 Middle School Clubs (Grade 6)

SCHOOL DISTRICTS SERVED:

Bishop Public Schools

Boone-Apache Public Schools

Chattanooga Public School

Duncan Public Schools

Geronimo Public Schools

Lawton Public Schools

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

STARBASE Oklahoma, Inc.

Housed in the School Age Center, STARBASE Oklahoma-Lawton shares two classrooms with the four staff at the center. The creative and inspiring staff bring excitement to the students as they enter the building. The staff have been involved in “STARBASE-on-Wheels” with base restrictions in place. The road show has allowed many students to continue the experience. The STARBASE Lawton 2.0 has two clubs, exploring rocketry and energy, along with experiments with the Engineering Design Process.

CONTACT INFORMATION:

6599 Lucas Road, Fort Sill Youth Center

Fort Sill, OK 73503

TELEPHONE: 918.833.7757

DIRECTOR: Rita A. Miller

EMAIL: SB.OK-FortSill@dodSTARBASE.org

WEBSITE: <http://www.STARBASEok.org>



OKLAHOMA

OKLAHOMA CITY

STARBASE Oklahoma-Tinker, *Established 2001*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Tinker Air Force Base



NUMBER OF CLASSES HELD: 40

FY 2020 ANNUAL BUDGET: \$517,800

NUMBER OF STUDENTS SERVED:

Basic Program: 946

Supplemental Programs: 195

STARBASE 2.0 PROGRAM:

4 Middle School Clubs (Grades 6-7)

SCHOOL DISTRICTS SERVED:

Choctaw-Nicoma Park Schools

Crutcho Public Schools

Mcloud Public Schools

Mid-Del Public Schools

Independent Private Schools

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

STARBASE Oklahoma, Inc.

Located on Tinker Air Force Base, STARBASE Tinker is housed inside the Youth Center where they share class space. The classrooms are set up and then packed away each day. The four staff provide excellent instruction even with the constraints.

The Tinker staff are getting prepared for launch day of the STRATOSTAR weather balloon, with the students preparing their “experiment” to send up in excess of 92,000 feet in December 2020! The students are super excited to see what the effects of that altitude has on their capsule contents.

CONTACT INFORMATION:

4460 McNarney Ave., Bldg 5520

Oklahoma City, OK 73145

TELEPHONE: 918.833.7757

DIRECTOR: Rita A. Miller

EMAIL: SB.OK-Tinker@dodSTARBASE.org

WEBSITE: <http://www.STARBASEok.org>



OKLAHOMA

TULSA

STARBASE Oklahoma-Tulsa, *Established 1993*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Tulsa Air National Guard Base



NUMBER OF CLASSES HELD: 38

FY 2020 ANNUAL BUDGET: \$517,800

NUMBER OF STUDENTS SERVED:

Basic Program: 861

Supplemental Programs: 225

STARBASE 2.0 PROGRAM:

3 Middle School Clubs (Grades 6-7)

SCHOOL DISTRICTS SERVED:

Caney Valley Public Schools

Hominy Public Schools

Owasso Public Schools

Porter Public Schools

Pryor Public Schools

Tulsa Public Schools

Union Public Schools

Verdigris Public Schools

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

STARBASE Oklahoma, Inc.

STARBASE Tulsa is the headquarters of the STARBASE Oklahoma Program. Two classrooms and 11 staff members are housed in facilities at the Tulsa Air National Guard Base, Tulsa, OK. Tulsa's Career Day on the 6th day exudes excitement! Career Day takes the student into areas on the base, where military personnel place the student into their job. From the fireman suit, seeing inside the cockpit of an F-16, putting a pilot helmet on, and installing cabling, the student relates careers and STEM. In addition, Tulsa STARBASE 2.0 hosts three clubs exploring Engineering Design Process, rocketry, wind energy and mechanical energy in different types of automobiles and much more. The program received its Level III certification in Fiscal Year 2019.

CONTACT INFORMATION:

9131 Viper Street, Building 031

Tulsa, OK 74115

TELEPHONE: 918.833.7757

DIRECTOR: Rita A. Miller

EMAIL: SB.OK-Tulsa@dodSTARBASE.org

WEBSITE: <http://www.STARBASEok.org>



OREGON

KLAMATH FALLS

STARBASE Kingsley, *Established 1993*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Kingsley Field



NUMBER OF CLASSES HELD: 20

FY 2020 ANNUAL BUDGET: \$353,000

NUMBER OF STUDENTS SERVED:

Basic Program: 527

Supplemental Programs: 16

STARBASE 2.0 PROGRAM:

2 Middle School Clubs (Grades 6-8)

SCHOOL DISTRICTS SERVED:

Klamath County SD

Klamath Falls City Schools

Independent Private Schools

STARBASE Kingsley began serving students in 1993 and was the first of four STARBASE Oregon Programs. The Kingsley Program serves every 5th grade student in the Klamath Falls Basin a fact they are quite proud of. They are sponsored by the 173rd Fighter Wing at the Kingsley Field Air National Guard Base.

STARBASE Kingsley's greatest growth has been in their 2.0 program. The main 2.0 Club focus has been the 3-D Slot Car Engineering Curriculum design. Kingsley is further developing this program by offering Navigation/Drone Curriculum, Robotics Challenges and extensive Flight Camps. The STARBASE Kingsley 2.0 Clubs and Summer Academies are an integral contributor to the Klamath County Aerospace Engineering Career Pathway at the Middle School level.

CONTACT INFORMATION:

302 Bong Street, Suite 19

Klamath Falls, OR 97603

TELEPHONE: 541.331.8278

DIRECTOR: Denise Kortes

EMAIL: SB.Kingsley@dodSTARBASE.org



OREGON

PORTLAND

STARBASE Portland, *Established 1993*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Portland Air National Guard Base



NUMBER OF CLASSES HELD: 31

FY 2020 ANNUAL BUDGET: \$530,000

NUMBER OF STUDENTS SERVED:

Basic Program: 837

Supplemental Programs: 190

SCHOOL DISTRICTS SERVED:

Beaverton School District

Canby School District

Parkrose School District

Portland Public Schools

Reynolds School District

STARBASE Oregon stood up the Portland program in late 1993 as the second STARBASE site in the state. The Portland metro area is extremely diverse with 172 Title I 5th grade classes within a 30-minute travel radius. STARBASE Portland has steadily increased the capacity of classes served over the last eight years from 42 in 2012 to 60 in 2020 in an effort to reach as many Oregon youth as possible. The Portland Air National Guard Base is the air defense base for the Pacific Northwest and home to the F-15.

Every visiting STARBASE student is provided the opportunity to visit the F-15 hangar and explore. In previous years, the Portland 2.0 Club has offered students the opportunity to design and 3-D print their own slot cars, completing the 20-hour club with a grand finale car race.

In 2014, STARBASE Portland developed and piloted the “iPads as Student Log Books” program with the intention of offering the STARBASE Oregon students a learning environment that is technologically relevant and preparatory. The Portland staff went on to offer other STARBASE directors and instructors beginning in 2016, assisting in the growth of the STARBASE iPad program at a national level.

CONTACT INFORMATION:

6801 NE Cornfoot Road, Building 165

Portland, OR 98686

TELEPHONE: 503.972.8630

DIRECTOR: Denise Kortez

EMAIL: SB.Portland@dodSTARBASE.org



OREGON

UMATILLA

STARBASE Umatilla, Opening Spring 2021

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Camp Umatilla Armed Forces Training Center



FY 2020 ANNUAL BUDGET: \$264,000

ANTICIPATED SCHOOL DISTRICTS SERVED:

- Pendleton
- Hermiston
- Morrow County
- Umatilla

The newest STARBASE Oregon Program will be located at Camp Umatilla Armed Forces Training Center in the North East Columbia River Basin. Camp Umatilla is an exceptional facility for the STARBASE Program, which includes 3,350 sq. ft. of classroom space, offices, student restrooms, a kitchen, preparation areas and ample storage. Camp Umatilla also offers unique STEM opportunities to STARBASE students. It is home to the Smithsonian's Burrowed Owl Project, and Camp Umatilla shares airspace with the Pendleton Unmanned Aerial System Test Range. A STARBASE program will provide Camp Umatilla with new opportunities for collaboration and further strengthen relationships with the local communities.



CONTACT INFORMATION:

Camp Umatilla Armed Forces Training Center
Hermiston, OR 97838
TELEPHONE: 503.972.8630
DIRECTOR: Denise Kortes
EMAIL: SB.Umatilla@dodSTARBASE.org



OREGON

WARRENTON

STARBASE Camp Rilea, *Established 2019*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Camp Rilea Armed Forces Training Center



NUMBER OF CLASSES HELD: 17

FY 2020 ANNUAL BUDGET: \$190,000

NUMBER OF STUDENTS SERVED:

Basic Program: 431

Supplemental Programs: 32

SCHOOL DISTRICTS SERVED:

Astoria School District #1

Jewell School District #8

Knappa School District #4

Seaside School District #10

Warrenton-Hammond School District #30

The STARBASE Camp Rilea staff hit the ground running and has developed STARBITS teaching tools. The staff at STARBASE Camp Rilea is scheduled to teach 30 STARBASE directors and instructors how to build STARBITS circuit modules in June of 2021.

Camp Rilea's Armed Forces Training Center is home to STARBASE Oregon's third STARBASE Program. The facility annexed a piece of property with a schoolhouse on it and then completely renovated the building for STARBASE Camp Rilea. The program began welcoming students in March of 2019 and serves all of the 5th grade students in the area, along with a quarter of the 6th grade students.

CONTACT INFORMATION:

33168 Patriot Way

Warrenton, OR 97146

TELEPHONE: 503.972.8630

DIRECTOR: Denise Kortes

EMAIL: SB.CampRilea@dodSTARBASE.org



PUERTO RICO

CAROLINA

STARBASE Puerto Rico, Established 1995

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Muñiz Air National Guard Base



NUMBER OF CLASSES HELD: 19

FY 2020 ANNUAL BUDGET: \$411,000

NUMBER OF STUDENTS SERVED:

Basic Program: 428

Supplemental Programs: 30,000

STARBASE 2.0 PROGRAM:

2 Middle School Clubs (Grades 6-7)

SCHOOL DISTRICTS SERVED:

Barranquitas

Caguas

Canovanas

Carolina

Cidras

Guayama

Manatí

San Juan

Vega Alta

Independent Private Schools

STARBASE Puerto Rico was established at Muñiz Air National Guard Base in 1995 with the full

support of the Puerto Rico National Guard. Fiscal Year 2020 marked 25 years of serving youth, improving their knowledge in areas of science, technology, engineering, and mathematics (STEM). The program has since served over 24,000 participants. In order to better serve their students, classes are conducted in Spanish. Since 2018, Puerto Rico's STARBASE 2.0 program has served 137 students at four schools with the assistance of 24 volunteer mentors/coaches.

STARBASE Puerto Rico is a member of the Puerto Rico NASA Space Grant Consortium, an affiliate that provides them with the best STEM educators that the island has to offer, including college students assigned to work at their facility.

CONTACT INFORMATION:

200 José A. Santana Avenue
Carolina, PR 00979

TELEPHONE: 787.253.2513

DIRECTOR: Urbano Ayala Oliveras

EMAIL: SB.PuertoRico@dodSTARBASE.org



SOUTH CAROLINA

BEAUFORT

STARBASE MCAS Beaufort, *Established 1999 (Opening Summer 2021)*

SERVICE COMPONENT: Marine

MILITARY LOCATION: Marine Corps Air Station Beaufort



FY 2020 ANNUAL BUDGET: \$0

ANTICIPATED SCHOOL DISTRICTS SERVED:

Beaufort County School District

STARBASE Marine Corps Air Station (MCAS) Beaufort opened in 1999 and served students through most of Fiscal Year 2019 when contractual issues forced a temporary closure at the end of the 2018-2019 school year. Efforts are underway at the time of printing to re-open the program.

STARBASE MCAS Beaufort is considering a move to a new facility located in the DoD Schools and Common Housing area. The new facility includes four classrooms and a kitchen. If the relocation is approved, three classrooms will be dedicated to STARBASE, and the Provost Marshall's Office will use the remaining space. The new facility includes outdoor space for rocket launching.



CONTACT INFORMATION:

1011 Geiger Boulevard
Beaufort, SC 29904

EMAIL: SB.Beaufort@dodSTARBASE.org



SOUTH CAROLINA

COLUMBIA

STARBASE Swamp Fox, *Established 2003*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: McEntire Joint National Guard Base



NUMBER OF CLASSES HELD: 49

FY 2020 ANNUAL BUDGET: \$376,000

NUMBER OF STUDENTS SERVED:

Basic Program: 1,189

Supplemental Programs: 19

STARBASE 2.0 PROGRAM:

1 Middle School Club (Grade 6)

SCHOOL DISTRICTS SERVED:

Calhoun

Kershaw

Lexington

Lexington #2

Lexington/Richland #5

Richland School District #1

Richland #2

Sumter

Independent Private Schools

STARBASE Swamp Fox enjoyed a successful year even though the school year was shortened due to the COVID-19 pandemic. The program was

on track to set a new attendance record of over 1,600 students for school year 2019-2020. Even though all schools in South Carolina closed two months early, 1,189 students were still able to complete the program. STARBASE Swamp Fox also transitioned to a new location on McEntire Joint National Guard Base, returning to the Air National Guard cantonment area, which provided more opportunities for student interaction with military personnel. Staff members also participated in numerous school events such as STEM Nights and Career Days.

CONTACT INFORMATION:

1325 South Carolina Road, Building 984

Eastover, SC 29044

TELEPHONE: 803.647.8126

DIRECTOR: John M. Motley, Jr.

EMAIL: SB.SwampFox@dodSTARBASE.org

WEBSITE: <https://www.scSTARBASE.org>



SOUTH DAKOTA

RAPID CITY

STARBASE Rapid City, *Established 2002*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Camp Rapid



NUMBER OF CLASSES HELD: 30

FY 2020 ANNUAL BUDGET: \$317,300

NUMBER OF STUDENTS SERVED:

Basic Program: 721

STARBASE 2.0 PROGRAM:

1 Middle School Club (Grades 6-7)

SCHOOL DISTRICTS SERVED:

Douglas School District 51-1
Rapid City School District 51-4

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

STARBASE of South Dakota, Inc.

STARBASE Rapid City was established in 2002 and is hosted by the South Dakota National Guard on Camp Rapid in Rapid City, South Dakota. Their basic STARBASE program hosts, on average, 800 local students each year. They also have a traveling team, NOVA Honor, that travels throughout the western portion of their

state delivering the STARBASE program to 5th graders on Native American Indian Reservations and in rural schools.

STARBASE Rapid City also has a successful STARBASE 2.0 program, attends several outreach events, and holds as many two and three day sessions as possible to schools on their waiting list.

CONTACT INFORMATION:

2823 W. Main Street, Camp Rapid Bldg 801
Rapid City, SD 57702
TELEPHONE: 605.737.6083
DIRECTOR: Polly Unterbrunner
EMAIL: SB.RapidCity@dodSTARBASE.org
WEBSITE: <https://www.sdSTARBASE.org>



SOUTH DAKOTA

RAPID CITY

STARBASE NOVA Honor, *Established 2008*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Camp Rapid



NUMBER OF CLASSES HELD: 24

FY 2020 ANNUAL BUDGET: \$317,300

NUMBER OF STUDENTS SERVED:

Basic Program: 579

SCHOOL DISTRICTS SERVED:

Custer School District 16-1
Eagle Butte School District 20-1
Edgemont School District 23-1
Hot Springs School District 23-2
Kadoka Area School District 35-2
Lyman County School District 42-1
Meade School District 46-1
New Underwood School District 51-3
Oglala Lakota County School District 65-1
Pierre Indian Learning Center
Red Cloud Indian School
St. Joseph's Indian School
Stanley County Public Schools 57-1
Takini School
Timber Lake School District 20-3

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

STARBASE of South Dakota, Inc.

STARBASE NOVA Honor was established in 2008. Instructors are typically on the road traveling to schools with a pull-behind trailer four days a week during the school year delivering the STARBASE program to 5th graders in rural schools and on Native American Indian Reservations, including the Pine Ridge Indian Reservation, which has the highest poverty rate in the entire nation. When travel is allowed by the schools, the students take a one-day field trip to either the South Dakota Air and Space Museum at Ellsworth Air Force Base or the Sanford Research Lab in Lead, South Dakota, where military members and/or STEM professionals offer their time as tour guides or guest speakers.

CONTACT INFORMATION:

2823 W. Main Street, Camp Rapid, Bldg 801
Rapid City, SD 57702
TELEPHONE: 605.737.6083
DIRECTOR: Polly Unterbrunner
EMAIL: SB.NOVAHonor@dodSTARBASE.org
WEBSITE: <https://www.sdSTARBASE.org>



SOUTH DAKOTA

SIoux FALLS

STARBASE Sioux Falls, *Established 1994*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Joe Foss Field/Sioux Falls Armory



NUMBER OF CLASSES HELD: 25

FY 2020 ANNUAL BUDGET: \$329,000

NUMBER OF STUDENTS SERVED:

Basic Program: 528

Supplemental Programs: 224

STARBASE 2.0 PROGRAM:

1 Middle School Club (Grade 6)

SCHOOL DISTRICTS SERVED:

Garretson School District 49-4

Sioux Falls School District 49-5

Independent Private Schools

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

STARBASE of South Dakota, Inc.

STARBASE Sioux Falls began serving students in the eastern part of South Dakota in 1994. They are hosted by the South Dakota National Guard and are uniquely supported by both the Air and Army Guard programs. The “Air” side provides

a classroom at Joe Foss Field while the Army supports an additional classroom and office space at the Sioux Falls Armory. Their basic STARBASE program in Sioux Falls hosts an average of 800 students per year and in combination with their Native American outreach program, STARBASE NOVA Courage, the staff provides over 60 STARBASE academies, and 10 two-day enrichment programs. They also facilitate practicum experiences for education students from local universities and opportunities for military members and their children to experience STARBASE during the summer months.

CONTACT INFORMATION:

801 W. National Guard Drive

Sioux Falls, SD 57104

TELEPHONE: 605.367.4930

DIRECTOR: Donna Van Veldhuizen

EMAIL: SB.SiouxFalls@dodSTARBASE.org

WEBSITE: <https://www.sdSTARBASE.org>



SOUTH DAKOTA

SIoux FALLS

STARBASE NOVA Courage, *Established 1999*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Joe Foss Field/Sioux Falls Army



NUMBER OF CLASSES HELD: 24

FY 2020 ANNUAL BUDGET: \$329,000

NUMBER OF STUDENTS SERVED:

Basic Program: 515

Supplemental Programs: 210

SCHOOL DISTRICTS SERVED:

BIA Schools

Big Stone City School District 25-1

Browns Valley School District

De Smet School District 38-2

Harrisburg School District 41-2

Huron School District 02-2

Iroquois School District 02-3

Rosholt School District 54-4

Sisseton School District 54-2

Summit School District 54-6

Waubay School District 18-3

Webster Area 18-5

Wilmot School District 54-7

Wolsey Wessington School District 02-6

Independent Private Schools

SUPPORTING NOT-FOR-PROFIT

ORGANIZATION: STARBASE of South Dakota, Inc.

STARBASE NOVA Courage was established in 1999. Instructors are typically on the road with a pull-behind trailer 4 days a week during the school year delivering the STARBASE program to 5th graders on Native American Indian Reservations and in rural schools. A few of their schools even make the two hour bus ride to Sioux Falls for a day to visit the South Dakota Air National Guard at Joe Foss Field to see the F-16s and hear speakers.

STARBASE NOVA Courage plans to serve even more Native American youth in 2021 as they develop and finalize their first NOVA STARBASE 2.0 program at their Wagner location.

CONTACT INFORMATION:

801 W. National Guard Drive

Sioux Falls, SD 57104

TELEPHONE: 605.367.4930

DIRECTOR: Donna Van Veldhuizen

EMAIL: SB.NOVACourage@dodSTARBASE.org

WEBSITE: <https://www.sdSTARBASE.org>



TEXAS

AUSTIN

STARBASE Austin, *Established 2012*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Camp Mabry



NUMBER OF CLASSES HELD: 34

FY 2020 ANNUAL BUDGET: \$697,000

NUMBER OF STUDENTS SERVED:

Basic Program: 906

Supplemental Programs: 126

STARBASE 2.0 PROGRAM:

5 Middle School Clubs (Grades 6-8)

STARBASE 3.0 JROTC PROGRAM: Yes

SCHOOL DISTRICTS SERVED:

- Austin Independent School District
- Del Valle Independent School District
- Hutto Independent School District
- Lockhart Independent School District
- Pflugerville Independent School District
- Round Rock Independent School District
- Independent Private Schools

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

Texas STARBASE Inc.

Hosted by the Texas Military Department at Camp Mabry, STARBASE Austin challenges students to participate in activities exploring careers and to observe science, technology, engineering and mathematics (STEM) applications in the “real world.” Students interact with military personnel who reiterate their active role in the community and how they use STEM in their lives and careers. STARBASE Austin’s objective is to raise the interest and improve the knowledge and skills of at-risk students by offering exemplary instruction using a hands-on, minds-on curriculum correlated to the 5th-8th Grade Texas Essential Knowledge and Skills (TEKS).

CONTACT INFORMATION:

2200 W. 35th Street, Building 31, Camp Mabry
Austin, TX 78702

TELEPHONE: 512.782.3454

DIRECTOR: Patrick Yonnone

EMAIL: SB.TX-Austin@dodSTARBASE.org

WEBSITE: <https://www.STARBASEaustin.org>



TEXAS

SAN ANGELO

STARBASE Goodfellow, *Established 2017*

SERVICE COMPONENT: Air Force

MILITARY LOCATION: Goodfellow Air Force Base



NUMBER OF CLASSES HELD: 36

FY 2020 ANNUAL BUDGET: \$424,000

NUMBER OF STUDENTS SERVED:

Basic Program: 944

Supplemental Programs: 20

SCHOOL DISTRICTS SERVED:

Bronte Independent School District

San Angelo Independent School District

Wall Independent School District

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

San Angelo Museum of Fine Arts

Since its inception in September 2017, STARBASE Goodfellow and their partners have served Goodfellow Air Force Base and the surrounding communities. Joint-service military members, DoD civilians from the base and professor volunteers from Howard College and San Angelo State University serve as mentors throughout the year by sharing their STEM knowledge and expertise or

providing base tours to students while at the same time showcasing their career fields.

STARBASE Goodfellow is now in its third academic year of operations and will be able to educate and inspire even more youth in San Angelo and the surrounding communities by developing a 2.0 program in the near future that will target local 6th-8th grade middle schools.

CONTACT INFORMATION:

221 Texan Street, Building 901

Goodfellow AFB, TX 76908

TELEPHONE: 325.654.4740

DIRECTOR: Jesus Longoria, Jr.

EMAIL: SB.Goodfellow@dodSTARBASE.org

WEBSITE: <https://STARBASEgoodfellow.org>



TEXAS

HOUSTON

Texas STARBASE Houston, *Established 1994*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Ellington Field Joint Reserve Base



NUMBER OF CLASSES HELD: 27

FY 2020 ANNUAL BUDGET: \$651,000

NUMBER OF STUDENTS SERVED:

Basic Program: 741

STARBASE 2.0 PROGRAM:

2 Middle School Clubs (Grade 6)

SCHOOL DISTRICTS SERVED:

Galena Park Independent School District
Galveston/Houston Arch Diocese
Houston Independent School District
Humble Independent School District
La Porte Independent School District
Pasadena Independent School District
Sheldon Independent School District
Homeschools & Independent Private Schools

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

Texas STARBASE Inc.

Texas STARBASE is located at the Ellington Field Joint Reserve Base and, with the support of the 147th Attack Wing, has been in operation for over 26 years. Texas STARBASE occupies 8,066 square feet and operates out of two facilities (Building 1055 and 1056). These facilities house two dedicated classrooms, two computer labs, two large activity rooms, storage areas, restrooms, and six staff offices. In FY 2011 funds were made available allowing the program's service capacity to double. To date the STARBASE Houston site has served over 27,100 students from 152 schools representing 26 school districts. Texas STARBASE conducts STARBASE 2.0 afterschool program at our local schools.

CONTACT INFORMATION:

14657 Sneider Street, Building 1055
Houston, TX 77089
TELEPHONE: 281.929.2034
DIRECTOR: Loraine Guillen
EMAIL: SB.TX-Houston@dodstarbase.org



TEXAS

SAN ANTONIO

STARBASE Kelly, Established 1995

SERVICE COMPONENT: Air Force Reserve

MILITARY LOCATION: Joint Base San Antonio-Lackland



NUMBER OF CLASSES HELD: 21

FY 2020 ANNUAL BUDGET: \$306,000

NUMBER OF STUDENTS SERVED:

Basic Program: 531

Supplemental Programs: 114

STARBASE 2.0 PROGRAM:

1 Middle School Club (Grades 6-8)

SCHOOL DISTRICTS SERVED:

Edgewood Independent School District

South San Antonio Independent School District

Southwest Independent School District

STARBASE Kelly has been a STEM partner to San Antonio area school districts for the past 25 years, providing a rigorous and well-developed curriculum that impacts student learning and attitude long after they leave the program. They are located with the 433rd Airlift Wing Reserve unit, home of the C-5M Super Galaxy aircraft, at Joint Base San Antonio – Lackland. STARBASE Kelly students get to tour this giant aircraft with

crew members to understand some of the real-world STEM careers, particularly in the military.

STARBASE Kelly has graduated over 20,000 students since the program opened in 1995. Over 90 percent of them come from Hispanic/Latino backgrounds, and over 85 percent are considered low income/at-risk students. STARBASE Kelly also provides an afterschool STARBASE 2.0 club and proudly collaborates with many other STEM-based programs and organizations in the area.

CONTACT INFORMATION:

203 Galaxy Road

JBSA-Lackland, TX 78236

TELEPHONE: 210.925.3708

DIRECTOR: Katherine Kiolbassa-Spalding

EMAIL: SB.Kelly@dodSTARBASE.org



UTAH

LAYTON

STARBASE Hill, *Established 2011*

SERVICE COMPONENT: Air Force

MILITARY LOCATION: Hill Air Force Base



NUMBER OF CLASSES HELD: 32

FY 2020 ANNUAL BUDGET: \$524,000

NUMBER OF STUDENTS SERVED:

Basic Program: 833

Supplemental Programs: 464

STARBASE 2.0 PROGRAM:

4 Middle School Clubs (Grade 6)

SCHOOL DISTRICTS SERVED:

Davis School District

Independent Private Schools

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

Davis Education Foundation

In operation since 2011, STARBASE Hill has maintained a reputation as a premier STEM academy for the students of Utah. STARBASE Hill has a robust basic STARBASE program as well as 2.0 outreach programs. Their basic STARBASE program impacts 1,600 to 1,800 5th grade

students each year, with double that number on a wait list.

A resurrection of the 2.0 program jolted the surrounding districts with an in-school and afterschool program for 6th graders. The 2.0 STEM extension and mentorship program enhanced the skills of more than 500 students in 10 schools. A third classroom addition to the campus promises to enrich STEM activity throughout Utah communities and accommodate even more students.

CONTACT INFORMATION:

5731 E. Avenue, Building 460

Hill Air Force Base, UT 84056

TELEPHONE: 801.586.7493

DIRECTOR: David Amparan

EMAIL: SB.Hill@dodstarbase.org

WEBSITE: <https://www.starbasehill.org>



VERMONT

RUTLAND

STARBASE Rutland, *Established 2002*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Vermont Armed Forces Reserve Center



NUMBER OF CLASSES HELD: 24

FY 2020 ANNUAL BUDGET: \$400,000

NUMBER OF STUDENTS SERVED:

Basic Program: 531

Supplemental Programs: 20

STARBASE 2.0 PROGRAM:

2 Middle School Clubs (Grades 6-8)

SCHOOL DISTRICTS SERVED:

Addison Central Supervisory District
Addison Rutland Supervisory Union
Arlington School District
Bennington Rutland Supervisory Union
Greater Rutland Supervisory Union
Mill River Unified School District
Otter Valley Unified Union
Quarry Valley Unified School District
Rutland City Public Schools
Rutland North East Supervisory Union
Slate Valley Modified Unified School District
Slate Valley Unified School District
Southwestern Vermont Supervisory Union
Two Rivers Supervisory Union
White River Valley School District
White River Valley Supervisory Union
Windham Central Supervisory Union

SUPPORTING NOT-FOR-PROFIT

ORGANIZATION: STARBASE Vermont, Inc.

STARBASE Vermont's Rutland site has been at the forefront of STEM education with Southern Vermont Schools for more than 18 years. Sponsored by the 158th Fighter Wing of the Vermont Air National Guard and supported by the STARBASE Vermont, Inc. (501c3) non-profit, the Rutland site reaches students throughout Southern Vermont. STARBASE Rutland uses hands-on, minds-on learning to raise the interest and improve the knowledge and skills of at-risk youth in science, technology, engineering, and mathematics (STEM).

CONTACT INFORMATION:

2143 Post Road, Rutland AFRC
Rutland, VT 05701

TELEPHONE: 802.786.3820

DIRECTOR: Dan Myers

EMAIL: SB.VT-Rutland@dodstarbase.org

WEBSITE: <http://www.starbasevt.org>



VERMONT

SOUTH BURLINGTON

STARBASE South Burlington, *Established 1993*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Vermont Air National Guard Base



NUMBER OF CLASSES HELD: 21

FY 2020 ANNUAL BUDGET: \$400,000

NUMBER OF STUDENTS SERVED:

Basic Program: 366

Supplemental Programs: 519

SCHOOL DISTRICTS SERVED:

Addison Northwest Supervisory Union

Burlington School District

Champlain Valley School District

Franklin West Supervisory Union

Lamoille North Supervisory Union

Missisiquio Valley School District

South Burlington School District

Winooski School District

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

STARBASE Vermont, Inc.

STARBASE Vermont's South Burlington site has been at the forefront of STEM education for more than 27 years. Sponsored by the 158th Fighter Wing

of the Vermont Air National Guard and supported by the STARBASE Vermont, Inc. (501c3) non-profit, the South Burlington site reaches students throughout Northern Vermont.

STARBASE South Burlington uses hands-on, minds-on learning to raise the interest and improve the knowledge and skills of at-risk youth in science, technology, engineering, and mathematics (STEM). Our program inspires students and ignites a passion for learning that is empowering the innovators of tomorrow.

CONTACT INFORMATION:

62 NCO Drive, Building 90

South Burlington, VT 05403

TELEPHONE: 802.660.5201

DIRECTOR: Dan Myers

EMAIL: SB.VT-SouthBurlington@dodstarbase.org

WEBSITE: <http://www.starbasevt.org>



VIRGINIA

WINCHESTER

Winchester STARBASE Academy, *Established 2012*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Winchester Readiness Center



NUMBER OF CLASSES HELD: 45

FY 2020 ANNUAL BUDGET: \$604,000

NUMBER OF STUDENTS SERVED:

Basic Program: 912

Supplemental Programs: 49

STARBASE 2.0 PROGRAM:

1 Middle School Club (Grades 6-7)

STARBASE 3.0 JROTC PROGRAM: Yes

SCHOOL DISTRICTS SERVED:

Clarke County Public Schools

Frederick County Public Schools

Winchester Public Schools

Homeschool & Independent Private Schools

The Winchester STARBASE Academy opened for classes in August 2012 at the Winchester Readiness Center and is supported by the 116th Infantry Regiment. Their two-classroom facility allows them to serve 16 Shenandoah area schools.

In order to expand the benefits of STARBASE, a STARBASE 2.0 program was brought to Daniel Morgan Middle School in Winchester during the fall of 2015, which led to four years of participation with FIRST LEGO League competitions. In addition, a new partnership was developed with the Shenandoah University (SU) teaching program for the Fall 2020 semester. The SU Elementary Education students spend four days at STARBASE to participate in a variety of STEM activities and may choose to spend 20 practicum hours at their program.

CONTACT INFORMATION:

181 Pendleton Drive

Winchester, VA 22602

TELEPHONE: 540.686.4964

DIRECTOR: Susan Corrigan

EMAIL: SB.Winchester@dodstarbase.org

WEBSITE: <https://www.starbasewinchester.com>



WEST VIRGINIA

CHARLESTON

West Virginia STARBASE – Charleston, *Established 2001*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: McLaughlin Air National Guard Base



NUMBER OF CLASSES HELD: 39

FY 2020 ANNUAL BUDGET: \$470,000

NUMBER OF STUDENTS SERVED:

Basic Program: 1,043

Supplemental Programs: 112

SCHOOL DISTRICTS SERVED:

Kanawha County School District

Putnam County School District

West Virginia STARBASE – Charleston is hosted by the West Virginia National Guard’s 130th Airlift Wing in Charleston, WV. They conducted their first academy in 2001 serving 22 classes and 647 students. Since that time, they provided the engaging STARBASE program to over 950 classes and almost 24,000 students. The 2019-20 school year was a record breaker when they served over 1,200 area students.

The West Virginia STARBASE 2.0 program began in 2012 with a basic robotics program. By 2018, their expertise led to hosting the annual Kanawha County Robotics Competition. Overall, the

STARBASE 2.0 robotics program has involved over 70 middle school students.

The West Virginia STARBASE program is also ready to expand their outreach. Plans are underway to establish an additional 2.0 program with Kanawha County schools and the Katherine Johnson NASA Independent Verification and Validation facility in Fairmont, WV. A third classroom for their basic STARBASE program is also in the works.

CONTACT INFORMATION:

1679 Coonskin Drive, Civil Engineering Building
Charleston, WV 25331

TELEPHONE: 304.341.6440

DIRECTOR: Robin Barnette

EMAIL: SB.WV-Charleston@dodstarbase.org



WEST VIRGINIA

MARTINSBURG

STARBASE Martinsburg, *Established 2003*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: Shepherd Field Air National Guard Base



NUMBER OF CLASSES HELD: 72

FY 2020 ANNUAL BUDGET: \$517,000

NUMBER OF STUDENTS SERVED:

Basic Program: 1,909

Supplemental Programs: 5,240

STARBASE 2.0 PROGRAM:

3 Middle School Clubs (Grades 6-8)

STARBASE 3.0 JROTC PROGRAM: Yes

SCHOOL DISTRICTS SERVED:

Berkley County Schools

Jefferson County Schools

In 2003, STARBASE Martinsburg began serving 600 students in a single classroom. Fast-forward ten years and by 2013, they were operating three classrooms daily, reaching 2,500 students each year. Also, in 2013, they began their STARBASE 2.0 afterschool STEM program for middle schools. The first year included one club at one school. Currently, STARBASE Martinsburg operates 2.0 clubs at three schools with six different clubs. This

year, 2021, will bring new changes as they embark on STARBASE 3.0. This program will allow them to reach high school students.

STARBASE Martinsburg has now delivered the DoD STARBASE curriculum to well over 30,000 students. With multiple community outreach programs and involvement, their awareness and impact will never cease. They exist to share their love of STEM with thousands of children and educators alike.

CONTACT INFORMATION:

222 Sabre Jet Blvd, Building 120

Martinsburg, WV 25404

TELEPHONE: 304.616.5501

DIRECTOR: Sherra L. Triggs

EMAIL: SB.Martinsburg@dodstarbase.org

WEBSITE: <https://starbasemartinsburg.webs.com/>



WISCONSIN

MILWAUKEE

STARBASE Wisconsin, *Established 2011*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: US Army Reserve Center



NUMBER OF CLASSES HELD: 16

FY 2020 ANNUAL BUDGET: \$502,250

NUMBER OF STUDENTS SERVED:

Basic Program: 465
Supplemental Programs: 54

STARBASE 2.0 PROGRAM:

2 High School Clubs (Grades 9-10)

SCHOOL DISTRICTS SERVED:

Milwaukee Public School

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

STARBASE Wisconsin, Inc.

Since 2011, STARBASE Wisconsin has served over 7,200 urban youth. In FY 2020, they were able to reach 459 students before COVID forced classroom closure. They reopened with virtual classes in their fall session. As an academic program of the Department of Defense and Wisconsin Air National Guard, STARBASE Wisconsin provides educational access to an exciting, technology-rich classroom environment. STARBASE Wisconsin partners with

the Milwaukee Public School District and the local Boys and Girls Club to provide STEM programming during and after school.

In addition to their 5th grade STARBASE program offered to Milwaukee public, choice, and charter schools, the STARBASE Wisconsin 2.0 program offers students the opportunity to be immersed in the world of aviation through 30 hours of instruction. This afterschool program is similar to an abbreviated Private Pilot Ground School with Flight Performance Training using desktop Flight Simulators. In the past, they have also supported the Wisconsin Women in Aviation activities and Scouts BSA STEM weekends.

CONTACT INFORMATION:

5130 W. Silver Spring Dr., Building 301
Milwaukee, WI 53218
TELEPHONE: 414.535.5786
DIRECTOR: John W. Puttre
EMAIL: SB.Wisconsin@dodstarbase.org
WEBSITE: <https://www.starbasewi.org>



WYOMING

CHEYENNE

Wyoming STARBASE Academy, *Established 1993*

SERVICE COMPONENT: National Guard

MILITARY LOCATION: F.E. Warren Air Force Base



NUMBER OF CLASSES HELD: 38

FY 2020 ANNUAL BUDGET: \$461,000

NUMBER OF STUDENTS SERVED:

Basic Program: 949

STARBASE 2.0 PROGRAM:

3 Clubs (Grades 5-6)

SCHOOL DISTRICTS SERVED:

Laramie County School District #1
Laramie County School District #2

SUPPORTING NOT-FOR-PROFIT ORGANIZATION:

Wyoming STARBASE Academy Foundation

Wyoming STARBASE Academy has operated in partnership with the Wyoming National Guard and Wyoming Military Department since 1994. They are the one and only STARBASE in the state, and they are located in Cheyenne, which is also the capital of Wyoming.

This unique program has brought science, technology, engineering, and mathematics (STEM) to every 5th grader within two different school districts and will soon launch a STARBASE 2.0 afterschool program. The STARBASE staff is actively collaborating with schools and the community to bring challenging but fun “hands-on, mind-on” activities in STEM. Their goal is to bring STEM career knowledge to student groups that have been historically under-represented and to make STEM accessible for every student in the area.

CONTACT INFORMATION:

5410 Bishop Blvd

Cheyenne, WY 82009

TELEPHONE: 307.777.8191

DIRECTOR: Germaletta Brown

EMAIL: SB.Wyoming@dodstarbase.org

WEBSITE: <https://www.starbase.wyo.gov>



“ DoD STARBASE is a vital curriculum component of the Indiana Public School Education System. As our Nation is in a fight to stay competitive in a global marketplace; it is imperative the workforce of tomorrow leads the way in Science, Technology, Engineering and Mathematics (STEM) today. STARBASE Indianapolis, Stout Field, takes the principles taught in the classroom and brings them to life through creative application processes – answering the ‘Why is this important’ every middle school student asks at one point in their educational development.”

- LT COL ROBERT L GEARY JR., STARBASE INDIANA-INDIANAPOLIS

APPENDIX 2020



DoD STARBASE STUDENT POST ASSESSMENT 2019-2020

DoD STARBASE Student Post Assessment 2019-2020

We want to learn more about you and the DoD STARBASE program. We are asking you to answer questions about things taught in DoD STARBASE. Then we ask you to tell us what you think about different things.

Answer the next three questions by entering the information as given by your STARBASE Instructor.

Please enter your **Academy Number**, as given by your STARBASE Instructor: _____

Please enter your **Class Number**, as given by your STARBASE Instructor: _____

Please enter your **Student Number**, as given by your STARBASE Instructor: _____

Before we begin the assessment, we want to get a little information about you.

Select your grade in school

- Grade 3
- Grade 4
- Grade 5
- Grade 6
- Grade 7

Select whether you are a boy or a girl

- Boy
- Girl

Answer the next four questions by selecting "Yes" or "No."

I have met military people before coming to DoD STARBASE.

- Yes
- No

I heard about DoD STARBASE before I knew I was coming here.

- Yes
- No

I know someone that went through DoD STARBASE before me.

- Yes
- No

My parent or guardian is in the military.

- Yes
- No

DoD STARBASE STUDENT POST ASSESSMENT 2019-2020, CONTINUED

This next part asks questions about things DoD STARBASE teaches. Most of the questions have four choices and ask you to click in the circle next to the best answer. Some questions are harder than others. Try your best to answer each question. If you do not know the answer at all, just make your best decision. **You cannot go to the next question until the question you are already on has been answered.**

Practice problem:

The first month of the year is:

- June
- December
- January
- October

In the practice problem, you would click the circle by 'January'.

1. Which one of Newton's Laws explains why it is important to wear a seat belt in a moving car?

- First Law of Motion - an object in motion will stay in motion unless acted upon by an outside force.
- Second Law of Motion - acceleration of an object increases as the amount of force increases.
- Third Law of Motion - for every action there is an equal and opposite reaction.
- Law of Gravity - an object attracts another object in direct proportion to their combined mass.

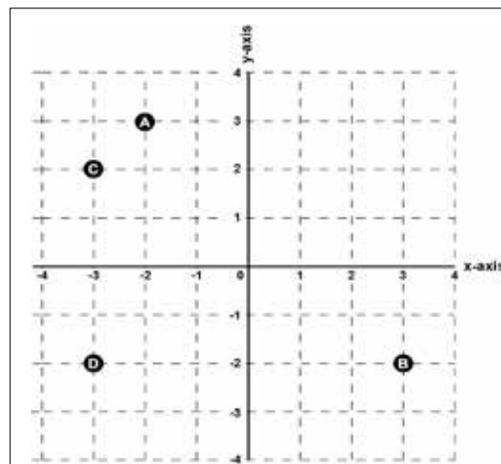
2. The balloon is tied and the temperature is constant. What can you change about the air in the balloon?

- Shape
- Density
- Viscosity
- Amount of air



3. Which letter is at coordinates (3, -2) ?

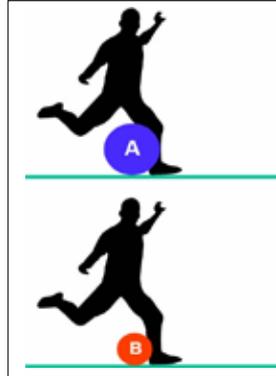
- A
- B
- C
- D



DoD STARBASE STUDENT POST ASSESSMENT 2019-2020, CONTINUED

4. An Engineering team meets for the first time. Which step of the Engineering Design Process will they do first?
- Make a list of requirements.
 - Brainstorm solutions.
 - Make a hypothesis.
 - Define a problem.

5. What will happen if Ball A and Ball B are kicked with the same amount of force?
- Ball A will roll farther.
 - Ball B will roll farther.
 - They will roll the same distance.
 - The distance cannot be predicted.



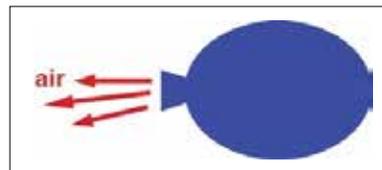
6. Which of the following is a fluid?
- A jar of marbles
 - A cup of water
 - A bucket of sand
 - A truckload of rock

7. Sodium and chloride bond to form salt. (NaCl) What does this bonded substance represent?
- An element
 - An atom
 - A compound
 - A cell

8. What is the first step when using computer design software to build a model?
- Define a shape to extrude or revolve.
 - Record the dimensions of the part.
 - Communicate to the manufacturing engineers.
 - Add colors to the design.

9. Which number is equal to 6%?
- 6
 - 6/10
 - 0.6
 - 6/100

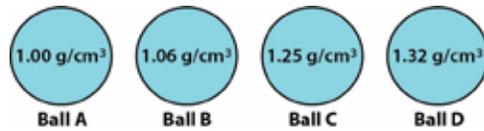
10. How will the balloon move as air is released out the back?
- The balloon will not move.
 - The balloon will move in the opposite direction.
 - The movement of the balloon cannot be predicted.
 - The balloon will move in the same direction as the air.



DoD STARBASE STUDENT POST ASSESSMENT 2019-2020, CONTINUED

11. Based on the density shown for each ball above, which one will float on saltwater if the density of saltwater is 1.02 g/cm^3 ?

- Ball A
- Ball B
- Ball C
- Ball D



12. If you want to develop a cleaner that will dissolve paint spills, which of the following property characteristics of the paint will be most important to test?

- Density
- Viscosity
- Solubility
- Magnetism

13. Which of the following states of matter has the least amount of kinetic energy?

- Solid
- Liquid
- Gas
- Plasma

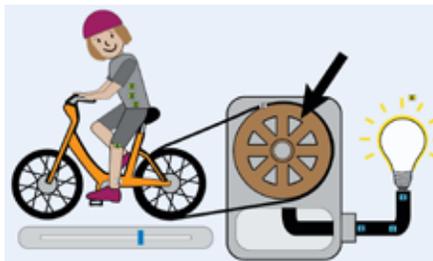
14. When using CAD software, which sketch can be revolved or extruded to form a 3D shape?

- A
- B
- C
- D



15. Which form of energy is the arrow pointing to in the diagram?

- Light energy
- Chemical energy
- Electrical energy
- Mechanical energy



16. Water is poured into a small cup and a large bowl. What is the same about the water in each container?

- Mass
- Shape
- Volume
- Density

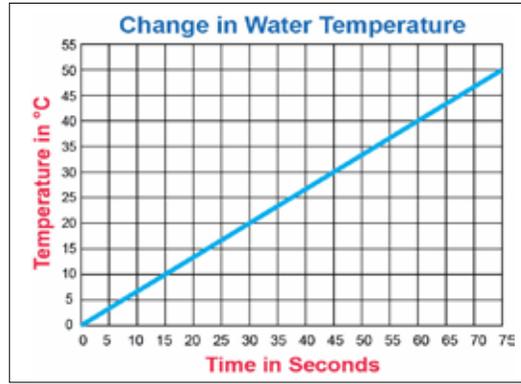
17. Which of the following is an example of physical change?

- Baking soda and vinegar mix and produce bubbles and foam.
- Paper burns and produces smoke and ash.
- A glass falls on the floor and shatters.
- Batter is baked to make a cake.

DoD STARBASE STUDENT POST ASSESSMENT 2019-2020, CONTINUED

18. How many seconds will it take for water to reach a temperature of 30 degrees?

- 20 seconds
- 45 seconds
- 60 seconds
- 75 seconds



19. You are using a ruler to measure the length of a shoebox. Which unit of measurement will you use?

- Grams
- Meters
- Milliliters
- Centimeters

20. Which of the following are examples of new technologies that solve real problems in the world today?

- A farmer using GPS to plant crops.
- A doctor using a 3D printer model for practice before performing surgery.
- Robots are used in places that are unsafe for humans.
- All of the above.

21. Who uses science, technology, math, and engineering concepts in their jobs? [Select all that apply]

- | | |
|---|--|
| <input type="checkbox"/> Accountant | <input type="checkbox"/> Language translator |
| <input type="checkbox"/> Actor/actress | <input type="checkbox"/> Lawyer |
| <input type="checkbox"/> Animal breeder | <input type="checkbox"/> Mail carrier |
| <input type="checkbox"/> Architect | <input type="checkbox"/> Maintenance worker |
| <input type="checkbox"/> Camera operator | <input type="checkbox"/> Manager |
| <input type="checkbox"/> Car designer | <input type="checkbox"/> Mechanic |
| <input type="checkbox"/> Crime scene investigator | <input type="checkbox"/> Military personnel |
| <input type="checkbox"/> Construction worker | <input type="checkbox"/> Nurse |
| <input type="checkbox"/> Cook | <input type="checkbox"/> Poet |
| <input type="checkbox"/> Dog walker | <input type="checkbox"/> Police officer |
| <input type="checkbox"/> Farmer | <input type="checkbox"/> School counselor |
| <input type="checkbox"/> Fireman | <input type="checkbox"/> Social worker |
| <input type="checkbox"/> Hair designer/barber | <input type="checkbox"/> Sports athlete |
| <input type="checkbox"/> Historian | |
| <input type="checkbox"/> Housekeeper | |

Glossary

Academy: See DoD STARBASE Program Academy.

American Indian or Alaska Native: A person having origins in any of the original peoples of North and South America (including Central America) who maintains cultural identification through tribal affiliation or community attachment.

Appropriations: An act of Congress that permits Federal agencies to incur obligations and to make payments out of the Treasury for specified purposes. An appropriations act is the most common means of providing budget authority.

Asian: A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian Subcontinent, including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam.

At-Risk: Being “at-risk” means having one or more family background or other factors that have been found to predict a high rate of school failure at some time in the future. This “failure” generally refers to dropping out of high school before graduation but also can mean being retained within a grade from one year to the next. The risk factors include having a mother whose education is less than high school, living in a single-parent family, receiving welfare assistance, and living in a household where the primary language spoken is other than English.

At-Risk Youth: Students at risk are those who have characteristics that increase their chances of dropping out or falling behind in school. These characteristics may include being from a single-parent household, having an older sibling who dropped out of high school, changing schools two or more times other than the normal progression (e.g., from elementary to middle school), having Cs or lower grades, being from a low socio-economic status family, or repeating an earlier grade.

Black or African American: A person having origins in any of the black racial groups of Africa.

Chemistry: The science of matter; the branch of the natural sciences dealing with the composition of substances and their properties and reactions.

Class: Within the context of a DoD STARBASE Academy, a class is a grouping of students. This group may not necessarily have been a homogenous entity prior to DoD STARBASE instruction; it may be a temporary grouping only for the purposes of such instruction.

Classroom Contact Hour: A period of 60 minutes, plus or minus 5 minutes, in which a DoD STARBASE Academy instructor and/or other STARBASE classroom volunteers are actively involved with students in teaching an application of science, technology, engineering, and/or mathematics to the students.

Classroom Teacher: Teacher from schools that participate in DoD STARBASE classes.

Coach: An experienced adult providing support, training, and guidance to a student in achieving a specific goal.

Computer-Aided Design (CAD): The use of computer systems to assist in the creation, modification, analysis, or optimization of a design. It is both a visual and symbol-based method of communication whose conventions are particular to a specific technical field.

Conferences: DoD STARBASE holds conferences as needed to provide professional development to the DoD STARBASE directors and instructors.

Core Curriculum: The fixed course of study taught by all DoD STARBASE academies. (See DoD STARBASE Curriculum.)

Creo: Creo is the leading 3D Computer-Aided Design (CAD) solution used by design engineers for product simulation, 3D mechanical design, analysis testing, tooling creation, and much more. Creo is scalable, interoperable suite of product design software that delivers fast time to value. It helps teams create, analyze, view, and leverage product designs downstream utilizing 2D CAD, 3D CAD, parametric, and direct modeling.

GLOSSARY, CONTINUED

Current Expenditures: Expenditures for operating DoD STARBASE Academies, excluding capital outlay. These expenditures include such items as staff salaries, facilities, staff travel, supplies, equipment, contract services, and public relations/outreach.

Demographics: See Ethnicity/Race.

Director: DoD STARBASE staff member responsible for the DoD STARBASE Academy.

Disability: Any of the disabilities classified in the U.S. Department of Education's Office of Special Education Programs (OSEP), which collects information on students with disabilities as part of the implementation of the Individuals with Disabilities Education Act (IDEA). Categories of disabilities include autism, deaf-blindness, developmental delay, emotional disturbance, hearing impairment, intellectual disability, multiple disabilities, orthopedic impairment, other health impairment, specific learning disabilities, speech or language impairments, traumatic brain injury, visual impairments, and preschool disability.

DoD: Department of Defense.

DoD Components: DoD entities that have established or are in pursuit of establishing a DoD STARBASE Academy, including the military departments, defense agencies, and defense field activities.

DoD Instruction (DoDI): Document that implements policies, responsibilities, and procedures for executing the DoD STARBASE program.

DoD STARBASE Program Academy: A DoD educational program designed to improve the knowledge and skills of students in kindergarten through 12th grade in science, technology, engineering, and mathematics. It follows the academy model description in DoDI 1025.7.

DoD STARBASE Curriculum: DoD STARBASE core curriculum is comprised of the following areas:

Physics & Chemistry

- A. Motion & Force
- B. Fluid Mechanics
- C. Building Blocks of Matter

Energy

- A. Energy Fundamentals

Technology

- A. Current & Emerging Technologies
- B. Applying Technology

Engineering

- A. Engineering Design Process (EDP)
- B. 3-D Computer-Aided Design (3.0 hours as mandated by OASD/M&RA)

Mathematics Operations & Applications

- A. Numbers & Number Relationships
- B. Measurement
- C. Geometry
- D. Data Analysis

STEM Careers

- A. STEM Careers on Military Facilities
- B. Personal Investigations

GLOSSARY, CONTINUED

DoD STARBASE Program: The DoD STARBASE program is authorized by Title 10 United State Code Section 2193b as a DoD science, technology, engineering, and mathematics education improvement program. OASD/M&RA administers policy and oversight; the DoD components execute the program as a DoD STARBASE Academy. DoD STARBASE is funded by Congress as a Civil Military Program.

DoD STARBASE Site/Location: The location of a DoD STARBASE Academy where the program is taught.

DoD STARBASE 2.0 Program: A unique school-based program targeting typically at-risk 6th to 8th graders occurring outside of normal school hours. The program takes place in partnering schools expressing the desire for additional DoD STARBASE program resources.

DoE: Department of Education.

Driver: Drivers identify a set of related attitudinal clusters for the student population (i.e. when the driver is present, the set of attitudes will most likely be present, or in reverse, when the condition in the list of attitudes are present, the target “driver” attitude will also be present).

Elementary School: A school with one or more of grades K-6 that does not have any grade higher than grade 8. For example, schools with grades K-6, 1-3, or 6-8 are classified as elementary.

Elementary/Secondary Schools: Elementary/secondary schools include regular schools (i.e., schools that are part of state and local school systems and private elementary/secondary schools, both religiously affiliated and nonsectarian); alternative schools; vocational education schools; and special education schools.

Energy: In physics, the capacity for doing work. It may exist in potential, kinetic, thermal, electrical, chemical, nuclear, or other various forms.

Engineering: The discipline dealing with the art or science of applying scientific knowledge to practical problems. Engineering is the use of scientific principles to design and build machines, structures, and other items, including bridges, tunnels, roads, vehicles, and buildings. The discipline of engineering encompasses a broad range of more specialized fields of engineering, each with a more specific emphasis on particular areas of applied mathematics, applied science, and types of application.

Enrollment: The total number of students registered at a DoD STARBASE Academy at a given time, generally in the fall of the year.

Ethnicity/Race: Categories developed in 1997 by the Office of Management and Budget (OMB) that are used to describe groups to which individuals belong, identify with, or belong in the eyes of the community. The categories do not denote scientific definitions of anthropological origins. The designations are used to categorize U.S. citizens, resident aliens, and other eligible non-citizens. Individuals are asked to first designate ethnicity as: Hispanic or Latino or Not Hispanic or Latino. Second, individuals are asked to indicate one or more races that apply among the following: American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, White.

Expenditures: Charges incurred, whether paid or unpaid.

Fiscal Year: The yearly accounting period for the federal government, which begins on October 1 and ends on the following September 30. The fiscal year is designated by the calendar year in which it ends; for example, fiscal year 2020 begins on October 1, 2019, and ends on September 30, 2020.

Free or Reduced-Price Lunch: See National School Lunch Program.

Gap Score: Difference between pre-program and post-program test scores.

Graduate: An individual who has received formal recognition for the successful completion of a prescribed program of studies.

GLOSSARY, CONTINUED

High School: A secondary school offering the final years of high school study necessary for graduation, in which the lowest grade is not lower than grade 9. Usually includes grades 10, 11, and 12 or grades 9, 10, 11, and 12. Alternatively, according to the 2007-2008 Schools and Staffing Survey, defined as a school with no grade lower than 7 and at least one grade higher than 8.

Hispanic or Latino: A person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin, regardless of race.

Inner City Location: Usually older, poorer, and more densely populated central section of a city.

Inquiry-Based Learning: A student-centered educational approach that focuses on using and learning content as a means to develop information-processing and problem-solving skills. In this approach the teacher acts as a facilitator. Students are involved in the building of knowledge through active involvement.

Instructor: DoD STARBASE educator.

Kindergarten: Includes transitional kindergarten, kindergarten, and pre-1st grade students.

Location: See DoD STARBASE Site/Location.

Mapping: The process of using maps to chart a course.

Mathematics: The study of the measurement, properties, and relationships of quantities and sets, using numbers and symbols. A body of related courses concerned with knowledge of measurement, properties, and relations quantities, which can include theoretical or applied studies of arithmetic, algebra, geometry, trigonometry, statistics, and calculus.

Median: A number that half of the data is larger than it and a half smaller. If the itemized data are listed in order of size, the median is the middle number in the list.

Mentor: An experienced and trusted guide and advisor.

Middle School: A school with no grade lower than 5 and no grade higher than 8.

Minority: Racial and ethnic minority populations are defined as Asian American, Black or African American, Hispanic or Latino, Native Hawaiian and Other Pacific Islander, American Indian and Alaska Native.

Nanotechnology: The science of manipulating materials on an atomic or molecular scale especially to build microscopic devices.

National School Lunch Program: Established by President Truman in 1946, the program is a federally assisted meal program operated in public and private nonprofit schools and residential childcare centers. To be eligible for free lunch, a student must be from a household with an income at or below 130 percent of the federal poverty guideline; to be eligible for reduced-price lunch, a student must be from a household with an income between 130 percent and 185 percent of the federal poverty guideline.

Native American: See American Indian or Alaska Native.

Native Hawaiian or Other Pacific Islander: A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.

Navigation: The theory, practice, and technology of charting a course to a specific destination.

Not-For-Profit Organization: A legal entity recognized or chartered by competent state authority and to which the Internal Revenue Service has given status as a 501(c) 3 tax-exempt organization.

GLOSSARY, CONTINUED

OASD/M&RA: Office of the Assistant Secretary of Defense/Manpower and Reserve Affairs.

Operational Academies: An academy that has participating students.

Outreach: Providing services to any populations who might not otherwise have access to those services. A key component of outreach is that the groups providing it are not stationary, but mobile; in other words, they are meeting those in need of outreach services at the locations where those in need are located.

Participant: A DoD STARBASE student. Participant also refers to military command support units, the local sponsoring base command, community leaders, local community sponsoring committees, school systems, schools, teachers, military service volunteers, DoD STARBASE Board members, staff, and parents.

Percentile (Score): A value on a scale of 0 to 100 that indicates the percent of a distribution that is equal to or below it.

Physics: Natural science that studies matter, its motion and behavior through space and time, and that studies the related entities of energy and force. Physics is one of the most fundamental scientific disciplines, and its main goal is to understand how the universe behaves.

Pre/Post Application: Prior to the start of the program and at the completion of the program.

Program Year: For this report the DoD STARBASE program year is the same as the government fiscal year, which runs October 1 to September 30.

Public School: A school that provides educational services for at least one of grades K-12 (or comparable ungraded levels), has one or more teachers to give instruction, has an assigned administrator, receives public funds as primary support, and is operated by an education or chartering agency. Public schools include regular, special education, vocational/technical, alternative, and charter schools. They also include schools in juvenile detention centers, schools located on military bases and operated by the Department of Defense, and Bureau of Indian Education-funded schools operated by local public-school districts.

Race/Ethnicity: See Ethnicity/Race.

Race/Ethnicity Unknown: The category used to report students or employees whose race and ethnicity are not known.

Rural Location: All population, housing, and territory not included within an urbanized area. Whatever is not urban is considered rural.

Salary: The total amount regularly paid or stipulated to be paid to an individual, before deductions, for personal services rendered while on the payroll of a business or organization.

Sample Population: A statistically significant representation of the total number of students tested each year.

School District: An education agency at the local level that exists primarily to operate public schools or to contract for public school services.

Science: The body of related course concerned with knowledge of the physical and biological world and with the processes of discovering and validating this knowledge.

Secondary School: A school with one or more of grades 7-12 that does not have any grade lower than grade 7. For example, schools with grades 9-12, 7-9, 10-12, or 7-8 are classified as secondary.

Site: See DoD STARBASE Site/Location.

Socio-Economic Disadvantage(d): A term used to describe economically deprived, poor, poverty stricken, or disadvantaged individuals or groups. (See also Socio-Economic Status.)

GLOSSARY, CONTINUED

Socio-Economic Status: A measure of an individual or family’s relative economic and social ranking based on such factors as father’s education level, mother’s education level, father’s occupation, mother’s occupation, and family income.

STEM: Science, Technology, Engineering, and Mathematics (STEM) fields of study that are considered to be of particular relevance to advanced societies.

STEM Careers: Includes careers in physical and life sciences, computer science, mathematics, and engineering. Many employment experts include health professions, health technology, and social sciences under this umbrella as well.

Supplemental Programs: These are programs that for one reason or another (e.g. below traditional STARBASE program minimum hours, do not cover the core curriculum areas, etc.) do not meet DoDI standards for a full STARBASE academy. They are more diverse than traditional DoD STARBASE programs, are often conducted during the summer months and may be designed to reach students that do not fall under the targeted “participant” schools or are in response to requests by members of the community to serve other groups of children. Supplemental programs are not required and are beyond the normal operation and obligations of the academy. In many cases, supplemental programs are established in response to the demand created by the popularity and success of the DoD STARBASE program within the community.

Teacher Certification: License granted by states for teachers to teach a given subject. These vary by state, but generally include: Obtaining a bachelor’s degree; Completing a teacher preparation program, which includes either an undergraduate, master’s, or alternative program; Getting state or national certification to teach by completing all requirements.

Technology: The sum of techniques, skills, methods, and processes used in the production of goods or services or in the accomplishment of objectives, such as scientific investigation. Technology can be the knowledge of techniques, processes, and the like, or it can be embedded in machines to allow for operation without detailed knowledge of their workings. Systems applying technology by taking an input, changing it according to the system’s use, and then producing an outcome are referred to as technology systems or technological systems.

Title I Grant Program: The federal government provides grants to local education agencies to supplement state and local education funding based primarily on the number of children from low-income families in each local education agency. The program provides extra academic support and learning opportunities to help disadvantaged students catch up with their classmates or make significant academic progress.

Urban Area (UA): Populated centers consisting of 50,000 or more people.

Urban Cluster (UC): Populated centers consisting of at least 2,500 and less than 50,000 people.

Volunteer: A person who freely offers to take part in an enterprise or undertake a task.

White: A person having origins in any of the original peoples of Europe, the Middle East, or North Africa.



“As an engineer, pilot, and armed forces officer, I was interested in the STARBASE program and I’ve been mightily impressed! The science and math curricula is amazing in its breadth for young people. I found out about it because I still build and launch model rockets after 50 years and I heard that the students build and launch their own rockets. The students are engaged throughout the course, but you should see the fun they have launching!”

- COLONEL JERE BERGER, STARBASE
SOUTH BURLINGTON



“*STARBASE is a program that allows America the opportunity to choose where we put our next foot forward; a chance for our young people to realize the impact of expeditionary attitude, forecast where their dreams can take them and a platform to leap from as they become future leaders. Our children deserve a place where they can be excited about science and see modern marvels like the F-16 in person. I’ve briefed hundreds of STARBASE students about flying the F-16 and I promise — if you could see a child’s eyes light up when you hand them a fighter pilot’s helmet and tell them to try it on, there would be no question that STARBASE is worth our national support. You cannot supply that moment in a classroom with a book or video. It could very well be the moment that makes the difference.*”

- CAPTAIN TAYLOR “FEMA” HIESTER, STARBASE SIOUX FALLS



For more information contact:

Office of the Assistant Secretary of Defense/Manpower and Reserve Affairs (OASD/M&RA)
1500 Defense Pentagon
Washington, DC 20301-1500
Phone: 703.693.8630

www.DoDSTARBASE.org

