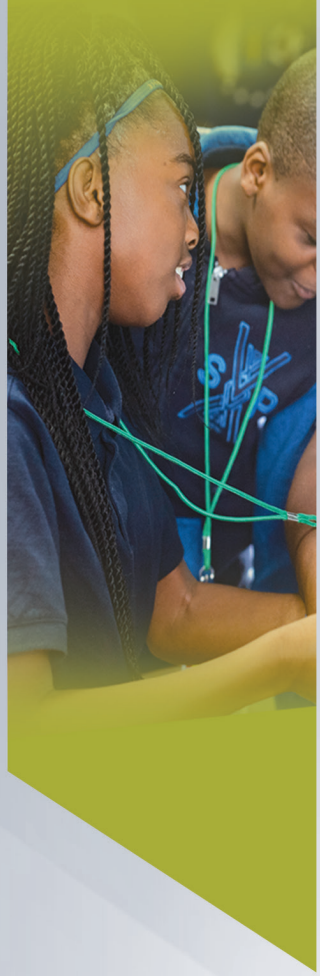
DoD STARBASE
A Department of Defense Youth Program

ANNUAL REPORT 2019



INCREASING DIVERSITY, EQUALITY & INCLUSION IN STEM

"DoD STARBASE is my favorite place to learn. Thank you for inspiring me to be an engineer. I will change the world."

- STUDENT AT BENNINGTON GRADE SCHOOL, ATTENDING STARBASE SALINA

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

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, mind-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, and Air 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

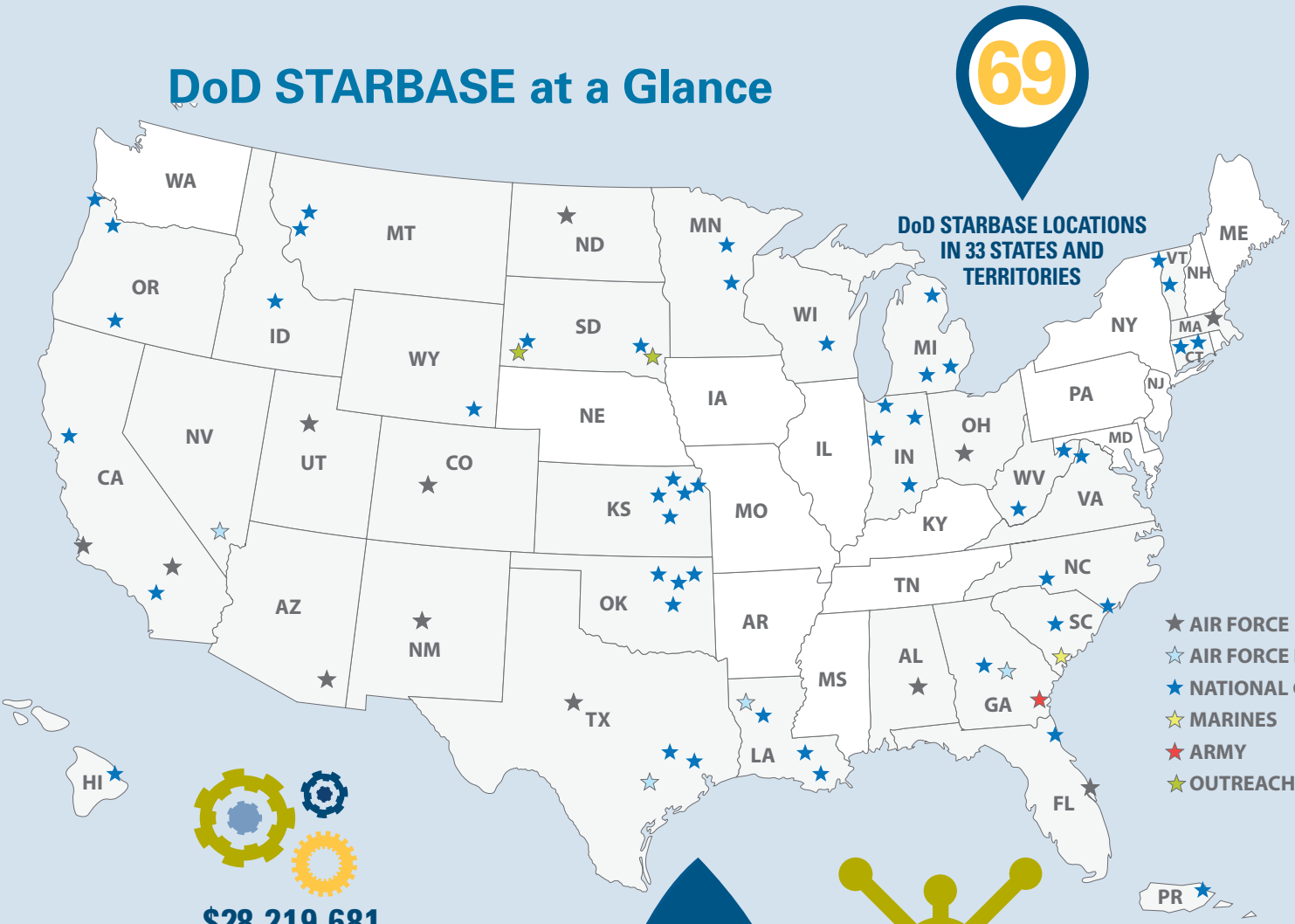
MATHEMATICS OPERATIONS & APPLICATIONS

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

DoD STARBASE at a Glance



$28,219,681
PROGRAM OPERATING BUDGET

$350,870
MEDIAN OPERATING COST PER LOCATION

99,744 STUDENTS
SERVED IN 2019
BASIC AND SUPPLEMENTAL PROGRAMS

99
DoD STARBASE 2.0 OUTREACH PROGRAMS IN 23 STATES

1,303,467
STUDENTS SERVED SINCE 1993

An Issue of National Importance and National Security

Science, technology, engineering, and mathematics (STEM) have been the foundation for discovery and technological innovation throughout American history. The 2019 Federal STEM Education Strategic Plan states that "having a well-prepared and diverse STEM workforce will assure that tomorrow's breakthroughs happen here in America and continue to strengthen our national security and grow our economy."[1] The growth of foreign capabilities and an uncertain future highlight the urgent need to dramatically increase the percentage of students entering and completing STEM degrees in post-secondary education. According to the National Science Board's Science and Engineering Indicators 2018, "Americans' basic STEM skills have modestly improved over the past two decades but continue to lag behind many other countries."

Careers in STEM contribute greatly to our nation's capacity for innovation and are among the fastest-growing and highest-paying careers in the economy of the 21st century. The Department of Defense (DoD) recognizes that developing a sustainable world-class STEM workforce requires partnerships among government, industry and academia to tap the full strength of America. With facilities located on military installations across the country, the DoD STARBASE program adds value and strengthens the relationships between the military, the community and the surrounding school districts.

Despite the value and importance of STEM skills, not all Americans have equal access to STEM education or are equally represented in STEM fields. We've known for decades that women and minorities are significantly underrepresented when it comes to STEM education and careers.

As also reported in the *Indicators*, women make up approximately half of the population, yet they represent less than 30% of the STEM workforce. Similarly, underrepresented racial and ethnic groups make up 27% of the population but comprise only 11% of the STEM workforce.[2]

Exposure to STEM education is the first step towards inspiring students to engage in STEM discovery and innovation. Studies have shown that children who experience STEM education early on will be better prepared to understand STEM concepts later in their academic career.[3] DoD STARBASE teachers are accomplishing this objective by bringing exciting and engaging STEM lessons into the elementary classroom at the 4th, 5th and 6th grade level. Students attending the DoD STARBASE program learn to conduct scientific experiments, gather and analyze data, draw and communicate conclusions, develop and evaluate prototypes, and think critically.

DoD STARBASE teachers understand that STEM education has the potential to spark a lifelong interest in learning that can translate into increased performance in the classroom in all subject areas. These same teachers also serve as the link between their students and STEM professionals who share their passion and real-world knowledge and applications of STEM.

The mission statement in the 2016-2020 DoD STEM Strategic Plan is to "attract, inspire and develop exceptional STEM talent across the education continuum to enrich our current and future DoD workforce to meet defense technological challenges." DoD STARBASE supports this

[1] https://www.whitehouse.gov/wp-content/uploads/2018/12/STEMEducation-Strategic-Plan-2018.pdf
[2] https://www.nsf.gov/statistics/2018/nsb20181/report
[3] http://d3lwefg3pyezlb.cloudfront.net/docs/Early_STEM_Matters_FINAL.pdf

CONTINUED

AN ISSUE OF NATIONAL IMPORTANCE, CONTINUED

effort through the development of a continuum of high-quality experiences for students from elementary school through high school. The continuum of opportunities and activities for DoD STARBASE Junior High and High School students includes instruction and mentoring from STEM professionals outside of the traditional school day as well as participation in STEM-based competitions at the local, state and national level.

This annual report provides detailed data and analysis from the student knowledge and attitudinal assessments, rigorous program operational evaluations as well as evidence of long-term outcomes from the testimony and reports of former DoD STARBASE students, educational leaders, military leaders and STEM professionals.

The DoD STARBASE program adds value and strengthens the relationships between the military, the community, and the surrounding school districts.

A LETTER FROM LT. GENERAL ROBERT MCMURRY, JR.

COMMANDER OF THE AIR FORCE LIFE CYCLE MANAGEMENT CENTER,
WRIGHT-PATTERSON AIR FORCE BASE, OHIO

As leaders in the development, fielding, and sustainment of state-of-the-art technology and weapon systems, the United States Air Force relies heavily on experts in the science, technology, engineering, and mathematics (STEM) career fields.

In order to be successful now and in the future, we must continue to excite, attract, develop, and retain a world-class STEM workforce.

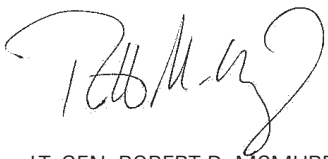
DoD STARBASE helps us do this by introducing young students to STEM, and making it fun, with the hope that they will pursue a STEM education and then consider working with us when they graduate from college.

The term "STEM" is relatively new to our collective lexicon. However, much of the world's greatest marvels and achievements have a strong bond to STEM. Moving forward, these skills and abilities will continue to be necessary and essential for the defense of our nation.

The Department of Defense (DoD) realizes cultivating a diverse talent pipeline by promoting full inclusion of excellence in STEM across the United States is crucial to our National Security. Building this pipeline of future STEM talent will require the DoD to commit to helping our youth discover and cultivate STEM interest. All children should have the opportunity to explore and interact with their world through hands-on experience, which helps solidify the concepts to ensure understanding and appreciation. The younger this interest can be established, the better. I am proud that DoD recognizes this and has made the STARBASE program available.

DoD STARBASE Wright-Patt's vision is to raise interest, knowledge, and skills improvement in a variety of STEM career fields that the Air Force will need in the future. Since its inception in 2004, STARBASE Wright-Patt has impacted more the 37,000 students and continues to have a strong foothold in the local Dayton Area.

The Air Force will continue to proudly support the DoD STARBASE Program across the country. It is essential that we continue to support such advanced and effective STEM programs by providing exceptional K-12 STEM educational programs and opportunities to our youth.



LT. GEN. ROBERT D. MCMURRY, JR.

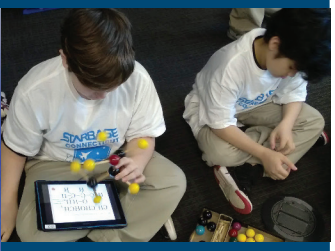
"The way DoD STARBASE teaches makes it even more enjoyable. I really like how they involve everyone in hands-on activities. This helps me remember everything better."

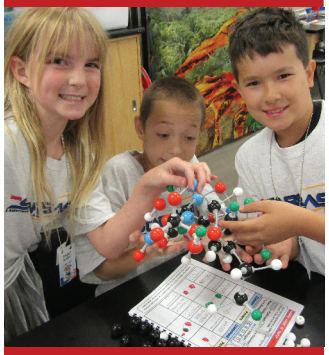
- STUDENT AT FORT WAYNE SUMMER CAMP, ATTENDING STARBASE INDIANA-FORT WAYNE

"DoD STARBASE Sacramento exerts a positive influence on the local community through learning in general, and science in particular. We are ambassadors for DoD that help enhance responsible citizenship in the local youth, thereby shaping the leaders of the future."

- CPT WILSON UGAH, STARBASE SACRAMENTO

ASSESSMENT 2019





DoD STARBASE
A Department of Defense Youth Program

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 more than 60 military affiliated installations across the United States in accordance with Title 10, U.S. Code, Section § 2193b. Each year, conduct and effectiveness of the DoD STARBASE program is evaluated in several ways, including: structured interviews, questionnaires, program visits, and conversations with program participants. The program also is evaluated annually in terms of measuring 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 1,524 students, 2,820 teachers, and all DoD STARBASE directors. A brief overview of the assessment highlights some of the key findings of the analysis.

HIGHLIGHTS

DOD STARBASE PROGRAM

- DoD STARBASE programs are located at a variety of military installations including: Air Force (12 locations), Air Force Reserve (4 locations), Army (1 location), National Guard (51 locations), and Marine Corps (1 location).
- The DoD STARBASE program conducted 3,256 classes serving 1,343 schools in 450 school districts across the United States and Puerto Rico during FY 2019.
- More than 81,000 students attended the 5-day program with an additional 18,682 students participating in supplemental programs during FY 2019.
- DoD STARBASE programs served primarily students from public schools (84 percent) in urban areas (79 percent) with 76 percent of the schools participating with DoD STARBASE meeting Title 1 requirements. Most of the DoD STARBASE locations (88 percent) serve school districts within a 50-mile radius of their program site.
- The majority of DoD STARBASE students (94 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 (4 percent), Blacks/African American (23 percent), Hispanic or Latino (22 percent), Native Hawaiian or other Pacific Islander (1 percent), Low Income Students (76 percent), Students with Disabilities (13 percent), Students that use English as second language (16 percent).
- The average instructor to student ratio for FY 2019 was 1:14.
- The average class size for FY 2019 was 25 students.
- The median operating cost per location was $350,870.

DOD STARBASE STAFFING

- State affiliations make up 55 percent of the employment relationships, followed by contractors and federal affiliations at 42 percent and 3 percent, respectively.
- There was a 5 percent increase in the number of employees from FY 2018.
- Directors (42 percent) have typically worked with DoD STARBASE for 5-10 years. Deputy directors and instructors tend to have 2-7 years of DoD STARBASE experience at 68 percent and 59 percent respectively. Office managers and instructional assistants have the least amount of DoD STARBASE experience with most (33 percent and 55 percent, respectively) just starting their first year.
- There were 62 staff departures in FY 2019. The majority (37 departures) were at the instructor level. Instructional Assistants were the next highest with seven departures followed by directors, deputy directors, and office managers/administrative support at six departures each. The overall turnover rate in FY 2019 was 16 percent, which was 4 percent less than last fiscal year's turnover rate.

DOD STARBASE PROGRAM VOLUNTEERS AND OUTREACH

- DoD STARBASE locations documented participation of 12,643 volunteers who contributed a total of 134,590 hours, worth an estimated $3,288,950.
- DoD STARBASE volunteer support included 11,338 hours of support by 2,189 military personnel with an additional 2,389 hours of support provided by 351 DoD Science and Engineering personnel.
- Many DoD STARBASE locations (27 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, 70 percent of the teachers may use this training towards their certification requirements.
- DoD STARBASE locations (52 of 69) report 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 (51 of 69 locations) also offer a variety of supplemental programs to area youth in grades K-12 when schools are not in session conducting 429 supplemental classes with 18,682 students.
- In FY 2019, 43 DoD STARBASE locations in 23 states reported coordinating a total of 99 DoD STARBASE 2.0 programs and 128 2.0 clubs.
- The average student retention rate within the 2.0 program was 81 percent. Relocations, time conflicts, and lack of interest in the chosen curriculum are cited by directors as the main reasons why students drop from the program.
- Former DoD STARBASE students made up 53 percent of the DoD STARBASE 2.0 program participants.
- Mentors (575 mentors) from a variety of professions participated in the DoD STARBASE 2.0 program to include: military (11 percent), DoD Science and Engineering Mentors (4 percent), nonmilitary/DoD Professionals (4 percent), industry professionals (9 percent), college students (5 percent), staff members for the school hosting the 2.0 program (30 percent), STARBASE staff members (33 percent), other types (4 percent).
- The DoD STARBASE 2.0 programs operate through a combination of federal and private funds. Of the 43 DoD STARBASE locations coordinating a 2.0 program, 40 percent receive funding from both sources and 60 percent operate using only their federal DoD STARBASE funds.

STUDENT ASSESSMENT

- Most respondents were in 5th grade (98 percent) and therefore were between 10 and 11 years old.
- Approximately equal proportions of girls (49 percent) and boys (51 percent) were represented in the study sample.
- Eighty-one percent of the attitudinal items[4] increased in favorableness from pre-STARBASE to post-STARBASE program. In fact, 76 percent of those positive changes were statistically significant. Some of the largest shifts occurred in attitudes toward STEM subjects, the military, and STEM-related careers.
- Performance on the knowledge items increased significantly with a 26 percent improvement in the number of correct answers from pre- to post-test. Despite the addition of three new items, the knowledge improvements were comparable to the 30 percent increase in 2018, 28 percent gain in 2017, 25 percent enhancement in 2016, and the 26 percent positive change in 2015.
  - o Physics showed the largest improvement among curriculum areas (average increase of 35 percent in the number of correct answers) as it has in previous years.
  - o Chemistry also showed a strong gain, with 30 percent more correct answers, while Engineering and Technology each had improvements of 24 percent.
  - o Mathematics scores improved substantially as well, with a 20 percent gain in the average number of correct answers.

[4] A total of 37 items are included on the attitudinal survey. Thirty-one items are administered both pre- and post-program, five items are administered post-program only, and one pilot item is included in selected analyses only.

TEACHER ASSESSMENT

- 2,820 teachers from 65 academies responded to the survey. This number is about 7 percent higher than last year's total (N = 2,630), which is expected given that three additional STARBASE academies were surveyed in 2018-2019.
- Teachers gave 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 confidence in what they can accomplish, increased levels of student excitement about learning overall, and willingness to try new things.
- Teachers strongly endorsed the statement that STARBASE reinforces positive behaviors that she/he tries to teach students (mean = 6.68 of possible 7.00).
- Teachers strongly endorsed the statement that students talk about STARBASE long after the program has ended (mean = 6.51 of possible 7.00).
- Teachers strongly endorsed the statement that attending DoD STARBASE helps students better understand how STEM skills/abilities fit job requirements for certain career fields (mean = 6.36 of possible 7.00).
- Teachers strongly endorsed the statement that attending DoD STARBASE helps students better understand that developing their current STEM skills/abilities is necessary to have good future career choices (mean = 6.36 of possible 7.00).
- 99.5 percent (2,805) of the teachers indicated they will recommend DoD STARBASE to other teachers, principals, or school administrators.
- 91.9 percent (2,592) of participating teachers report that attending DoD STARBASE has influenced them to become skilled in STEM instruction.
- In results quite similar to 2018, the number of teachers "Very Likely" or "Extremely Likely" to recommend the DoD or the military as a career option to students jumped by approximately 30 percentage points (75 percent increase) after participating in the DoD STARBASE program (Pre-program 39.8 percent Very or Extremely Likely to recommend versus 70.1 percent Very or Extremely Likely to recommend Post-program).

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

"I enjoy talking with the kids. **Sharing my experience and learning from them.** It's fun to see my job from a kid's view."

- CMSgt BLAKE PARKE, STARBASE SIOUX FALLS

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[5] funds the operation of DoD STARBASE. Synergy between the local military base, schools, and surrounding communities enhance and strengthen the program.

During FY 2019, the DoD STARBASE program conducted 3,256 classes serving 1343 schools, in 450 school districts, across the United States and Puerto Rico. More than 81,000 students attended the 5-day program in FY 2019. The program has grown from FY 2018 with a 6 percent increase in the number of students served, and a 2.5 percent increase in DoD STARBASE classes.

During the summer months many DoD STARBASE locations also offer a variety of supplemental programs to area youth in grades K-12.[6] Of the 69 locations, 55 locations offered some type of supplemental program conducting 429 supplemental classes. A locations ability to offer supplemental programing may be due to the number of part-time or seasonal staff, funding, and facility agreements with the hosting military installation.[7] The number of students participating in supplemental programs during FY 2019 increased by 12 percent from FY 2018, serving a total of 18,682 students.

Almost 50 percent of these students participated in supplemental programs conducted at the Oklahoma and Ohio locations. These 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 Science, Technology, Engineering, and Mathematics (STEM) events and airshows to STEM camps and special subject academies lasting up to two weeks. In FY 2019 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.

THE MILITARY

The military hosts and supports DoD STARBASE programs. Programs are located at various military installations[8] including: Air Force (12 locations), Air Force Reserve (4 locations), Army (1 location), National Guard (51 locations), and Marine Corps (1 location).

Most of the DoD STARBASE locations (88 percent) serve school districts within a 50-mile radius of the programs' duty station.[9] 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

[5] Operation and maintenance, defense-wide, civil military programs.

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

[7] Supplemental programs were not offered at AL - STARBASE Maxwell, AZ - STARBASE Arizona, CA - STARBASE Sacramento, FL - STARBASE Florida, GA - STARBASE Savannah, LA - Bayou State STARBASE, STARBASE Jackson Barracks, and STARBASE Louisiana, NC - Ft Fisher, PR - STARBASE Puerto Rico, SC - STARBASE MCAS Beaufort, SD - STARBASE NOVA Honor, WI - STARBASE Wisconsin, and WV - West Virginia STARBASE Academy. New locations STARBASE Patrick and STARBASE Vandenberg did not see students in FY 2019.

[8] 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 1 students. STARBASE NOVA Courage and STARBASE NOVA Honor are outreach units that serve Native Americans in South Dakota. STARBASE Connecticut - Waterbury is currently located at Naugatuck Community College because space became limited at the Waterbury Armory.

[9] KS - STARBASE Salina, NM - STARBASE New Mexico, PR - STARBASE Puerto Rico, SD - STARBASE NOVA Honor and STARBASE NOVA Courage, VT - STARBASE Vermont - Rutland, and STARBASE Vermont - South Burlington serve students beyond 50 miles of their host facility.

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 systems 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, tour guides, and other support activities.

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.

THE SCHOOL DISTRICT

Students from local school districts surrounding the host military installation participate in the DoD STARBASE program. In FY 2019, a total of 1,343 schools participated in the DoD STARBASE program which includes schools from Title 1 eligible, public, private, urban, and rural districts (see Table 1).

Table 1: FY 2019 Demographics of 1,343 Participating Schools[10]

School Type	Number of Schools	Percentage of Total Schools
Title 1 Eligible	1,018	76%
Public	1,125	84%
Private	155	12%
Urban	1,062	79%
Rural	319	24%

[10] Numbers shown are for five-day programs and do not include other supplemental programs. Some schools are counted in more than one category.

"Having the opportunity to **interact and educate your students about the military, equipment, and technology the Marine Corps uses has been a great experience** for everyone. My instructors have truly enjoyed explaining equipment capabilities and operations to your students. Your staff is high spirited, motivated and it has been a pleasure working with them. The Marines here at South Bend, Indiana, look forward to a continued relationship with DoD STARBASE."

- FIRST SERGEANT WILLIAM MCKUEN, MARINE CORPS, STARBASE INDIANA - SOUTH BEND

As shown in Table 1, DoD STARBASE programs served primarily students from public schools (84 percent) in urban areas (79 percent) with 76 percent of the schools participating with DoD STARBASE meeting Title 1 requirements. The Title 1 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.[11]

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.

[11] U.S. Department of Education, Office of State Support. (2015). Improving Basic Programs Operated by Local Educational Agencies (Title 1, Part A). Retrieved from https://www2.ed.gov/programs/titleiparta/index.html.

A LETTER OF SUPPORT FROM MAJOR GENERAL JON JENSEN

DEPARTMENTS OF THE ARMY AND THE AIR FORCE

JOINT FORCE HEADQUARTERS MINNESOTA
OFFICE OF THE ADJUTANT GENERAL
20 - 12TH STREET WEST
SAINT PAUL, MN 55155-2004

NGMN-ZA 2 December 2019

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

SUBJECT: STARBASE Minnesota Letter of Support

1. STARBASE Minnesota has been an integral part of the Minnesota National Guard since its founding in 1993. The program allows our leaders the opportunity to help ignite a student's interest in STEM (Science, Technology, Engineering, and Math) education from a young age and in turn, reinforces the Minnesota National Guard's connection to the local communities.

2. With an emphasis on diversity and inclusion, STARBASE Minnesota is proud to provide programming to the diverse population represented in its communities. In fiscal year 2019, at the St. Paul location alone, 69% of the students were children of color, 23% were English Language Learners (ELL), and 49% were females – all of which are underrepresented and underserved in STEM.

3. Beyond the students, STARBASE Minnesota provided opportunities for over 1,200 community members to volunteer and lend their support to the program. Scientists, engineers, business leaders, educators, parents, and members of the Minnesota National Guard spent a combined 11,080 hours supporting students on our two Air National Guard bases. With locations in St. Paul and Duluth, our two Minnesota STARBASE sites will serve over 5,200 students next year. The 4th and 5th grade students will be exposed to innovative, real world STEM learning experiences by world class educators. The Minnesota National Guard will continue to expand outreach in 2020 with the opening of a new state of the art STARBASE facility on the 148th Fighter Wing in Duluth. The new facility will allow STARBASE greater opportunities to engage with the students in the Northland region.

4. Now, perhaps more than ever before, the United States military relies on soldiers and airmen with STEM backgrounds to best equip us to defend our country against adversaries in ways we have yet to encounter. Department of Defense STARBASE strives to build essential STEM skills reflective on the world of ever-changing technologies. Through programs such as engineering design, 3D printing and prototyping, robotics, VR and AR, STARBASE helps prepare the next generation of problem solvers and innovators.

5. I look forward to seeing STARBASE Minnesota continue to grow and impact the children of Minnesota.

JON A. JENSEN
Major General, MNARNG
Adjutant General

DoD STARBASE Minnesota
Receives Tekne Community Impact Award

The Minnesota High Tech Association (MHTA) has named STARBASE Minnesota as the recipient of the 2018 Tekne Award in the Community Impact award category.

The Tekne Awards honor companies and individuals who have played a significant role in developing innovative, technological products and services that positively impact the lives and futures of people living around the world. Tekne Awards were presented to 16 of Minnesota's most influential companies during ceremonies at the Minneapolis Convention Center on November 29, 2018, where they were recognized for innovations in software, emerging technologies, STEM workforce development, cybersecurity, biotechnology, advanced manufacturing, and more.

STARBASE Minnesota is part of the nationwide Department of Defense (DoD) STARBASE program whose mission is to educate and inspire youth in science, technology, engineering, and mathematics (STEM) with 69 sites across the United States and Puerto Rico. The State of Minnesota currently hosts two STARBASE locations, which started with STARBASE Twin Cities in 1993 and continued with the opening of a program in Duluth in 2017. Both STARBASE Minnesota locations are hosted by the Minnesota National Guard who provide an exciting, state-of-the-art, and high-tech STEM environment. They are also supported by STARBASE Minnesota, Inc. – a 501(c)3 nonprofit organization. Since 1993, over 64,000 Minnesota youth have participated in the DoD STARBASE Program.

In Minnesota, the DoD STARBASE program engages STEM-passionate stakeholders from government, military, education, and industry on a common vision of developing a love of STEM in students and future STEM-skilled workforce. Innovative curriculum taught by top-notch educators in a "real world" context that is further enhanced by engineers and scientists from 17 leading STEM corporations brings STEM to life for students. The Minnesota National Guard provides capacity-building support that enables STARBASE to serve nearly 5,000 students each year. This engaging, evidenced-based 25-hour STEM program for students in 4th through 6th grades is in high demand. Currently, 60 schools from 11 school districts in the Twin Cities and Duluth participate in this free program that targets students who are traditionally underrepresented in STEM.

STARBASE Minnesota, Inc. has a 22-member Board of Directors and 12-member Duluth Advisory Board with backgrounds in business, education, military, and government. All are passionate about igniting students' interest in STEM and creating pathways to future careers. In addition to their active involvement in STARBASE, stakeholders and partners invest financially making STARBASE one of the most successful, mutually beneficial collaborations of federal, state, corporate, and private entities in the region.

Kim Van Wie, Executive Director of STARBASE Minnesota - Twin Cities, shared just how honored the STARBASE board and staff are with this recognition, "The STARBASE Minnesota program is unique, bringing the public and private sectors together to develop the next generation of STEM leaders and innovators who will contribute to the economic health and strength of our communities. With the involvement of our many partners, students are able to build a frame of reference for STEM in the real world, a newfound confidence and excitement about future STEM careers." Mike Thyken, Chairman of STARBASE Minnesota, Inc. Board of Directors said, "It is an honor to be given this most prestigious award and to serve these students and communities. We are thrilled!"

"This year's Tekne Award winners exemplify the diversity and strength of Minnesota's innovative economy," said Margaret

CONTINUED

Anderson Kelliher, president and CEO of the Minnesota High Tech Association. "The selected organizations all continuously challenge the status quo of the science and technology industries, and we were proud to honor them in this ceremony."

MHTA is an innovation and technology association united in fueling Minnesota's prosperity. Their mission is to help bring together the people of Minnesota's technology ecosystem and lead the charge in directing technology issues to Minnesota's state capitol. MHTA is the only membership organization that represents Minnesota's entire technology-based economy. MHTA members include organizations of every size – involved in virtually every aspect of technology creation, production, application and education in Minnesota.

MINNESOTA LEGISLATURE

THE GREAT SEAL OF THE STATE OF MINNESOTA · L'ETOILE DU NORD · 1858

A House resolution

honoring STARBASE Minnesota on receiving a 2018 Tekne Award

WHEREAS, the Minnesota High Tech Association (MHTA) is an innovation and technology association united in fueling Minnesota's prosperity, bringing together the people of Minnesota's science and technology ecosystem, and leading the way in bringing science and technology issues to leaders at the state capitol; and

WHEREAS, since 2000, MHTA has sponsored the Tekne Awards, which honor companies and individuals who have played a significant role in developing innovative technological products and services that positively impact the lives and future of people living around the world; and

WHEREAS, STARBASE Minnesota is a 501(c)3 nonprofit organization founded in 1993 whose mission is to educate and inspire youth in science, technology, engineering and math (STEM); and

WHEREAS, STARBASE provides exciting, 20-25 hour immersive STEM programs for schools expanding their capacity to meet students' needs in STEM; and

WHEREAS, innovative curriculum taught by top-notch educators in a "real world" context that is further enhanced by engineers and scientists from 17 leading STEM corporations brings STEM to life for students; and

WHEREAS, volunteers from the STEM industry and the Minnesota National Guard participate in the program to demonstrate how STEM is used in the workplace and to expand students' awareness of future careers; and

WHEREAS, STARBASE has a 22-member Board of Directors and 12-member Duluth Advisory Board with backgrounds in business, education, military, and government, and all are passionate about igniting students' interest in STEM and creating career pathways; and

WHEREAS, 60 Twin Cities and Duluth schools from 11 school districts currently participate in STARBASE free of charge, and since 1993 STARBASE has served over 64,000 youth, primarily students underrepresented in STEM; and

WHEREAS, on November 29, 2018, at the Minneapolis Convention Center STARBASE, based on their outstanding accomplishments of the last 25 years, received a 2018 Tekne Award in the Community Impact category; NOW, THEREFORE,

BE IT RESOLVED by the Committee on Rules and Legislative Administration of the House of Representatives of the State of Minnesota that it congratulates STARBASE Minnesota for their outstanding service to their community, state, and country in receiving a 2018 Tekne Award.

Dated: December 6, 2018

Kurt Daudt, Speaker
Minnesota House of Representatives

Bob Dettmer
State Representative

Jenifer Loon
State Representative

AMY KLOBUCHAR
MINNESOTA

COMMITTEES:
AGRICULTURE, NUTRITION, AND FORESTRY
COMMERCE, SCIENCE, AND TRANSPORTATION
JOINT ECONOMIC COMMITTEE
JUDICIARY
RULES AND ADMINISTRATION

United States Senate

WASHINGTON, DC 20510

November 29, 2018

Minnesota High Tech Association
400 South 4th Street, Suite 416
Minneapolis, MN 55415

Dear Friends:

Thank you for your invitation to this year's Tekne Awards. I want to acknowledge all of the work the Minnesota High Tech Association does to support our state's technology ecosystem. I want to especially applaud all of the finalists and award recipients this evening - you exemplify the best and brightest of our state's diverse technology industry.

The Minnesota High Tech Association has created a support network that fosters innovation and collaboration in Minnesota's science and technology industries. As part of that mission, you host Minnesota's annual Tekne Awards bringing together business, government, and academic leaders for an event celebrating innovative companies that play a critical role in our state's economy. Tonight's event is an example of your commitment, not only to one another but also to the future of your industry. This is both a celebration of our state's science and technology industries and an opportunity to recognize the continued impact of your hard work on the lives of so many people.

All of you here are contributing to our state's long and enduring legacy of innovation. Whether it is medical devices, computer software, or advanced manufacturing technologies, innovation is the fuel that powers our economy forward and you are leading the way. Your work is critically important and as your partner in Washington, I remain committed to expanding STEM education resources and helping businesses of all sizes succeed.

Thank you to the Minnesota High Tech Association, the participants, and businesses who come together to shine a light on innovation. It is an honor to serve you in the United States Senate.

Sincerely,

Amy Klobuchar
United States Senator

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 The Office of the Assistant Secretary of Defense (OASD) for Manpower and Reserve Affairs (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.[12]

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 mathematics 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 (94 percent).[13] Table 2 shows the number of students at each grade level. The total number of students served in FY 2019 was 81,062.

Table 2: Grade Level of FY 2019 DoD STARBASE Students – Basic Five-Day Program

Grade Level	Number of Students
Kindergarten through 3rd Grade	34
4th Grade	2,293
5th Grade	76,093
6th Grade	2,346
7th Grade	173
8th Grade	42
9th Grade and Above	81
Total Number of Students	**81,062**

Note: Total number of students - Basic and Supplemental Programs: 99,744

[12] 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).

[13] The locations serving grades other than the 5th grade are: CA - STARBASE Edwards, CO - STARBASE Peterson, CT - STARBASE Connecticut - Windsor Locks, FL - STARBASE Florida, GA - STARBASE Savannah, HI - STARBASE Hawaii, KS - STARBASE Wichita, LA - Bayou State STARBASE and Pelican State STARBASE, MI - STARBASE Alpena and STARBASE One, MN - STARBASE Minnesota - St. Paul, MT - STARBASE Fort Harrison, NC - STARBASE Charlotte, NV - STARBASE Nellis, PR - STARBASE Puerto Rico, UT - STARBASE Hill, 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 Science, Technology, Engineering, and Mathematics (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 2019, 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 students[14] (65 percent) attended schools in the central city with White students attending schools in mostly rural areas (79 percent).[15] Table 3 shows the percentage of students from each of these groups.

Table 3: Groups Underrepresented/Underserved in STEM

Group	Percentage of Students
Females	49%
American Indians or Alaskan Natives	4%
Blacks/African Americans	23%
Hispanics or Latinos	22%
Native Hawaiians or other Pacific Islanders	1%
Low Income Students	76%
Students with Disabilities	13%
Students who use English as second language	16%

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 2019 program year was 1:14, with the average class size for the FY 2019 program year at 25 students. One location reported an average below 20 students.[16] 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 of students arriving from the school, the resulting DoD STARBASE class may contain students originating from multiple classrooms. In FY 2019, most (41 DoD STARBASE locations) operated simultaneous classes ranging from two to as many as four.[17] On average,

[14] Hispanics and Latinos, African Americans, American Indians, Alaskan Natives, Native Hawaiians, and Pacific Islanders

[15] 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.

[16] STARBASE Minnesota - St. Paul reported averages of less than twenty students due to STARBASE classroom size limitations. Participating school classes are divided into groups not to exceed 16 students to meet room restrictions.

[17] STARBASE Minnesota - St. Paul has more than six classrooms but they are small in size. Participating school classes are divided into groups not to exceed 16 students to meet room occupancy restrictions.

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[18]	Average Number of Classes Served
1	24	30
2	35	54
3	4	97
4	3	110

DOD STARBASE STAFF

EMPLOYMENT AFFILIATION

The DoDI provides general guidelines on personnel 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 policy 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. Contractor affiliations make up 42 percent of the employment relationships, followed by state and federal[19] affiliations, which are at 55 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. Determination of starting salaries is the prerogative of each location. 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. 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.[20] Of these 24 locations, 14 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.

[18] CA - STARBASE Vandenberg and FL - STARBASE Patrick are newly funded programs that did not see students in FY 2019. STARBASE MCAS Beaufort was operational during most of FY19, however contractual issues forced temporary closure at the end of the 2018-19 school year and operational information was not reported. The program is expected to re-open in Spring 2020.

[19] STARBASE Edwards and STARBASE Wright-Patt are the only locations with federal employment affiliations four and two, respectively), in FY 2019.

[20] 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 - 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 2019 Single Classroom Staffing Profile

Position	Number of Staff	Full-Time[21]	Part-Time
Director	25	25	0
Deputy Director/Instructor	23	23	0
Instructor	39	35	4
Office Manager	18	17	1
Instructional Support	5	1	4
Other	5	3	2
Total	**115**	**104**	**11**

Many locations have made adjustments to the DoDI staff manning 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 used 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 2019 other instructional support positions included: An Executive Director (IN), DoD STARBASE 2.0 coordinators, teaching assistants, tech 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 2019 Multiple Classroom Staffing Profile

Position	Number of Staff	Full-Time	Part-Time
Director	39	39	0
Deputy Director/Instructor	37	37	0
Instructor	92	79	13
Office Manager	35	27	8
Instructional Support	40	25	15
Other	32	20	12
Total	**275**	**227**	**48**

Tables 1 and 2 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.[22]

[21] Full-time is defined as an employee working more than 125 days per year.

[22] 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.

STAFF CHANGES AND DEPARTURES

Directors (42 percent) have typically worked with DoD STARBASE for 5-10 years. Deputy directors and instructors tend to have 2-7 years of DoD STARBASE experience at 68 percent and 59 percent respectively. Office managers and instructional assistants have the least amount of DoD STARBASE experience with most (33 percent and 55 percent, respectively) just starting their first 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) software, tablet training, and updates to the DoD STARBASE curriculum.

There was a 5 percent increase in the number of employees from FY 2018 with 62 staff departures in FY 2019. The majority (37 departures) were at the instructor level. Instructional assistants were the next highest with seven departures followed by directors, deputy directors, and office managers/administrative support at six departures each. The overall turnover rate in FY 2019 was 16 percent, which is 4 percent less than last fiscal year's turnover rate. Directors reported the most common reasons that staff members who left the DoD STARBASE program gave was because of personal reasons (18 percent), better opportunity at another academic institution (15 percent), moving (13 percent), or retiring (13 percent).[23] Only one of these positions remained unfilled at the end of FY 2019.

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 12,643 volunteers who contributed a total of 134,590 hours, worth an estimated $3,288,950[24] contribution to the program during FY 2019.

As illustrated in 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 $1,850,377 to the program in FY 2019. The amount of time donated by this field of experts (over 79,000 hours) is a testament to the schools' commitment and support of the DoD STARBASE program.

Table 7: FY 2019 Volunteer Participation (Non-Military)

	Volunteers	Hours	Value
Teachers/School Personnel	4,182	79,013	$1,850,377
Parents	5,168	34,329	$908,298
Community/Other[25]	753	7,521	$191,722

[23] Other reasons reported for leaving: non-academic career change (10 percent), terminated (5 percent), better financial opportunity (3 percent), furthering education (3 percent), and position eliminated (3 percent).

[24] 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.

[25] Other volunteers include STEM groups, firefighters, board members, etc.

In addition, 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 Science, Technology, Engineering, and Mathematics (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 11,338 hours of support by 2,189 military personnel with an additional 2,389 hours of support by 351 DoD Science and Engineering personnel.

Outreach

Many DoD STARBASE locations provide resources and training to local teachers. Of the 69 locations, 27 locations provided training to local teachers in FY 2019. At the DoD STARBASE locations that offer teacher training, 70 percent of the teachers may use this training towards their certification requirements. The most common types of teacher training are 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 programs to create an inventory of STEM programs to share with schools, teachers, and students. Directors from 52 of the 69 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.

> **"DoD STARBASE Savannah is always engaged,** no matter what day or hour I come over to visit with them. They are always prepared and organized. No discrepancies! Visiting personnel are always impressed with the program."
>
> -CSM LAVANDER WILKERSON, STARBASE SAVANNAH

A LETTER OF SUPPORT FROM COLONEL PATRICK J. CARLEY

DEPARTMENT OF THE AIR FORCE
42D AIR BASE WING (AETC)
MAXWELL AIR FORCE BASE ALABAMA

MEMORANDUM FOR THE SPECTRUM GROUP

FROM: 42 ABW/CC

SUBJECT: Letter of Support for Maxwell AFB—STARBASE

1. Maxwell AFB has hosted a vibrant and effective STARBASE program since 2003. During the tough years of sequestration the base and the community teamed up to provide resources and a creative approach to operations; wherein, strengthened the program and brought in new ideas and enthusiasm. With shared goals of a better educated workforce and more emphasis on technology, STARBASE has been the perfect instrument to move the community toward success in education.

2. Our Maxwell AFB STARBASE is an outstanding example of interactive, impactful education at work. In 2019, STARBASE served 2,000 students from 3 school districts in 3 counties. In addition, to the core STARBASE Program 1.0 for 5th graders, they launched a summer camp partnership with Autauga County and provided support to the system as district leadership has increased their commitment to more STEM instruction and opportunities for students. STARBASE now offers 2.0, an after school program serving our local middle schools. This program allows students to continue their exploration and interest in science and technology and encourages students to pursue STEM education. With more than 75% of the students coming from a Title-1 school (very low income) the impact of this dynamic program cannot possibly be overstated.

3. STARBASE shines as a model for what can be accomplished with the right amount of effort and talent. We encourage volunteers and mentors from our staff and faculty to partner with the STARBASE instructors and introduce students to possibilities in STEM careers and participate in classroom instruction. We are very proud to host Maxwell AFB STARBASE and are very grateful for continued congressional support to fund this program.

PATRICK J. CARLEY, Colonel, USAF
Commander

DoD STARBASE GRADUATES WHERE ARE THEY NOW?

A LETTER OF SUPPORT FROM THE PARENTS OF GRADUATES LUKE, DAVID, & HUNTER HAMILTON

December 5, 2019

We have three sons who attended DoD STARBASE Oklahoma as young students in the public school system and members of Boy Scouts in Oklahoma. It is by far the BEST STEM program our sons attended over the years! The skills they learned at STARBASE Oklahoma carried over to a lifetime of learning and education, so we cannot thank you enough. Through your hard work, they experienced interactive real world STEM lessons they still talk about today. From their experiences at STARBASE, they learned how important STEM learning really is and how exciting it is to learn new things. In reflection, they have told us they especially enjoyed the hands-on learning experiences with Newton's Laws of Motion, touring the base, viewing a static display of fighter jets, and learning about different career fields at the Oklahoma Air National Guard in Tulsa, Oklahoma, during the Career Day.

We know that your job and funding might not always be easy, so we wanted to tell you how much we really appreciate all of your hard work. Because of you, all three of our sons had a positive, engaging learning experience at STARBASE Oklahoma that inspired them to pursue careers in STEM and with the Oklahoma Air National Guard. Thank you so much!

Very Sincerely,

COLONEL (RET.) BRUCE AND CELICIA M. HAMILTON

Luke, Hunter, and David Hamilton are pictured here with their dad, Colonel (ret) Bruce Hamilton, former Operations Group Commander from the Tulsa Air National Guard. Luke is in the 146th Air Support Operations Squadron as a Tactical Air Control Party (TACP) member and TACP instructor. He attends college at Oklahoma Community College and will finish up at Oklahoma State University (OSU) in 2022 with a bachelor's degree in organizational leadership. Hunter is in the 219th Electronics Engineering and Installation Squadron (Tulsa) as an engineering tech/officer candidate. He graduated from OSU in December 2019 with a bachelor's degree in electrical engineering. David is an F-16 pilot candidate in T-38s at Vance AFB Pilot Training Program. He graduated from OSU with a bachelor's degree in mechanical engineering and will graduate from pilot training in February 2020.

"The skills they learned at STARBASE Oklahoma carried over to a lifetime of learning and education."

- COLONEL (RET.) BRUCE AND CELICIA M. HAMILTON

The Hamilton brothers are shown here attending STARBASE Oklahoma summer camp in Tulsa. Pictured from left to right are David (age 13), Hunter (age 12), and Luke (age 10).

DoD STARBASE 2.0 Program

2.0 PROGRAM ELEMENTS

DoD STARBASE 2.0 is a Science, Technology, Engineering, and Mathematics (STEM)-based afterschool mentoring program that is based at a collaborating school system.[26] The objective is to serve students at other grade levels in STEM areas beyond their initial DoD STARBASE experience. The program was introduced in 2010 and has expanded to 23 states. In FY 2019, 2.0 programs were organized by 43 DoD STARBASE locations who reported coordination of 99 DoD STARBASE 2.0 programs. Throughout FY 2019, directors of the 43 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 afterschool program that targets underserved/underrepresented 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 afterschool 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; empowering schools through student referrals. Basic program requirements are outlined in the DoD STARBASE 2.0 Program Guide. The guide lists expectations for program basics, 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 held after school hours
- Parking is provided for mentors
- A nutritional snack is provided for the students
- The students are in 6th, 7th and/or 8th grades

PARTICIPANTS

In FY 2019, school districts and schools partnered with DoD STARBASE at 99 locations to operate 128 STARBASE 2.0 clubs. Although the number of DoD STARBASE sites electing to coordinate a 2.0 program decreased by two, the number of school based operating locations has increased by 21 percent. Many of the FY 2019 DoD STARBASE 2.0 students were former DoD STARBASE students (53 percent). While most participants were male (55 percent), that number has dropped by 5 percent from FY 2018 which could be as a result of efforts to include more girls in programs for underserved groups. The average club size was 19 students. In FY 2019, the DoD STARBASE 2.0 program served 2567 student participants, up 35 percent from FY 2018. The retention rate was down slightly at 81 percent from 88 percent in FY 2018. 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.

[26] In FY 2019, DoD STARBASE 2.0 programs were offered in Alabama, California, Connecticut, Georgia, Indiana, Kansas, Louisiana, Massachusetts, Michigan, Minnesota, Montana, North Carolina, New Mexico, Ohio, Oklahoma, Oregon, Puerto Rico, South Carolina, South Dakota, Texas, Vermont, Virginia, and West Virginia.

"We enjoy the opportunity to give young minds a glimpse into the world of army aviation and its history. We firmly believe that without DoD STARBASE there would be less interest in aviation among our youth."

- SFC MICHAEL MUNSON, STARBASE SALINA

2.0 CURRICULUM

Over the course of three to five months, DoD STARBASE 2.0 students work with a STEM mentor 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 career awareness

Program locations use a variety of different team projects to achieve these goals. STEM projects include: Scalextrics, robotics, forensic science, 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.[27]

STAFF

DoD STARBASE 2.0 is primarily a volunteer program. The participation of volunteer STEM mentors and volunteer classroom teachers is coordinated by a designated DoD STARBASE STEM Mentor Coordinator. This is typically a part-time position and many programs choose to hire the STEM Mentor 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 Mentor Coordinator play an invaluable role in the success of DoD STARBASE 2.0. The responsibilities of the STEM Mentor Coordinator include:

- Program marketing
- Managing relationships with schools
- Recruiting and screening program volunteers
- Managing volunteer STEM mentors
- Coordinating and delivering volunteer training
- Tracking data
- Supporting and motivating program volunteers
- Selecting program curriculum

[27] FIRST LEGO League is a global competition where 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 where they design, build, and launch a rocket with specific characteristics.

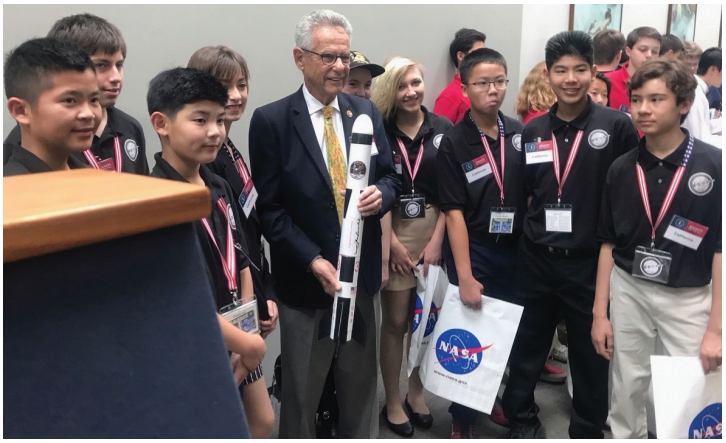
STARBASE ELITE Sail to New Heights

DOD STARBASE LOS ALAMITOS TARC TEAM WHITE HOUSE BOUND

...they know that teamwork and persistence pay off.

The American Rocketry Challenge (TARC) team at DoD STARBASE Los Alamitos has reconvened for another year of test launches, late night designing, and memories that will last a lifetime. It all started back in 2017 when a group of home schooled 5th graders came for a week-long STARBASE experience, and now, nearly three years later, they are still learning and moving forward together. TARC, also known as the Team America Rocketry Challenge, is the world's largest rocket contest with nearly 5,000 students nationwide competing each year. The contest gives middle and high school students the opportunity to design, build, and launch model rockets and hands-on experience solving engineering problems.

The Los Alamitos team captain, Regina Rodeghiero, is now in 8th grade and still remembers doing lessons on Atmospheric Properties as a student at STARBASE in 2017. Today she is applying what she learned to her rocket. After completing STARBASE, she signed up for



Above top, All this, and the US Senate too? "Team Rocket DC and Beyond" from STARBASE.

Above, Congressman Lowenthal meets with the STARBASE Los Alamitos TARC team at "Rockets on the Hill" day. The 2019 TARC theme was Apollo 11, in honor of the historic 50th anniversary celebration.

Right top, DoD STARBASE Los Alamitos "Team Rocket DC and Beyond" holds up their rocket to photographers along with 100 other finalists at "Rockets on the Hill" day in Washington, DC, in May 2019. Pictured with them is STARBASE mentor Tim Ziesmer.

Right, "Team Rocket DC and Beyond" poses for one last picture at Capitol Hill in May 2019 before preparing for the competition in Virginia the next day.

Readying for Launch: The STARBASE Los Alamitos TARC team takes one final picture before launching early in the morning at the TARC Final Flyoff in Virginia.

the Los Alamitos DoD STARBASE 2.0 after-school program. Together with her teammates, she designed a rocket that got them a qualifying score for TARC, but it wasn't quite good enough to put them in the finals. The dedicated group continued the following year with their goal described in the team's new name "Team Rocket DC and Beyond." At the finals in Virginia, they placed 51st with their rocket launch. But there was more left to do and with a new moniker of "STARBASE Elite" they continue to vie for the top spot. This year, teams of 3 to 10 students must build a model rocket that carries one raw hen egg to an altitude of 800 ft, stays airborne for between 40 and 43 seconds, and returns the rocket to the ground safely.

The team that places first at the National Finals wins an all-expenses-paid trip to represent the United States in the International Rocketry Challenge, hosted at the Farnborough Air Show in London, England, in July 2020. The United States Rocketry Team competes against the winning teams from Japan, the United Kingdom, and France.

After three years of working together, the team knows each other's strengths and weaknesses and how to accommodate for them. They know when they need to get serious and work, and when it's time to celebrate together. They know how to create spreadsheets for rocket supplies and stay on budget. They know how things like wind and rain affect a launch, and what accommodations need to be made. But most importantly, they know that teamwork and persistence pay off.

"I know what I want to do now," said Regina at a meeting of the Orange County Chapter of the Society of Military Engineers (SAME). "I want to be an engineer." Her announcement was met with applause. But before that happens, she has at least one more goal that she is working to attain and that is to represent the United States in London next summer. And she's not the only one. All of her teammates are determined to get an even better score than they did last year. With four more years of eligibility left to make it happen, we have every reason to believe the Los Alamitos team will bring their dream to fruition!

TARC is sponsored by the Aerospace Industries Association and the National Association of Rocketry. Co-sponsors include NASA, United States Department of Defense, the American Association of Physics Teachers, and the Civil Air Patrol.

STEM MENTORS

Mentors provide a vital role in the success of the participants and the program by providing a role model of a successful STEM professional. 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, mentoring can be a powerful experience for STEM professionals, building work skills and connecting them to their community. The ideal STEM mentor team consists of a lead STEM mentor, representatives from local STEM industries, college students, and members of the military. To serve as a DoD STARBASE 2.0 STEM mentor, volunteers must meet the following minimum requirements:

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

The 576 mentors who participated in the 2.0 program 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 mentor, 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. The number of mentors participating in a DoD STARBASE 2.0 program increased from FY 2018 by 18 percent with the largest increases in the STARBASE Staff Member and Host School Staff Member categories.

Table 8: Mentor Types

Type	Number of Mentors
Military	63
DoD Science and Engineering	23
Non-Military, DoD, Professionals	23
Industry Professionals	52
College Students	29
STARBASE Staff Members	190
Host School Staff Members	173
Other[28]	23
Total Number of Mentors	**576**

FUNDING

The DoD STARBASE 2.0 programs operate through a combination of federal and private funds.[29] Of the 43 DoD STARBASE locations coordinating a 2.0 program, 60 percent operate solely using their federal DoD STARBASE funds. The remaining 40 percent receive funding from combinations of federal and private funds.

[28] Other types of mentors include high school students, parents, and police officers.
[29] Private funds include not-for-profit, donations, grants, and host school contributions.

The DoD STARBASE Curriculum

Today's DoD STARBASE Science, Technology, Engineering, and Mathematics (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."[30]

The 36 learning objectives are clearly outlined for each of the curriculum's STEM categories, which are consistent with National Science Education Standards.[31] 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.

[30] 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.

[31] 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.

The Stem Gems of Oklahoma

The Women's Energy Network of Greater Oklahoma Leads the Way for Girls Through DoD STARBASE Oklahoma After-School

Back in 2016, Kimberly Duffle, a member of the Women's Energy Network Greater Oklahoma (WEN OK) and an employee of Chesapeake Energy, was a presenter at the quarterly STARBASE Oklahoma - Tinker (STARBASE OK) career day. During the visit she mentioned that WEN OK was interested in more long-term mentoring opportunities with girls rather than doing only brief presentations at the career days. This thought sparked the creation of STEM Gems – an all-girls DoD STARBASE 2.0 after-school club at Kerr Middle School in Oklahoma City.

STARBASE Oklahoma Deputy Director Sharon Brooks, the WEN OK Community Initiatives/STEM Chair Susan Shons, and committee member Maria Simpson put their heads together to develop the concept that would focus on oil and gas exploration – one of the biggest industries in the state of Oklahoma. A proposal was made to the WEN OK board of directors in July 2017, and they gave the green light to move forward. For the next 12 months, WEN OK members worked closely with STARBASE OK to develop the curriculum for the 11 lesson modules, using one as a stepping stone to the next. Modules began with an Introduction to Energy and continued with Geology and Maps, Rocks and Fossils, Petroleum Systems, Coring Drilling, Drilling Site Equipment, Completions, Production Part 1 and 2, Transportation and Storage, and finally, Renewables.

The Women's Energy Network of Greater Oklahoma receives the Outstanding Chapter Program Award for the STEM Energy 2.0 Program at the 2019 WEN National Conference in Denver, Colorado. WEN OK President Natalie Martin accepted the award from National WEN President Erin McGee, and the WEN OK Community Initiatives/STEM Chair Maria Simpson was also in attendance.

In 2018, STARBASE OK contacted the former Tinker Air Force Base Wing Commander Col (ret) Stephanie Wilson about being a mentor and, as a result of her previous involvement, she suggested Kerr Middle School as the location for the new 2.0 club. In July 2018, WEN OK and STARBASE OK representatives met with the STEM director for Mid-Del Public Schools and the principal and assistant principal for Kerr Middle School to present their proposal to create a STARBASE 2.0 program at Kerr Middle School. The plan was enthusiastically accepted, and final preparations began to pilot the STEM Gems at Kerr in October 2018.

Fifteen 8th grade girls were recommended by their science teacher to participate in the pilot STARBASE 2.0 club. The girls divided themselves into five three-person teams. STARBASE OK recruited six mentors – one for each team and an extra to fill in when necessary. The original mentor teams also had mentors from the community. Stephanie Wilson brought her military experience and engineering background. Kristin Eaton, a retired high school science teacher, and Chris Tait, the Kerr 7th grade science teacher, mentored from a teaching perspective. Tait's wife Trenish, an engineer with Pratt Whitney, also joined in. Susan Shons and Maria Simpson represented WEN OK. Sharon Brooks served as the STARBASE OK representative and mentor assistant. Each of the 11 modules was facilitated by WEN OK members whose primary job in the oil and gas industry is directly related to the specific topic. The facilitators began each lesson sharing how they got interested in the field and the education path they took to this career. During the 12 meetings, 18 WEN OK members facilitated the 11 modules at the DoD STARBASE 2.0 club meetings.

The results were overwhelmingly positive. STEM Gems Mentor Chris Tait, Senior Explorer (aka – Mentor/Science teacher at Kerr Middle School), said in reflection: "At first I wasn't sure if I was the right person, being a male teacher, to moderate for an all-female after-school activity. But I know

Right, participants from Kerr Middle School learn the process of Coring, which is taking samples of the rock from within the oil well or potential oil wells using a cylindrical sample of the rock with different types of "earth samples" to simulate getting "core samples" to analyze.

Below, students test their knowledge of building an oil rig.

the reason the principal chose me. I am someone who speaks against stigmas, stereotypes, and prejudices of all kinds in my science classroom and my life. For so long there has been a negative stereotype for women in the science fields and I am grateful that I get to play a direct role towards erasing that stereotype. I could have the roughest of days, but I always looked forward to STARBASE and I always leave feeling good about what I do for them every time we meet, and it always brightens my day. I want to give a thank-you to those in the STARBASE OK program and WEN OK for allowing me to moderate this great program for our young girls this year."

The program was formally recognized at the WEN National Conference in Denver, Colorado, in March 2019. WEN OK was presented with the Outstanding Chapter Program Award for the STEM Gem STARBASE 2.0 Program. The award was presented by National WEN President Erin McGee and was accepted by WEN OK President Natalie Martin. She recognized and thanked the 18 WEN OK volunteers across seven Oklahoma-based energy companies who contributed to the design, development, and delivery of the energy-focused STEM curriculum. ONE Gas, who provides natural gas distribution services to more than two million customers in Oklahoma, Kansas, and Texas, was also acknowledged as one of the many Chapter sponsors who helped WEN OK make programs like this possible.

This group had such a successful year and WEN OK members enjoyed the enthusiasm of the young girls' interest to learn about energy so much that they are continuing the program in 2020. The plan is to partner with the WEN OK Tulsa Area Chapter to pilot another STARBASE 2.0 STEM Gems program in the Tulsa area.

Said one student, "Coring, drilling, and building an oil derrick was really interesting and makes us think about what it would be like to do this for real. The challenges were just that – challenging, but all of them made us think. Being in this STARBASE 2.0 program, doing energy experiments has changed the way we view the field of energy and know there are a lot of careers we can go in." You go, girls!

Program Oversight

COMPLIANCE

The Office of the Assistant Secretary of Defense for Manpower and Reserve Affairs has the overall responsibility for the management of the DoD STARBASE program. The program is authorized under Title 10, U.S. Code § 2193b - Improvement of education in technical fields: program for support of elementary and secondary education in science, mathematics, and technology. 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 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 Science, Technology, Engineering, and Mathematics (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 the evaluation team. Shortfalls or non-compliance on required activities are usually handled through a corrective action plan agreed upon by the participants and OASD/M&RA to successfully obtain the required performance level under review. 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 only advance to higher levels of performance 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 could move towards and complete an activity at another level, the program would not be reviewed for the higher level of performance 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 whether an academy may be selected and/or considered for special programs that will be made available to locations at the required level. 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.

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, disability 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 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, is evaluated and approved 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

Twenty-six of the 49 FY 2019 visitations focused primarily on Level I compliance. This included 14 periodic Level I visitations and 12 new director orientations. There were 12 Level II evaluations and for the first time, 5 sites were evaluated for Level III designation. The remaining six visits were to discuss development of new STARBASE sites (4 visits) and explore high-school age after school programs (2 visits).

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-five-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 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 prepared upon completion of the visitation for historic documentation and follow-up purposes. A written summary of progress, made by the DoD STARBASE director, is sent to OASD/M&RA as corrective action tasks are completed. In some instances, a follow-up visitation is recommended for the following year 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 visit to outline DoD requirements and document Level I compliance. Twelve new director orientation visits were conducted in FY 2019.[32] 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 Department of Defense Instruction (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, 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 visitation includes observation of a club meeting, interviews of school staff and mentors, and examinations of 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.

[32] Orientation visits were conducted at: AL - STARBASE Maxwell, CA - STARBASE Edwards, FL - STARBASE Florida, HI - STARBASE Hawaii, ID - STARBASE Idaho, IN - STARBASE IN Fort Wayne and STARBASE IN Gary, LA - STARBASE Jackson Barracks, NC - STARBASE Charlotte, SD - STARBASE Sioux Falls, TX - STARBASE Goodfellow and STARBASE Kelly.

During FY 2019, a process was piloted to evaluate select DoD STARBASE locations for designation as a "Level III - High Performing DoD STARBASE Academy." This is the top level of STARBASE program performance. Over the past year, potential candidates were identified, applications solicited and programs evaluated to verify program enhancements. The result was the certification of five locations – STARBASE Louisiana, STARBASE New Mexico, STARBASE Oklahoma-Tulsa, STARBASE Robins and STARBASE Wright-Patt for Level III High Performing DoD STARBASE Academy designation. As Level III programs, future evaluations will be conducted on a three-year cycle and will focus on top-level compliance areas in order to allow the sites time to mentor new DoD STARBASE programs. Past academy performance for all other DoD STARBASE locations will be reviewed on an annual basis to determine eligibility for additional Level III consideration/designation.

Fiscal Analysis

The Office of the Assistant Secretary of Defense for Manpower and Reserve Affairs (OASD/M&RA) oversees the program and distributes funding. In FY 2019, the total program budget was $30,000,000. OASD/M&RA allocated $28,219,681 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 2019, the median operating cost per location was $350,870. Several factors contribute to the cost variances, including geographic location, number of operational classrooms, type and number of outreach programs, salary scales, and number of employees. OASD/M&RA annually reviews each location's budget to maintain an equitable distribution of funds.

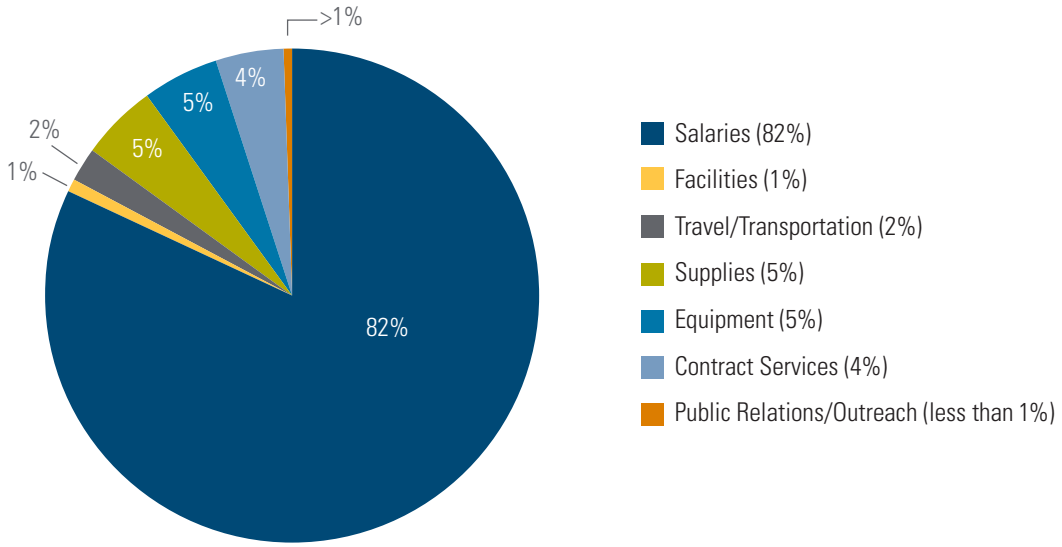
Operating simultaneous classrooms requires duplicate equipment, supplies, and staff. Many DoD STARBASE locations offset these expenses by sharing equipment between classrooms and hiring seasonal and/or part-time instructional staff. These offsets keep staff costs down to around 72 - 85 percent of the 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	$315,000	$85,890 - $425,000	$249,088
2	$376,000	$239,000 - $1,006,000	$322,242
3	$795,000	$440,000 - $920,000	$570,995
4	$645,000	$500,000 - $1,058,801	$583,957

Overall expenditures of DoD STARBASE funds allocated to each program site are shown in Figure 1. Staff costs, on average, account for 82 percent of the site budget followed by equipment (5 percent), supplies (5 percent), and contract services (4 percent). Also shown are costs for travel/transportation and facilities at two percent and one percent respectively. Travel and transportation costs are for staff business travel.

Figure 1: FY 2019 Expenditures of DoD Funds



In addition to DoD funds, 30 of the 69 locations obtained funding from non-DoD sources such as state allocations, grants, and donations. The total raised from non-DoD funding for FY 2019 was $827,918. A total of $1,123,007 non-DoD funding was expended in FY 2019.[33] Academies use supplemental funding for staff salaries (62 percent); supplies (20 percent); equipment (3 percent); public relations/outreach (1 percent); transportation/travel (5 percent); facilities/furnishings (2 percent); program/curriculum development (less than 1 percent); contract services (4 percent); and other expenditures (5 percent).

"Seeing the excitement in our children's eyes leading up to a visit to DoD STARBASE–Alpena served as a true testament to the quality learning experience that the program offers. With living in a small community, having a facility that provides **a fully-immersive experience in the fields of Science, Technology, Engineering, and Mathematics** helps ensure that our youth have a means to gain the knowledge necessary to make contributions to the highly-skilled American workforce!"

- MSGT AMBER SCHULDT, STARBASE ALPENA

[33] This amount is larger than the amount raised in FY 2019 because non-DoD funds may carry over and be used in other years.

Five DoD STARBASE Locations Receive Top Level Program Designation in 2019

LEVEL III STATUS AWARDED BY OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE FOR MANPOWER AND RESERVE AFFAIRS (OASD/M&RA) TO FIVE PROGRAMS

During FY19, a process was piloted to evaluate select DoD STARBASE locations for designation as a "Level III - High Performing DoD STARBASE Academy." This is the top level of STARBASE program performance. To be eligible for consideration, the program must have maintained a fully compliant Basic Level I and Advanced Level II program for the past six consecutive years, which included having a sustainable STARBASE 2.0 program.

In addition, they must have developed an activity or set of activities that significantly advanced the DoD STARBASE program mission and vision. This includes operational and program enhancements, higher-level problem-solving techniques, time-sensitive improvements, and efficiencies. Such enhancements must 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 at another STARBASE location within an 18-to-24-month period.

Over the past year, evaluators from The SPECTRUM Group assisted the Office of the Assistant Secretary of Defense for Manpower and Reserve Affairs (OASD/M&RA) in the identification of candidates as well as the solicitation and review of applications from potential candidates along with the verification of program enhancements. The result was the nomination of five locations – STARBASE Louisiana, STARBASE New Mexico, STARBASE Oklahoma - Tulsa, STARBASE Robins, and STARBASE Wright-Patt for Level III - High Performing DoD STARBASE Academy designation and the award of the same to all five sites.

As a Level III program, each location has the new responsibility to function as a resource to other DoD STARBASE locations regarding their special activity. They are also a role model for normal program operations and expertise, which assists with the development of new and/or existing DoD STARBASE sites. Congratulations to these exemplary locations who are now officially designated as a "Level III - High Performing DoD STARBASE Academy."

CONTINUED

"Over the four years I've been in the DoD STARBASE program, I learned to reach for the stars, work hard, and never give up. STARBASE helps me not only to be a leader but has also helped me with how I see science and mathematics. To be honest, I used to be really bad at mathematics but STARBASE has shown me a different way to look at mathematics and science, in a way that makes sense. It has shown me that I could have a future career that deals with a lot of mathematics and science, and that I don't have to be afraid of it. I now know that I can use mathematics and science to create something that is truly fantastic. I have found a love of engineering and my dream now is to become a rocket engineer and finally see the stars."

LEVEL III STATUS, CONTINUED

STARBASE LOUISIANA

(BARKSDALE AIR FORCE BASE, BOSSIER CITY, LOUISIANA – AIR FORCE RESERVE)

STARBASE Louisiana was recognized for the longevity of their STARBASE 2.0 Program and their sustainability/retention of their military mentors. When exploring options for their new STARBASE 2.0 program, STARBASE Louisiana searched for topics that were current, relevant, and high-tech without overlapping into the already saturated robotics programs in the area. Utilizing project-based engineering competitions not only generated interest and built excitement, but also attracted grant-donors to invest in the program. The curriculum was designed for multi-year participation with no overlaps so students can participate year after year without redundancy. The active participation and support from partner teachers and schools have allowed their 2.0 programs to grow from one location with three clubs in the pilot year to five locations with 13 clubs in FY19.

Creative scheduling has been used to embed the STARBASE 2.0 curriculum into the school day in multiple sites, allowing the Louisiana 2.0 team to serve more students. They have also extended the program into high school to create a true pipeline into college and career readiness.

An additional strength of the STARBASE Louisiana program is their unprecedented support from military organizations at Barksdale Air Force Base which include the 307th Bomb Wing Mission Support Group, 2nd Bomb Wing Public Affairs Office, the First Sergeants Association, and other base associated personnel. Their dedication to the STARBASE 2.0 initiatives and the basic STARBASE Louisiana program makes them a key contributor to the programs' success.

STARBASE NEW MEXICO

(KIRTLAND AIR FORCE BASE, ALBUQUERQUE,
NEW MEXICO – AIR FORCE)

The achievements of DoD STARBASE New Mexico centered around the development of a guidebook that outlines their process and success they have experienced with their involvement in the Team America Rocketry Challenge (TARC) as part of their STARBASE 2.0 program. Six TARC teams were fielded at STARBASE New Mexico during the 2018-19 school year.

The STARBASE New Mexico staff has fully documented their approach to TARC as used in their STARBASE 2.0 program. This includes curriculum, schedules, equipment lists, estimated costs, and all other information needed to begin a TARC-based program for middle school students at other DoD STARBASE locations. Dedicated mentors from the Air Force Research Laboratory and across the base coach and engage the students in the TARC process. Their enthusiasm for working with the students results in them returning to the program year after year.

Students for the program come from the Albuquerque Institute of Mathematics and Science (AIMS), a charter school that is open to any middle school student within the Albuquerque school district. School scheduling at AIMS includes a weekly "intensive" program during school hours. Students who want to participate in the STARBASE 2.0 program commit for both semesters, covering TARC through the challenge season and filling the remaining time with other student-chosen STEM topics. Students tend to stay with the program until they "age-out," mentoring new students as they come into the program.

"STARBASE 2.0 is very special in that the program allows the public to see the military as members of our society. We are not in planes, wearing body armor in a vehicle, we are not strangers in an airport being thanked for an unseen service, and we are not on TV being recognized for our valor. We are gluing fins on to model rockets and inspiring the next generation of scientists, mathematicians, and engineers. We get to lead and inspire students all over the socio-economic map. The outreach of this program has an unbelievable impact on the students, parents, and teachers of local schools that would otherwise not have budgets to support many of these projects. After working with this team for three years, I know I will be a life-long advocate of STEM outreach via similar programs. It cannot be overstated how much these personal interactions affect the public perception of our government in a very positive way as well as add immeasurable value to the future of our nation by cultivating mental capital."

STARBASE ROBINS

(ROBINS AIR FORCE BASE, WARNER ROBINS, GEORGIA – AIR FORCE RESERVE)

STARBASE Robins has become a key player in the Central Georgia FIRST LEGO League (FLL) through their STARBASE 2.0 program. They also actively use pre-service teaching candidates to supplement STARBASE teaching staff.

During FY19, STARBASE Robins coordinated 2.0 clubs at 12 schools and 4 counties in Central Georgia. Money from the AF STEM program pays for team FLL registration, so the program is provided at no cost to students. Clubs meet for 2 hours for 12 weeks for FLL in the fall and 2 hours for 12 weeks in the spring for robotics extension activities. In addition, STARBASE Robins hosts the Central Georgia Super Regional FLL Tournament at the Museum of Aviation with all STARBASE Robins staff members playing an operational role.

STARBASE Robins also supplements DoD program funds for staffing through the use of pre-service teacher candidates from Ft. Valley State University in the STARBASE classroom. Since 2012, STEM Methods course students 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. Candidates are observed and graded by university and STARBASE personnel. Their final project involves teaching an actual STARBASE lesson to participating students. STARBASE Robins benefits from extra hands in the classroom as well as the fresh ideas and feedback from teacher candidates. A similar relationship is in development with Middle Georgia State University.

"My students and I have thoroughly enjoyed the DoD STARBASE Robins program. We have looked forward to each class and activity with the same vigor and eagerness of traveling from one county to the next. I personally want to thank STARBASE Robins for allowing my students to venture outside of their community and their comfort zone. Often, students who live in impoverished neighborhoods tend not to venture outside of their community, but thanks to STARBASE Robins, our principal Dr. Coley, as well as our superintendent Dr. Jones, the Bibb Community, and all of Bibb County Schools systems and staff, our students were able to experience different activities and hopefully choose a career path that promotes their interest in life, such as engineering or even becoming an astronaut. To Infinity and Beyond! Thanks a million, STARBASE Robins!

"DoD STARBASE ROBINS helps students **create connections** between their learning in the classroom and outside of the classroom."

- AMANDA ERCEG, EDUCATOR AT ALEXANDRIA II ELEMENTARY SCHOOL, ATTENDING STARBASE ROBINS

STARBASE OKLAHOMA - TULSA

(TULSA AIR NATIONAL GUARD BASE, TULSA, OKLAHOMA – AIR NATIONAL GUARD)

STARBASE Oklahoma - Tulsa has added a STEM Career Day to their STARBASE class curriculum. Every quarter, students are invited back to the Tulsa Air National Guard base for a day where they can rotate through a variety of STEM career exploration presentations with base personnel. This is in addition to their five-day basic STARBASE program and the culminating event for the students and their teachers.

This event exposes students to the technological environments and positive civilian and military role models typically found on military bases and installations in an up-close and interactive environment. Students are inspired by the passion that military personnel have for their mission, and the base personnel are excited and proud to share their work with students. The students leave inspired and excited by the experience.

The STEM Career Day has also proven to be a great way to build relationships with other community partners. Organizations like the Oklahoma Highway Patrol, local Cancer Survivors, the Rogers County Sherriff's Department, the Tulsa Air and Space Museum, and the Tulsa International Airport also provide interactive experiences for the students that highlight their relationship with the Tulsa Air National Guard. It has proven to be a highlight of the DoD STARBASE experience in Tulsa, providing relevance for students and creating lasting memories of their neighbors in the military.

"We love having the kids come for Career Day. It is such a wonderful opportunity for both military personnel and STARBASE students. The interaction is incredible. STEM education is so important especially if students decide to make the military or a supporting function a career. It's amazing the number of students that are given better opportunities for their future because of DoD STARBASE."

"Receiving the designation of DoD STARBASE Level III is a huge honor. DoD STARBASE Wright-Patt would not be here without the outstanding leadership, dedication, and support of those who had the vision to establish the program here. Wright-Patterson Air Force Base and the Educational Outreach Office and all of our fantastic community partners continue to ensure the DoD STARBASE Wright-Patt legacy that was established at the beginning."

STARBASE WRIGHT-PATT

(WRIGHT-PATTERSON AIR FORCE BASE, DAYTON, OHIO – AIR FORCE)

STARBASE Wright-Patt has taken an active role to develop partnerships with local and statewide STEM and outreach programs. This helps solidify their position as a key player in the education of participating students and their exposure to the limitless possibilities of a STEM-related future. During FY19, over 500 hours of outreach activities were contributed by the STARBASE Wright-Patt staff. This is in addition to the basic STARBASE Wright-Patt program, which currently serves over 3,200 students each year, all of whom come from Title 1 eligible or designated school districts.

Their relationship with the Wright-Patterson Air Force Base (WPAFB) Educational Outreach office has opened many doors to increase visibility of the DoD STARBASE program and promoting STEM education in the greater Dayton Area as well as across the State of Ohio. The range of activities can provide ideas for other STARBASE programs on how to get involved in their communities and forge partnerships to help develop and influence the next generation of scientists and engineers in STEM.

Outreach and community activities range from involvement with the Ohio FIRST LEGO League to summer teacher workshops and summer camp opportunities for students. Partnerships are solicited and encouraged to provide the best possible STEM experiences for the students involved.Flight camps for 5-6th and 7-8th grade students are conducted each summer in conjunction with the National Museum of the United States Air Force in Dayton, Ohio. The camps are so popular that they are filled within five minutes of the opening announcement. STARBASE Wright-Patt provides interactive activities for annual STEM events such as the weekend long "Tech Fest," which is the Dayton Regional Science Festival, and the NCAA First Four Big Hoopla STEM Challenge where students, teachers, and families can learn about area STEM programs.

STARBASE Wright-Patt also assists with the Air Force "LEGACY" program designed to propel middle school students into an Air Force STEM career after college graduation. Participating students are inspired by a series of week-long camps with hands-on experiences/opportunities to engage with peers. STARBASE staff members handle camp logistics/scheduling and assist in classrooms. In 2019, over 60 percent of the 110 LEGACY student participants were STARBASE Wright-Patt alumni.

Student Assessment

OVERVIEW

To reach underserved U.S. students with opportunities to engage in Science, Technology, Engineering, and Mathematics (STEM) activities, while building an awareness of exciting career options in STEM fields, the Department of Defense (DoD) sponsors the STARBASE program at more than 60 military affiliated installations across the United States and also in Puerto Rico. The effectiveness of the STARBASE program is evaluated each year by assessing student gains in basic STEM conceptual knowledge, as well as changes in student recognition of the STEM-related nature of diverse jobs. In addition, the program's impact is gauged by surveying changes in student attitudes toward and interest in STEM activities in the contexts of school, the military, and their future potential 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 curriculum.

This evidence-based approach to program evaluation commences with a pre-test. Students are asked by their Instructors to complete the DoD STARBASE Student Assessment at the start of the STARBASE program. The students are given no feedback about their responses. Students subsequently complete a post-program assessment with the same instrument, at the completion of the instructional program. The key pre- to post-program assessment domains include:

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

The Student Assessment is reviewed for possible revisions each year to adapt to changes in the DoD STARBASE program, as well as to reflect the evolving direction of student engagement with STEM learning opportunities and career interests. Each item is evaluated based on the current year's assessment results by subject matter experts who manage the DoD STARBASE program curriculum, as well as professionals from the testing and measurement industry. Annual changes tend to be small to moderate, both because many scientific principles and facts are perennial and because continuity in assessments allows more accurate comparison across years.

INSTRUMENT DESIGN

The 2018-2019 DoD STARBASE Student Assessment consisted of a set of 20 multiple-choice knowledge items, one nomination-based knowledge item, and 37 attitudinal items. Some new knowledge items were introduced for 2018-2019. Whenever possible, changes in the assessment from one year to the next draw upon pilot items and historical items that are maintained in a data bank to allow for year-to-year comparisons.

The national standards for STEM learning objectives were updated in 2018. Consequently, the DoD STARBASE curriculum was modified to reflect the updated objectives more closely. The STARBASE Student Assessment was also reviewed to ensure that existing knowledge items align properly and achieve adequate coverage of the STEM curriculum domains. The DoD STARBASE Student Assessment is updated annually to:

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

As in previous years, the survey instrument for 2018-19 consists of two separate assessments. The first assessment is a 20-item test of STEM understanding that is focused on the core DoD STARBASE curriculum.

- **Knowledge Test** – 20 multiple-choice items and one "choose all that apply" nomination item was included in the assessment of STEM understanding. Fourteen multiple-choice items used in prior years were judged to be relevant to the curriculum objectives with satisfactory efficiency. Six new multiple-choice items were added to the knowledge assessment for better coverage of certain objectives.

  The nomination item presents a list of 25 occupations and asks a student to identify all jobs that utilize or require STEM knowledge. The item measures change in student perceptions based on how many of the 25 occupations the student identifies as STEM-related after attending STARBASE compared to before. Results from this exercise consistently reflect favorably on the program. But it would not be psychometrically sound to co-mingle the results of this STEM-job awareness item with results from more traditional knowledge items (e.g., identifying the correct chemical composition of the air we breathe). Therefore, a composite score based on the 20 multiple-choice items was used to evaluate knowledge gains for most comparative analyses.

The second assessment is a 37-item survey measuring various aspects of students' attitudes and opinions about STEM subjects, the DoD STARBASE program, and the military, with a focus on topics that impact academic success and future career goals.

- **Attitudinal Survey** – 32 survey items were administered both pre- and post-program. A composite score of 31 repeated survey items was used to evaluate attitudinal changes in most analyses. One attitude item about communication with the family is not included in the 31-item overall attitude composite. Also, five STARBASE program evaluation items administered post-program were included only in the survey but not in the composite score.

Data collected from students with the Knowledge Test and the Attitudinal Survey appear in this report as item-level results; results based on groups of items are identified as category results. There are also two overall composite scores, which are presented as a mean score (i.e., group average score) and also as a percent score (i.e., percent correct for Knowledge Test; percent favorable for Attitude Survey).

Item results, category results, and overall results are typically 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 student participants, the impact of DoD STARBASE participation in a given year, or trends that can be seen across years.

STUDY LOGISTICS

The DoD STARBASE Student Assessment was administered between January and June of 2019. The Student Assessment was administered twice to the same participating class of students (pre- and post-program) at each participating academy to gauge program impact. Most locations assessed only one selected class, as requested; two locations assessed two or more classes. The assessment forms were shipped directly to the DoD STARBASE academies and included the following instruction sets:

- **Directors' Instructions** – Overview of the DoD STARBASE evaluation components including details such as administration methodology, selection of participating classes, and an answer key for the Knowledge Test.
- **Administration Instructions** – Detailed instructions to the assessment coordinators including the materials needed for administration, filling out the assigned student code numbers, and instructions to be read during the administration of the assessment.

Completed assessments were returned to FifthTheory, LLC (FifthTheory) for processing using scan form technology.

DoD STARBASE GRADUATES
WHERE ARE THEY NOW?

A LETTER OF SUPPORT FROM GRADUATE SHANNA WALKER

Growing up in Topeka, Kansas, I went to a small private school that focused on liberal arts and not so much on science. When I was in 5th grade, my class went to DoD STARBASE and I got to do all these hands-on science experiments. I absolutely loved it! The things I remember most about my STARBASE experience revolved around a common theme – aviation. I loved learning the phonetic alphabet, learning about Zulu time, and my favorite was the flight simulator. Little did I know that this was just the start of a lifetime of learning and flying!

When I was in 7th grade, my school participated in a program called Wright Flight. This program asked us to set a personal goal at the beginning of the semester and learn about the history of aviation throughout the course of the program. At the end, everyone who achieved their goal and passed a simple knowledge test earned the opportunity to go to our local airport and fly a Young Eagles introductory flight. I flew with a local pilot in an aircraft he had built himself, and it was amazing. Once we were in the air, he gave over the controls and allowed me to fly the plane myself, under close supervision of course, while he explained the different instruments in the cockpit and how they function. It was during this flight that I fell in love with aviation!

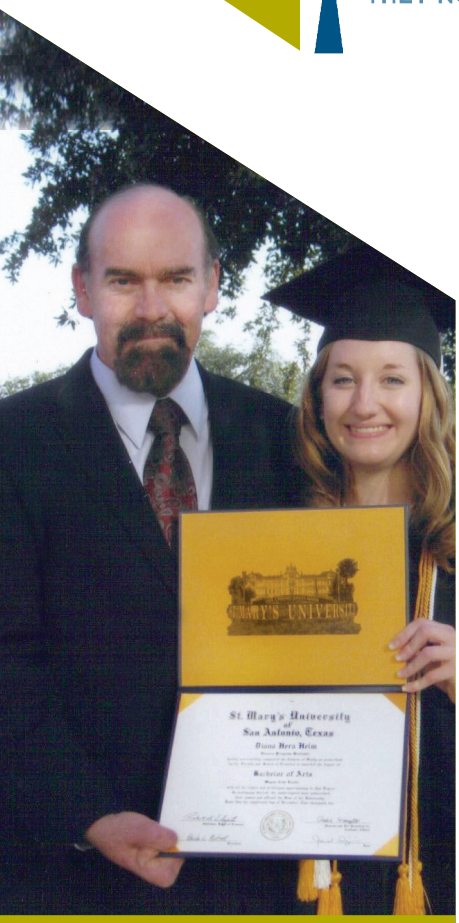
With the inspiration from STARBASE and Wright Flight, I decided I wanted to go into aviation and become a pilot. I am now set to graduate from Kansas State University - Polytechnic Campus in May of 2020. My long-term goal is to fly for a corporate airline, but for now I will be finding a job on the business side of the aviation industry, while I work on building more flight time and experience.

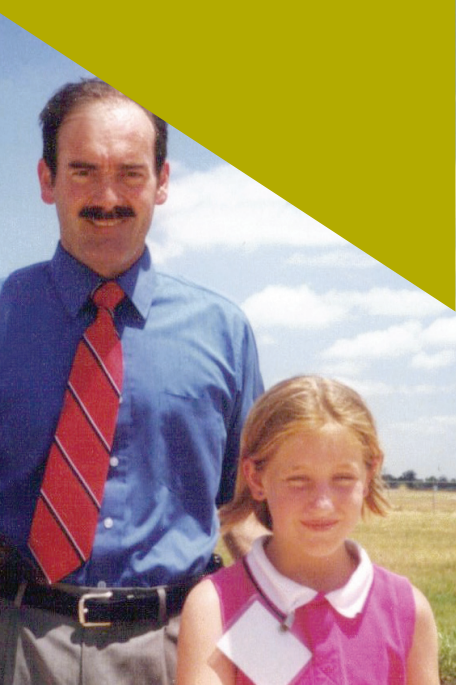
SHANNA WALKER
Salina, KS

> “Little did I know that this was just the start of a lifetime of learning and flying!”
>
> - SHANNA WALKER

DoD STARBASE GRADUATES WHERE ARE THEY NOW?

A LETTER OF SUPPORT FROM GRADUATE DIANA ERWIN





November 26, 2019

Dear Members of Congress,

It is an honor to be recognized as a featured graduate of the STARBASE Kelly program. It has been many years since I attended the program, but I have fond memories of all the learning and experiences that took place during my time there. Some of those memories include building and testing a model rocket, touring a C-5 aircraft, and engaging with caring teachers and other driven students.

Have you ever heard of the "summer slide?" It refers to a decline in reading ability and other academic skills that can occur over time when school isn't in session. It is vital for young people to be engaged in meaningful programs to fully develop their academic potential, as well as introduce them to new and ever-growing subjects (such as STEM) that they may find interest in. Whether over the summer or in combination with the traditional school year, programs like STARBASE do just that.

I like to think of my experience at STARBASE as the catalyst to future successes. After attending STARBASE as a 5th grade student, I went on to the San Antonio Pre-Freshman Engineering Program (PREP) during the summers after my 6th, 7th, and 8th grade years. PREP was similar in that it highlighted STEM subjects and promoted achievement in academics. I graduated from PREP with the highest overall GPA and was granted a generous scholarship to St. Mary's University in San Antonio at the young age of 14. I am also proud to share that I was the valedictorian of my high school, John Jay Science Academy. This was an accomplishment that can be attributed largely to hard work, dedication, and skills that were emphasized at an early age at STARBASE and honed throughout my education.

At St. Mary's University, I decided to pursue a degree in early childhood education to help teach and guide our young people just as the teachers at STARBASE did for me. According to the National Science Foundation, "In the 21st century, scientific and technological innovations have become increasingly important as we face the benefits and challenges of both globalization and a knowledge-based economy. To succeed in this new information-based and highly technological society, students need to develop their capabilities in STEM to levels much beyond what was considered acceptable in the past." Programs like STARBASE create extracurricular opportunities for young people to be engaged in new learning as well as develop a confidence that they can succeed in STEM fields or any other path they choose to pursue.

Today, I am proud to be teaching perhaps my most important students – my own two children. There is a famous proverb, "It takes a village to raise a child." I am grateful that STARBASE was part of my village, and I hope that many more young people, including my own children, are able to benefit from its noble mission into the future.

DIANA ERWIN

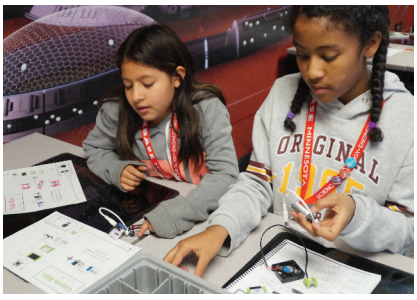
Student Demographic Information

The student survey was administered during the first half of 2019, yielding a total of 3,394 surveys (1,723 pre-program and 1,671 post-program) returned to FifthTheory for processing. Responses were received from all of the 66 participating DoD STARBASE academies for a 100 percent response rate, duplicating the response of 2018. New DoD STARBASE programs at Vandenberg and Patrick Air Force Bases were not included as they did not see students during FY 2019.

Surveys were matched pre- and post-program based on unique student ID codes. Those with matching data for both the pre- and post-program were retained for analysis. Of these matched pre-test/post-test cases, 116 had more than three unanswered items on the pre-questionnaire and 127 had more than 3 unanswered items on the post-questionnaire. The threshold of 3 unanswered items represents 15 percent of knowledge items and 10 percent of attitudinal items that form the composite scores. Having fewer than 85 percent of items answered reduces reliability of the total score. Also, that may not adequately reflect the full range of either a student's STEM topic knowledge or the student's interests and attitudes toward STEM-related endeavors.

Those less reliable cases were excluded from the sample for analyses except where it would eliminate more than 40 percent of a site's participants, which occurred with four STARBASE academies. In those instances, only participants missing three responses on both the pre-test and the post-test were removed so that some meaningful representation of those locations could be preserved in the results. That procedure resulted in 1,524 paired pre-test/post-test cases that are referenced throughout this report. Due to some remaining missing data that still met the rule, the precise number of participants varies slightly from analysis to analysis.

Five military service components sponsor DoD STARBASE programs but only four participated in the student assessment due to temporary closure at STARBASE MCAS Beaufort during FY 2019. With regard to this student assessment, the National Guard was the most represented component with 51 sites. The Air Force had ten participating sites as newly funded locations at Patrick AFB and Vandenberg AFB had not yet seen students. The Air Force Reserve was represented by four sites and the Army had one participating site. Table 10 contains the relevant details.



"I loved that we got to mess with pig and cow organs. I also liked that we did so much "hands on" learning. There was robotics, chemistry, and experimenting. My favorite part was nothing, because **I loved everything about what we did during the five days** we were able to be here."

- STUDENT AT BOYCE ELEMENTARY SCHOOL, ATTENDING WINCHESTER STARBASE ACADEMY

Table 10: Military Affiliation Profile of Academy Sample

	Response	Academy Frequency	Student Frequency	Student Percent
Sponsoring Component	Air Force	10	212	14.2
	Air Force Reserve	4	118	7.9
	Army	1	19	1.3
	National Guard	51	1,139	76.5

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

Students' previous exposure to military people and awareness of the DoD STARBASE program are presented in Table 11. Two-thirds of the students knew someone who had attended DoD STARBASE (64 percent), had heard about DoD STARBASE (62 percent), and/or had met military people before attending the DoD STARBASE program (58 percent). In addition, nearly one-fifth of students (18 percent) had a parent or guardian serving in the military. Still, roughly a third of students had no previous contact with the DoD STARBASE program 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.

Table 11: Experiential Profile: Students' Prior Experience With Military and DoD STARBASE

Item	Response	Frequency	Percent
I have met military people before coming to DoD STARBASE	No	667	41.7
	Yes	925	57.8
I heard about DoD STARBASE before I knew I was coming here	No	602	37.6
	Yes	992	62.0
I know someone that went through DoD STARBASE before me	No	565	35.3
	Yes	1,029	64.3
My parent or guardian is in the military	No	1,307	81.7
	Yes	285	17.8

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

"I am inspired to do more things that my friends may not be interested in and I'm excited to take my path into the forest of the world."

- STUDENT AT PHALEN LAKE ELEMENTARY, ATTENDING STARBASE MINNESOTA-ST. PAUL

The frequency and percent of DoD STARBASE students who self-reported belonging to select demographic categories are presented in Table 12. As in previous years, the DoD STARBASE student population is fairly evenly split between boys and girls (49 percent and 51 percent, respectively). Nearly all of the students were in the 5th grade (97.4 percent).

Table 12: Demographic Profile of Student Sample

Item	Response	Frequency	Percent
Grade	4	14	0.9
	5	1,559	97.4
	6	21	1.3
	Unknown/No answer	4	0.3
Gender	Boy	829	49.2
	Girl	794	50.8

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

"To speak with DoD STARBASE Indiana students was the highlight of my day, spending time seeing their excitement and energy for STEM concepts. STARBASE Indiana runs a great program."

- 122ND AIR NATIONAL GUARD BASE VICE COMMANDER, COL KYLE NOEL, STARBASE INDIANA-FORT WAYNE

Students' Attitudinal Responses

The following assessment provides a summary of the Attitudinal Assessment results for both the pre-program assessment and the post-program assessment. The analyses include those assessments with no more than three missing items for either survey. The attitudinal items were rated by students using a 7-point Likert scale that has a range of response choices from one (Strongly Disagree) through seven (Strongly Agree). The scale is anchored by a smiling face for Strongly Agree and by a frowning face for Strongly Disagree.

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

PRE-PROGRAM AND POST-PROGRAM ATTITUDINAL SURVEY MEANS

To provide a five-year comparison, the DoD STARBASE pre- and post-program Attitudinal Assessment total mean scores are shown in Table 13, beginning in 2015. Total mean scores are a composite averaged value of all the non-pilot items on the assessment, so it also has a possible range from one (Strongly Disagree, or least favorable) to seven (Strongly Agree, or most favorable). The pre-program means include the first 31 core survey items. The post-program means include the 31 core survey items plus the five post-program evaluation items. Utilizing mean scores in pre- to post-program comparisons controls for the difference in the total number of items given. Appendix A provides explanations of the statistical techniques used to analyze group differences and relationships throughout this report.

As in the previous years, there was a significant increase ($p < .001$) in post-program mean scores as compared to pre-program mean scores, indicating that students responded even more favorably following their STARBASE participation. The total mean scores for the pre- and post-program are fairly typical compared to recent years. Additional details are provided in Table 13, including the total mean attitudinal scores as well as the score shift from pre- to post-program, starting from 2015. It must be pointed out that, of the 37 attitude items, all were retained verbatim from 2017-18. In 2017-18, 14 items had slight wording modifications from prior years. A larger number of changed and pilot items were used in 2014 and carried into 2015. As a consequence, some dissimilarity in the overall means from 2015 as compared to the 2019 overall means was expected.

Table 13: Pre/Post Attitudinal Survey Means and Standard Deviations Based on 7-Point Likert Scale (2015 - 2019)

Survey	2015 Mean*	2016 Mean*	2017 Mean*	2018 Mean*	2019 Mean*
Pre-Program	5.18	5.56	5.62	5.62	5.53
Post-Program	5.59	5.77	5.85	5.84	5.65
Survey	Std. Dev.	Std. Dev.	Std. Dev.	Std. Dev.	Std. Dev.
Pre-Program	0.86	0.77	0.76	0.77	0.71
Post-Program	0.86	0.76	0.79	0.75	0.78

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

"The DOD STARBASE youth program at Goodfellow Air Force Base fosters ingenuity and creativity by **exposing students of all socioeconomic backgrounds to STEM**. I have had the fortunate opportunity to have my child attend the program and to witness the classrooms in action. I can attest to the success of this program at providing world class instruction and leadership surpassing all available local opportunities. We are a very active community dedicated to the well-being of families and education of our children. In order to compete in a global economy, **STEM education and careers must be a national priority and we are grateful that the STARBASE program is in Tom Green County**. We are proud to have Goodfellow Air Force Base in our community and grateful for their participation in the lives of our citizens."

- JUDGE STEVE FLOYD, TOM GREEN COUNTY

Table 14 rank-orders the attitude items, based on post-program means, from most favorable to least favorable. Seventy-seven percent of the items show some degree of increase in favorability from pre- to post-program means. The 23 starred items (representing 74 percent of the 31 core items assessed at both pre-test and post-test) show a statistically significant increase in favorability from pre-program to post-program attitudes. A number of items show what is called a "ceiling effect;" the responses were so positive at the pre-test that there was little room for an increase. For example, on an item such as "I like doing science experiments," the pre-program mean value of 6.37 represents 91 percent of the maximum possible. Although the higher post-test score of 6.42 was not a 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.

Three items declined slightly: "I want to learn more about technology." (5.89 to 5.80, down 1.5 percent), "I would like to know more about science." (5.82 to 5.74, down 1.3 percent), and "I would be interested in a STARBASE club at my school if it were offered." (5.64 to 5.53, down 1.6 percent). Each decline was small, and each mean remained positive in that it is well above the scale mid-point (3.5). The slight declines may reflect a sentiment among some students of getting as much exposure to STEM at STARBASE as they're currently 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, mathematics, and engineering topics." (5.52 to 5.66, up 1.4 percent), indicating sustained interest in STEM on the part of most students. These differences serve as reminders that all students have unique motivations and appetites for STEM that should be individually nurtured according to their readiness. STARBASE opens the door to new vistas on STEM and students can proceed at their own pace. Small declines of a few attitude items from pre- to post-program are not in themselves cause for undue concern about the value and impact of STARBASE.

Table 14: Pre/Post Rankings and Mean Scores of Student Attitudinal Responses

Pre-Program N=1,558		Attitudinal Item		Post-Program N= 1,614	
Mean (7-Point Likert Scale)	Rank		Mean (7-Point Likert Scale)	Sig.	Rank
6.37	1	I like doing science experiments.	6.42		1
6.23	4	People who work for military do lots of different things.	6.28		2
	post only	At DoD STARBASE, I learned a lot of things that I can use.	6.28		3
6.26	2	I think I will remember enjoying my time at DoD STARBASE.	6.25		4
	post only	DoD STARBASE Instructors made learning about science, technology, engineering, and math topics fun.	6.22		5
6.25	3	I like technology.	6.22		6
5.85	10	Math is important for developing new technology.	6.09	***	7
5.92	6	Most people use science, technology, math, or engineering skills every day.	6.08	***	8
	post only	DoD STARBASE is boring. (Reverse Scored)	6.07		9
5.56	19	Engineers help solve challenging problems.	6.06	***	10
5.82	11	I am aware of some jobs that use math, science, engineering, or technology.	6.06	***	11
5.88	8	Scientists work on things that make life better.	6.05	***	12
5.93	5	I do not think DoD STARBASE will help me do better in school. (Reverse Scored)	6.02	+	13
5.72	15	Math is really useful for solving engineering problems.	5.98	***	14
5.67	17	People who work for the military use technology in their jobs.	5.95	***	15
5.86	9	Learning about science, engineering, technology, and math will help me in my daily life.	5.94	+	16
5.69	16	A lot of good jobs use math to solve problems.	5.90	***	17
	post only	I will tell others about my DoD STARBASE experience.	5.88		18
5.82	12	I like learning how technology works.	5.87		19
	post only	I think almost any kid would have fun learning at DoD STARBASE.	5.85		20
5.79	14	Military bases are exciting.	5.84		21
5.89	7	I want to learn more about technology.	5.80	***	22
5.82	13	I would like to know more about science.	5.74	*	23
5.52	20	I enjoy learning about science, technology, math, and engineering topics.	5.66	***	24
5.64	18	I would be interested in a STARBASE club at my school if it were offered.	5.53	***	25
5.42	21	Jobs that use math, engineering, technology, and science are exciting.	5.51	*	26

*+p < .10, * p < .05, ** p < .01, *** p < .001. The ranks for means that appear equal were resolved at the third decimal point.*

Table 14: Pre/Post Rankings and Mean Scores of Student Attitudinal Responses, Continued

5.30	23	I am good at math.	5.42	***	27
5.15	26	A military base is a good place to work.	5.33	***	28
5.02	27	I like engineering.	5.31	***	29
5.37	22	I talk with my family about my plans for the future.	5.31		30
5.01	28	I am good at science.	5.29	***	31
5.26	24	I want to learn more about engineering.	5.22		32
5.00	29	When I finish school, I would like to get a job that has something to do with math, science, technology, or engineering.	5.18	***	33
4.76	30	Learning about science is easy for me.	5.08	***	34
5.17	25	Teachers at my school are excited about science.	5.07	***	35
4.47	31	Teachers at my school talk about why technology is important.	4.69	***	36
4.26	32	I am interested in being a scientist or engineer.	4.37	*	37

** p < .05, ** p < .01, *** p < .001. The ranks for means that appear equal were resolved at the third decimal point.*

ATTITUDE CHANGES FOLLOWING DOD STARBASE

Table 15 provides the top ten significant pre- to post-program attitudinal shifts for the 2019 program year. All of these changes were in the favorable direction. For example, there was an 8.6 percent increase in the favorability of attitudes about engineers helping to solve challenging problems. There also was a 7 percent increase in the students' perceptions regarding their level of ease in learning science and a 6 percent increase in the student believing he or she is good at science. Such results suggest that the DoD STARBASE program is having its intended impact on student attitudes and self-confidence about STEM.

Supporting the community relations goals for STARBASE, there was a 5 percent increase in recognition that people who work for the military use technology in their jobs. There also was a 4 percent increase in reports of being aware of jobs that use mathematics, science, engineering, or technology and close to a 4 percent increase in agreement that a lot of good jobs use mathematics to solve problems. There was even a nearly 5 percent increase in hearing teachers at the participant's school talk about why technology is important. These results clearly illustrate the value of the STARBASE program as an effective community relations program of the DoD and its influence on classroom teachers as well as their students to reinforce student excitement about STEM.

DoD STARBASE is the best thing ever.
Every day this week
I go home and tell
my mom all about it.
I Love DoD STARBASE.
P.S. My mom is jealous."

- STUDENT AT WHALE BRANCH MIDDLE SCHOOL, ATTENDING STARBASE MCAS BEAUFORT

Table 15: The Top 10 Ranking of Attitudinal Item Shifts From Pre- to Post-Program in 2019

Attitudinal Item	Pre-program Mean	Post-program Mean	Percent Positive Shift Pre- to Post-Program
Engineers help solve challenging problems.	5.58	6.06	8.60%
Learning about science is easy for me.	4.75	5.08	6.95%
I am good at science.	5.02	5.30	5.58%
I like engineering.	5.04	5.31	5.36%
People who work for the military use technology in their jobs.	5.68	5.97	5.11%
Teachers at my school talk about why technology is important.	4.48	4.70	4.91%
Mathematics is really useful for solving engineering problems.	5.74	5.99	4.36%
I am aware of some jobs that use mathematics, science, engineering, or technology.	5.82	6.06	4.12%
Mathematics is important for developing new technology.	5.86	6.10	4.10%
A lot of good jobs use math to solve problems.	5.69	5.90	3.69%

** Based on 7-Point Likert Scale*

MATHEMATICS AND SCIENCE ATTITUDINAL RATINGS

Similar to previous years, students' mean attitudes on science and mathematics in Table 16 are more positive post- as compared to pre-program. Specifically, students show significant shifts in their self-perceptions about being good at science, and to a lesser extent in mathematics, post-program. This suggests that the exposure to STEM concepts covered within the program curriculum is giving them more confidence in their science and mathematics abilities. As noted earlier, there was only a small change in students' liking for doing science experiments, because that score was already quite high. But there was a substantial increase after attending DoD STARBASE in the appreciation of mathematics as a tool for addressing engineering problems.

Table 16: Science and Mathematics Attitudinal Item Mean Scores (2019)

Mathematics and Science Attitudinal Items	Pre-Program Mean	Post-Program Mean	Gap Score*
I am good at science.	5.02	5.30	+0.28*** (5.58%)
I am good at mathematics.	5.32	5.42	+0.10*** (1.88%)
I like doing science experiments.	6.38	6.42	+0.04 (0.63%)
Mathematics is really useful for solving engineering problems.	5.75	5.99	+0.25*** (4.35%)

** Based on 7-Point Likert Scale, *** $p < .001$*

Table 17 shows the historical means for the science and mathematics items beginning in 2015. The attitudes across years remain consistently favorable with small fluctuations. The mean for "I like doing science experiments" is quite high. Similarly, the mean for "Mathematics is really useful for solving engineering problems" is also high, and higher than the previously used item of "I like mathematics." It appears that this trend is continuing.

Table 17: Post-Program Attitudinal Item Mean Scores* (2015 - 2019)

	2015	2016	2017	2018	2019
Post-Program Attitudes	Mean	Mean	Mean	Mean	Mean
I am good at science.	5.45	5.44	5.33	5.45	5.30
I am good at mathematics.	5.48	5.54	5.44	5.48	5.42
I like science/I like doing science experiments (2017-19).	5.57	5.74	6.46	6.48	6.42
I like mathematics/mathematics is really useful for solving engineering problems (2017-19).	5.16	5.26	6.11	6.10	5.99

** Based on 7-Point Likert Scale*

MILITARY-RELATED ATTITUDES

COMPARISONS OF ATTITUDES BASED ON PRIOR EXPERIENCE WITH MILITARY PERSONNEL

The DoD STARBASE curriculum is delivered mainly at military installations, but such facilities are not distributed across the United States in a way that allows all students to have equal exposure. Students who had prior experience with military locations and personnel tended to have more positive attitudes, both at the pre- and post-program assessments, compared to students who lacked such previous encounters. Prior experience was determined by affirmative response to the descriptive item "I have met military people before coming to DoD STARBASE." As expected, those with prior military exposure had significantly more positive attitudes, both before (5.57 vs. 5.48, $F(1,1521) = 6.35$, $p < .01$) and after program completion (5.69 vs. 5.59, $F(1,1521) = 5.59$, $p < .02$). This difference was evident on 13 items, presented in Table 18, including greater appreciation for mathematics, engineering, military bases, and STEM.

Table 18: Significant Differences in Attitudinal Items Based on Prior Military Contact

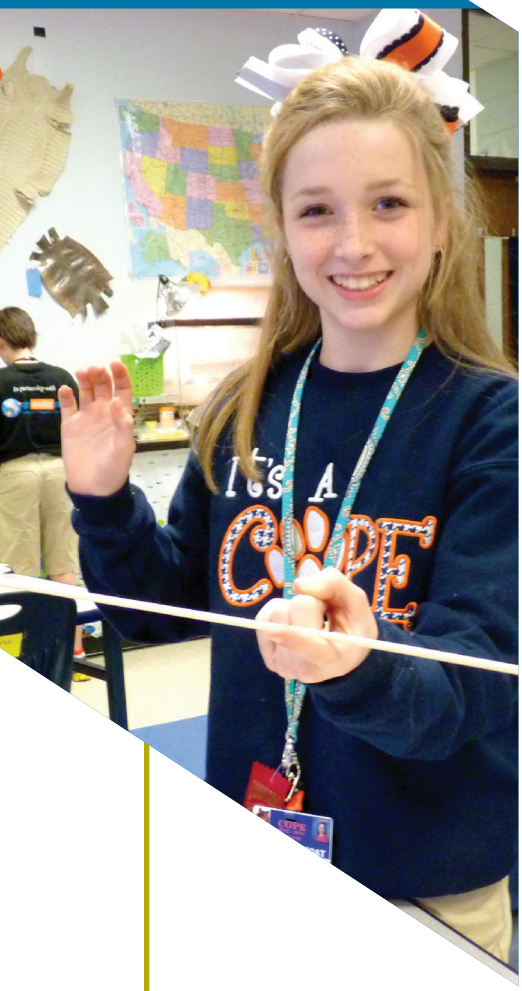
Attitudes That Are More Positive with Prior Military Contact
I am good at science. (post only)
Military bases are exciting. (pre & post)
Engineers help solve challenging problems. (pre & post)
A military base is a good place to work. (post only)
I like engineering. (pre & post)
Mathematics is really useful for solving engineering problems. (pre & post)
Mathematics is important for developing new technology. (pre & post)
I am aware of some jobs that use mathematics, science, engineering, or technology. (pre & post)
Most people use science, technology, mathematics, or engineering skills every day. (pre & post)
People who work for military do lots of different things. (pre & post)
I do not think DoD STARBASE will help me do better in school. (Reverse Scored, post only)
People who work for the military use technology in their jobs. (pre & post)
DoD STARBASE is boring. (Reverse Scored, post only)

Note: Group mean values are omitted for simplicity. They are available upon request.

DoD STARBASE GRADUATES WHERE ARE THEY NOW?

A LETTER OF SUPPORT FROM GRADUATE AVERY JEFFCOAT

The True Meaning of STARBASE



Avery Jeffcoat investigates Center of Mass in her 6th grade STARBASE Louisiana 2.0 session.

As Christmas approaches everyone is reminded of gift shopping galore, parties to attend, vacation to the in-laws, Chris Kringle and Frosty visits, and so much more. Christmas 2019 was a special one for me because I traveled back to see my family after just completing my first quarter of college. In high school, I couldn't wait for the career opportunities that college would bring and can now see how these opportunities are unlimited and at the fingertips of those who persevere. I could not be more thankful for what DoD STARBASE Louisiana allowed me to be a part of in elementary and middle school that prepared me for the next step of life. While being a part of dance teams and leadership programs tremendously impacted my life, I can always go back to memories of STARBASE in Louisiana and how it helped start a fire of really wanting to impact others. The true spirit of the STARBASE program not only creates a desire in students to pursue STEM careers, but also encouraged me to want to make a difference in the world today by choosing a career in the science, technology, engineering, and mathematics (STEM) fields.

The DoD STARBASE program offers students the opportunity to expand their knowledge in STEM categories, build CO2 cars or 3-D creations, and learn to work with people with different personalities. With this explanation, those who have not been through the program might be slightly impressed but not overall convinced in its effectiveness. From personal experience, I can testify that this program not only excels at every activity with the students but also effectively creates a deeper desire to pursue greatness. One of the most important memories I have from attending STARBASE Louisiana is a life talk from a volunteer local community leader. They asked, "Who wants to do something related to science? What about the field of mathematics?" A few hands went up. "STEM, or science, technology, engineering, and mathematics, kids, is one of the most important fields you can go into," they said. Now my thoughts were, "There's no way I could go into mathematics or science. I'm not very good at those subjects." The volunteer continued, "Now, kids, it is not like mathematics and science are your actual jobs. You can apply these four pillars in life to any job. For example, you could be a doctor who uses science in medicine to treat patients, an architect who uses mathematics to help construct a house, or a biomedical engineer who uses engineering to help make artificial body parts. Also, there are not as many girls as there are boys in the STEM field, so we need more girls to step up." At that point, the wheels in my brain started turning – "What if I could be the doctor or the biomedical engineer or the architect that would impact others with STEM, be in a job that pushes me to excel and try new things, and use those skills to impact others' lives?" Those wheels are still turning today.

> “For my life, DoD STARBASE was the program that pushed me toward science and medicine, and for that, I am eternally grateful.”
>
> - AVERY JEFFCOAT

I am now working on a path of STEM to one day become a Doctor of Dental Surgery and travel to third world countries on medical mission trips.

In the world today, women represent only 28 percent of the Science and Engineering workforce while men represent 72 percent of these fields. I believe that programs like STARBASE are helping to shift these statistics to a more positive percent. The program not only encouraged me to pursue an occupation in the field of science but also to encourage others to pursue this field. I am now a part of the Greek Women in STEM at Louisiana Tech University, which has over 190 members from the Greek life community. It takes organizations like STARBASE to spark an interest, a more profound desire in STEM fields to serve people and to make this world a better place. STARBASE helped me to envision a future where I could help those around me and execute it effectively. Through every lesson, I was molded into a woman who not only wants to make a difference but also, be an influence in the STEM fields. God has placed this passion of serving others through dentistry inside of me, but also a desire to teach others about it. I believe education is vital to teach and guide students into the calling on their life. For my life, DoD STARBASE was the program that pushed me toward science and medicine, and for that, I am eternally grateful.

For those who have not been through this program, I hope that you can understand how vital STARBASE is for the future of the next generation. These students could be the doctors who take care of your family, the architects who build your city’s new infrastructure, or the engineers that design the next spaceship.

I am blessed to have been a member of this life-changing program in both elementary and middle school and have used every lesson STARBASE taught me later in high school and college. From the first lesson to the last project I did, I can say that STARBASE left a lasting mark on me, and I will do all I can to keep promoting this organization. Funding the future of the next generation in STEM careers currently lies in the hands of Congress, though. So, will you choose to fund DoD STARBASE and help mold the future of students in STEM, or will you choose to let the true spirit of STARBASE fade and take away the student’s opportunity for greatness?

AVERY JEFFCOAT

Avery Jeffcoat, the 2019 STARBASE Louisiana Inc. 2.0 Scholarship recipient, is currently majoring in Biology at Louisiana Tech University and plans to become a dentist.

COMPARISONS BASED ON PRIOR KNOWLEDGE OF DOD STARBASE

Knowledge of the program was measured by responses to the item: "I heard about DoD STARBASE before I knew I was coming here." Those familiar with DoD STARBASE did not respond more favorably overall to the pre-test Attitudinal Assessment items (5.55 vs. 5.52, $F(1, 1{,}520) = 0.65$, $p = 0.42$) or at the time of the post-program assessment (5.66 vs. 5.63, $F(1, 1{,}520) = 0.69$, $p = 0.41$) than did students who had not heard of STARBASE before. This result suggests that those who had or had not heard about the STARBASE program started the program with comparably favorable attitudes on the whole.

However, inspection of the individual Attitudinal Survey items reveals that those who had heard about DoD STARBASE had more favorable attitudes about their school teachers' interest in science and technology, were positively disposed to involvement in a STARBASE club at their school, and did not expect STARBASE to be boring, as shown by Table 19.

The "prior knowledge of STARBASE" group was also more inclined, in the post-program survey, to believe that they were good in science, and to believe that mathematics is useful for engineering problems. The lack of post-test differences on the other items suggests that the STARBASE program generally moved all students a commensurate degree so that the pre-program attitudinal differences were ameliorated.

Table 19: Significant Differences on Attitudinal Survey Items Based on Prior Knowledge of DoD STARBASE

Pre- and Post-Program	Pre-Program Only	Post-Program Only
	Teachers at my school are excited about science.	I am good at science.
	Teachers at my school talk about why technology is important.	Mathematics is really useful for solving engineering problems.
	I would be interested in a STARBASE club at my school if it were offered.	
	I do not think DoD STARBASE will help me do better in school. (Reverse Scored)	

Note: All attitudes were more positive among students with prior knowledge of the STARBASE program. Mean values of item responses by DoD STARBASE knowledge group are omitted for simplicity. They are available upon request.

SHIFTS IN MILITARY-RELATED ATTITUDES

Table 20 shows the four items in the Attitudinal Survey related to perceptions surrounding the military. Significant positive change ratings were observed for the post-test items "People who work for the military use technology in their jobs" (mean = 5.97) and "A military base is a good place to work" (mean = 5.32). Two other items did not show shifts that were significant but one item "People who work for the military do lots of different things" had a pre-program value that was exceptionally high at 6.23 out of 7, so there was a ceiling effect, with little room for improvement. The positive sentiment was still maintained at post-test (mean = 6.28). The item "Military bases are exciting" did not show substantial improvement, but the post-program value (mean = 5.84) was still above the 3.5 midpoint of the scale. In general, there is a significant and consistent trend for students' attitudes about the military to be positively influenced by their DoD STARBASE experiences.

Table 20: Pre- to Post Attitudinal Shifts on Military-Related Items (2015 - 2019)

Military Attitudinal Items	2015	2016	2017	2018	2019
People who work for the military do lots of different things.	+.08*	+.07*	+.13**	+.14** 6.21-6.35	+.05 6.23-6.28
Military bases are exciting.	+.18***	+.09*	+.12**	+.14*** 5.88-6.02	+.04 5.81-5.84
A military base is a good place to work.	+.34***	+.22***	+.22**	+.26*** 5.31-5.57	+.17*** 5.16-5.32
People who work for the military use technology in their jobs. (2017)			+.24***	+.34*** 5.76-6.10	+29*** 5.68-5.97

** p < .05, ** p < .01, *** p < .001*

COMPARISON OF HIGH VS. LOW MILITARY ATTITUDE

Overall military attitudes were calculated based on a composite of the four items identified above. Consistent with prior years, students with a sum total of 27 or 28 (out of a possible 28) on those items in the post-program assessment were categorized as having high military attitudes (n = 355). Students with a sum total of 19 or less on those same items were categorized as having low military attitudes (n = 293).

Table 21 provides the responses for all the attitudinal items, which have been rank-ordered from largest to smallest gap score between the high and low military attitude groups based on a 7-Point Likert Scale. As expected, the greatest differences occur with the first four items that make up the composite scale. Other pre- to post-program item differences between the high and low military attitudes groups reflect more meaningful attitudinal differences. Those with more favorable attitudes on the four military items demonstrate:

- More interest in STEM careers and educational activities, broadly described (e.g., "When I finish school, I would like to get a job that has something to do with mathematics, science, technology, or engineering," "Jobs that use mathematics, engineering, technology, and science are exciting," "I enjoy learning about science, technology, mathematics, and engineering topics.");
- More interest in science ("I would like to know more about science," "Scientists work on things that will make life better.");
- More interest in technology ("I like learning how technology works," "I want to learn more about technology.");
- More interest in engineering ("I want to learn more about engineering," "I like engineering.");
- More interest in mathematics ("Mathematics is important for developing new technology," "A lot of good jobs use mathematics to solve problems.");
- Greater appreciation for the DoD STARBASE program ("I think almost any kid would have fun learning at DoD STARBASE," "I will tell others about my DoD STARBASE experience," "DoD STARBASE Instructors made learning about science, technology, engineering, and mathematics topics fun," "I would be interested in a STARBASE club at my school if it were offered.").

In summary, the results in Table 21 show students with more receptive attitudes toward the military also appear to be more receptive and able to absorb and retain the STEM-related lessons and applications presented in the DoD STARBASE context. All the gap differences between students with high or low military attitude scores presented in Table 21 represent item response differences for the post-program testing session; all results are statistically significant ($p < .0001$).

Table 21: Statistically Significant Post-Program Gap Scores Based on Low and High Military Attitudes

Attitude Item	Low Military Attitude (n = 293)	High Military Attitude (n = 355)	+ Gap*
Post-Program Attitudes (mean total) 37 Item Composite Score	**4.97**	**6.24**	**1.27**
A military base is a good place to work.	3.60	6.84	3.24
Military bases are exciting.	4.13	6.91	2.78
People who work for the military use technology in their jobs.	4.77	6.88	2.11
People who work for military do lots of different things.	5.06	6.95	1.89
I would be interested in a STARBASE club at my school if it were offered.	4.63	6.27	1.64
I want to learn more about engineering.	4.38	5.94	1.56
I am interested in being a scientist or engineer.	3.63	5.10	1.47
Jobs that use mathematics, engineering, technology and science are exciting.	4.81	6.26	1.45
A lot of good jobs use mathematics to solve problems.	5.16	6.56	1.40
I enjoy learning about science, technology, mathematics, and engineering topics.	4.88	6.27	1.39
I like engineering.	4.61	5.95	1.34
I will tell others about my DoD STARBASE experience.	5.19	6.46	1.27
When I finish school, I would like to get a job that has something to do with mathematics, science, technology, or engineering.	4.50	5.77	1.27
I like learning how technology works.	5.11	6.35	1.24
Learning about science, engineering, technology, and mathematics will help me in my daily life.	5.24	6.47	1.23
I think almost any kid would have fun learning at DoD STARBASE.	5.19	6.42	1.23
I want to learn more about technology.	5.10	6.28	1.18
I would like to know more about science.	5.14	6.29	1.15
DoD STARBASE Instructors made learning about science, technology, engineering, and mathematics topics fun.	5.59	6.68	1.09
I think I will remember enjoying my time at DoD STARBASE.	5.63	6.69	1.06
Mathematics is important for developing new technology.	5.49	6.55	1.06
At DoD STARBASE, I learned a lot of things that I can use.	5.67	6.73	1.06
Most people use science, technology, mathematics, or engineering skills every day.	5.45	6.50	1.05
I do not think DoD STARBASE will help me do better in school. (Reverse Scored)	4.42	5.47	1.05
Engineers help solve challenging problems.	5.44	6.48	1.04
Scientists work on things that make life better.	5.48	6.52	1.04

(Reversed scored) This item was reverse scored; therefore, a higher mean average value reflects a more positive attitude.
** Based on 7-Point Likert Scale, ** All contrasts are significantly different at $p < .0001$ or greater.*

Table 21: Statistically Significant Post-Program Gap Scores Based on Low and High Military Attitudes, Continued

Mathematics is really useful for solving engineering problems.	5.43	6.46	1.03
DoD STARBASE is boring. (Reverse Scored)	4.44	5.46	1.02
Learning about science is easy for me.	4.59	5.60	1.01
I am good at science.	4.82	5.76	0.94
Teachers at my school talk about why technology is important.	4.20	5.11	0.91
I talk with my family about my plans for the future.	4.96	5.86	0.90
I am aware of some jobs that use mathematics, science, engineering, or technology.	5.61	6.42	0.81
I like technology.	5.72	6.53	0.81
Teachers at my school are excited about science.	4.67	5.46	0.79
I like doing science experiments.	6.00	6.76	0.76
I am good at mathematics.	5.03	5.69	0.66

(Reversed scored) This item was reverse scored; therefore, a higher mean average value reflects a more positive attitude.
**All contrasts are significantly different at p < .0001 or greater.*

GENDER COMPARISONS AND ATTITUDINAL DIFFERENCES

Two sets of analyses compared the responses of boys and girls on the Attitudinal Survey, focusing both on mean total scores and on the item-level differences. Table 22 shows the overall gender differences in responses for both the pre- and post-program assessments. The boys' attitude scores tended to be higher than girls' scores in the pre-program assessment (5.60 vs. 5.47, $F(1, 1{,}522) = 11.11$, $p < .001$). Although an attitude difference favoring boys remained at the post-program assessment (5.75 vs. 5.61, $F(1, 1{,}522) = 12.93$, $p < .0001$), the favorability of girls' attitudes at the completion of the STARBASE program was comparable to that of the boys at the start of the program (5.61 vs. 5.60). These results suggest that the STARBASE curriculum not only reinforces boys' favorable disposition towards STEM but can serve as a valuable correction for the somewhat less favorable attitudes about STEM that girls may acquire elsewhere.

Table 22: Gender Differences on Pre/Post Attitude Assessment Mean Total Scores

	Sample Size	Pre-Program Mean (31 items)	Post-Program Mean (37 items)	Pre-Post Attitude Gap Score
Boys	750	5.60 (80.00%)	5.75 (82.14%)	0.15 (2.14%) *
Girls	771	5.47 (78.14%)	5.61 (80.14%)	0.14 (2.00%) *

** Difference is significant at the 0.05 level (2-tailed). Values in parentheses 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 half of the post-program items measuring favorable attitudes about STEM and the DoD STARBASE program (18 of 37). Boys displayed more positive attitudes toward STARBASE and STEM than girls on the 16 items shown in Table 23. These include three items related to science (e.g., "Scientists work on things that make life better."), three items related to technology (e.g., "I want to learn more about technology."), three items related to engineering (e.g., "I like engineering."), three items related to mathematics (e.g., "I am good at mathematics."), and three items related to the full gamut of STEM (e.g. "Jobs that use mathematics, engineering, technology, and science are exciting."). Boys also scored higher on two items pertaining to the military (e.g., "Military bases are exciting."). In the foregoing counts, several items mention more than one aspect of STEM, which is why the total exceeds sixteen.

Girls expressed more positive attitudes than boys on three items, including an awakening enjoyment of scientific procedures ("I like doing science experiments.") and spreading the word about the DoD STARBASE program ("I will tell others about my DoD STARBASE experience."). These outcomes suggest that both genders are deriving useful life lessons from the DoD STARBASE program, as indicated by means that are consistently above the midpoint of the scale. Boys seem to be a bit more appreciative of technology, engineering, mathematics, and the military, per se, whereas girls seem to appreciate the active learning aspects of the DoD STARBASE program, and seem eager to be advocates for the program. In the future, assessments might be made not only of whether incoming STARBASE students previously heard of the program (see above), but the extent to which STARBASE graduates actively attempted to recruit other students to the program, their success in doing so, and the performance of those recruits.

"DoD STARBASE has aided in providing partnership opportunities with the elementary schools in the local area of Manhattan, KS. Operations Kids Camp enjoys the STEM learning during camp in Salina. While at Manhattan our teenage kids have volunteer opportunities during the summer aiding with the teens' community involvement and volunteer credit for school."

- MAJ CHARLES LUNKWITZ, STARBASE MANHATTAN

Table 23: Gender Gap Score Differences in Post-Program Attitude Assessment Mean Item Scores

Attitude Item	Boys' Mean	Girls' Mean	B - G Difference*
Boys More Favorable Than Girls			
I am interested in being a scientist or engineer.	4.71	4.04	0.67
I want to learn more about technology.	6.08	5.51	0.57
I like learning how technology works.	6.15	5.58	0.57
I like engineering.	5.59	5.04	0.55
I want to learn more about engineering.	5.48	4.99	0.49
I like technology.	6.43	6.01	0.42
I am good at mathematics.	5.62	5.21	0.41
I enjoy learning about science, technology, mathematics, and engineering topics.	5.83	5.50	0.33
When I finish school, I would like to get a job that has something to do with mathematics, science, technology, or engineering.	5.34	5.04	0.30
Jobs that use mathematics, engineering, technology, and science are exciting.	5.64	5.41	0.23
Military bases are exciting.	5.95	5.72	0.23
Mathematics is important for developing new technology.	6.18	6.01	0.17
People who work for the military use technology in their jobs.	6.05	5.89	0.16
I am good at science.	5.38	5.22	0.16
Mathematics is really useful for solving engineering problems.	6.06	5.91	0.15
Scientists work on things that make life better.	6.12	5.99	0.13
Girls More Favorable Than Boys			
I like doing science experiments.	6.32	6.52	-0.20
I talk with my family about my plans for the future.	5.19	5.40	-0.21
I will tell others about my DoD STARBASE experience.	5.74	6.01	-0.27

** Based on 7-Point Likert Scale, ** All contrasts are significantly different at p < .05 or greater.*

"In school when I failed, I felt disappointed, but I learned that mistakes can help you more than you think. After DoD STARBASE, I want to create new things like an engineer."

- STUDENT AT WALLER ELEMENTARY, ATTENDING STARBASE LOUISIANA

GENDER DIFFERENCES BASED ON PRIOR EXPERIENCE WITH MILITARY PERSONNEL

Gender differences in attitudes were examined in terms of differential experience with military personnel (Table 24). The positive impact of prior exposure to the military did not interact with gender on pre-program attitudes ($F(1, 1,519) = .028$, $p = .87$) or post-program attitudes ($F(1, 1,519) = .30$, $p = .59$). That is, although boys had more favorable attitudes than girls, and those with prior exposure to the military were more favorable than those who did not have prior exposure to the military, the impact of one variable, such as gender, did not influence the impact of the other variable, exposure to the military. Pre- and Post-Program Means are expressed based on a 7-Point Likert Scale.

Table 24: Prior Experience With the Military 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	5.54	5.71	5.63	5.78	+.07
Girls	5.42	5.55	5.52	5.66	+.11

** Based on 7-Point Likert Scale*

IMPACT OF STUDENTS' GRADE LEVEL

In the 2019 sample, 97 percent of students were in the 5th grade, and about 3 percent were split between the 4th and 6th grades. With a homogenous sample having little variance in grade level, few relationships were expected.

Table 25 presents the statistically significant correlations between a student's grade level and Attitudinal Survey item responses. The magnitudes of the relationships are all small, and thus explain only a slight portion of the differences among students' attitudes toward STEM and DoD STARBASE. The observed statistical significance is due mostly to the large sample size, which increases the power and sensitivity of the analysis to detect trends that may have limited practical importance. This may especially be the case considering the narrow range of observed values. Indeed, five out of every 100 correlations may be significant by chance at an alpha of $p = .05$, so the three significant correlations produced by the 68 statistical tests (5 percent) performed here may not replicate in another sample.

At the pre-program assessment, there were no significant relationships on any of the 31 attitude items. At the post-program assessment, younger students were slightly more likely to believe that jobs that use mathematics, engineering, technology, and science are exciting, whereas older students were less likely to believe that ($r = -.058$, $p = .03$). Conversely, older students were slightly more likely to say that DoD STARBASE is boring ($r = .062$, $p = .02$) and to deny that "almost any kid would have fun learning at DoD STARBASE ($r = .065$, $p = .01$).

These results provide some indication that lower grade level students conclude their DoD STARBASE experience with slightly more positive views than students in a higher grade level. This suggests the value in continuing to focus on students at the 5th grade level, who can benefit most from their early positive experiences at DoD STARBASE.

Table 25: Correlation of Student Grade Level With Pre- and Post-Program Attitudinal Responses

Item	r with Grade
Post-program: Jobs that use mathematics, engineering, technology, and science are exciting.	-.058*
Post-program: DoD STARBASE is boring.	.062*
Post-program: I think almost any kid would have fun learning at DoD STARBASE.	-.065*

** Correlation is significant at the 0.05 level (2-tailed)*
NOTE: Positive values indicate increasing agreement with higher grade level, vice versa for negative values

EMPIRICAL CONFIRMATION OF ATTITUDE DIMENSIONS

Beginning in 2015, the 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, that provide the simplest description of the patterns of interrelationships observed in the data. As a result of this empirical confirmation, seven conceptual factors were derived in 2015, for which the definitions are provided below.

The results obtained in 2015 were clearly replicated in 2016. In 2017, despite some item modifications, six of the seven factors replicated. The 2015-16 factor of Mathematics Confidence, however, was replaced by a factor called "Teacher Support" in 2017, which was replicated in 2018. All of the 2017 factors were fully replicated in 2019. The specific items and the results of the PCA analysis for 2015-19 are presented in Appendix B. The correlation between the item loadings across the seven comparable 2018 and 2019 factors is $r = .87$, $p < .001$, precisely as it was in the 2018 vs. 2017 results. Such results indicate solid structural stability.

Also, similar to prior outcomes, each of the seven Attitude Dimensions in 2019 is sufficiently reliable for the purpose of program evaluation based on Cronbach's α, a statistical index of measurement consistency and coherence. The scale reliability for the Military Setting Endorsement and Teacher Support for STEM dimensions are lower than the other dimension in reliability because those composite scores are based on a small number of heterogeneous items. Teacher Support is defined by only two items and was part of Military Setting Endorsement in 2016. An alpha reliability outcome of just under .60 for this dimension's scale is adequate evidence of item cohesion upon which to make general outcome comparisons. Item 32 "I talk with my family about my plans for the future." was new in 2018, and loaded on Teacher Support, but it reduced the internal consistency to $\alpha = .50$, so it was not included in the composite.

"When I first thought of DoD STARBASE, I thought it would be boring. But when we got there, it was an adventure waiting to happen. Eggbert, Rockets, CAD, and MORE!"

- STUDENT AT CHEHALEM ELEMENTARY, ATTENDING STARBASE PORTLAND

- **STEM Concept Awareness** – Recognition of the value of technology in everyday life. (3 items, α = .83)
- **Future Planning** – Expression of interest in future careers and taking relevant classes, especially in STEM. (6 items, α = .87)
- **Science Confidence** – Appreciation for science and a positive view of one's capacity for learning science. (5 items, α = .71)
- **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 = .81)
- **Military Setting Endorsement** – Positive impressions about enjoying military facilities and the diversity of work activities done by people on military bases. (3 items, α = .65)
- **Teacher Support for STEM** – Teachers emphasize the value of science and technology. (2 items, α = .57)
- **DoD STARBASE Program Evaluation** – Positive rating of the impact of the DoD STARBASE program on learning and enthusiasm to convey that to others. (8 items, α = .88)

Contrast analyses were performed between the seven pre- and post-program assessments of the 2019 Attitude Dimensions (Table 26). As with the trends observed for the individual attitude items presented in Table 14, there were increases in favorability on five of the dimension scores from pre-program to post-program, including STARBASE Program Evaluation, STEM Behavior and Motivation, Science Confidence, Future Planning, and Military Setting Endorsement. There was no significant change on the three-item measure of STEM Concept Awareness, which is attributable to the fact of the pre-program mean being already so high at 5.99 that there was little room for improvement. There also was not a significant change in participants' perceptions that teachers in their own schools supported STEM, although a small rise was seen. That probably occurred because teachers from the students' own schools did not serve in the STARBASE program, so there was no basis for attitude changes about them. Thus, the outcomes on most Attitude Dimensions further substantiate the impressions suggested by other analyses of the individual items; namely, that the DoD STARBASE program continues to succeed in its intended mission to have a positive, beneficial impact on students' attitudes toward STEM learning activities, their interest in a career in STEM, and their appreciation of the activities observed in a military setting.

Table 26: Pre-Program and Post-Program Mean Attitudinal Dimension Scores

Attitude Dimension	Pre-Program*	Post-Program*	Gap
STEM Concept Awareness	5.99	5.95	-0.04
Future Planning	5.09	5.21	0.12**
Science Confidence	5.45	5.59	0.14**
STEM Behavior & Motivation	5.78	6.02	0.24**
Military Setting Endorsement	5.73	5.81	0.08**
Teacher Support for STEM	4.83	4.89	0.06
STARBASE Program Evaluation (3 items pre-, 8 items post-)	5.66	5.76	0.10**

** Based on 7-Point Likert Scale, ** Difference is significant at the 0.001 level (2-tailed).*

Analyses assessing gender differences were also conducted on post-program Attitude Dimension scores (Table 27). At the end of the DoD STARBASE program, boys' Attitude Dimension scores exceeded girls' scores on STEM Concept Awareness, Future Planning, Science Confidence, and STEM Behavior & Motivation. Perhaps more noteworthy is the finding that girls were not significantly different from boys on Military Setting Endorsement, Teacher Support for STEM, and their overall STARBASE Program Evaluation. The latter outcome indicates that girls believed that they derived a great deal of value from their participation.

Table 27: Gender Gap Score Differences in Post-Program Attitude Dimension Scores

Attitude Dimension	Girls' Mean*	Boys' Mean*	B - G Difference	Statistical Significance
STEM Concept Awareness	5.70	6.22	0.52	0.000***
Future Planning	5.00	5.43	0.43	0.000***
Science Confidence	5.52	5.65	0.13	0.013**
STEM Behavior & Motivation	5.98	6.06	0.08	0.042**
Military Setting Endorsement	5.78	5.84	0.06	0.299
Teacher Support for STEM	4.91	4.87	-0.04	0.52
STARBASE Program Evaluation	5.79	5.73	-0.06	0.264

** Based on 7-Point Liker Scale, ** p < .05, *** p < 0.001 level (2-tailed).*

DRIVERS OF TARGET STUDENT ATTITUDES

Multiple regression analyses were conducted to determine a set of non-overlapping statistical predictors for six important student target attitudes. These predictors, or drivers, are rank ordered by increasing relative impact of the driver attitude on the target attitude. The results indicate that if the conditions in each list are present (that is, more favorable attitudes are expressed), it is very likely the target attitude also will be present and operative in student tendencies.

These attitude items predict student feelings about particular aspects of the DoD STARBASE program with an increasing degree of accuracy. Each of the individual predictors also 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 the particular target attitude.

CONSIDERATIONS BASED ON DRIVERS

There are repeating drivers that appear to have a broad impact on the target attitudes.
One driver impacted four of the six target attitudes:

- I think almost any kid would have fun learning at DoD STARBASE.

Six drivers each impacted three of the six target attitudes:

- A military base is a good place to work.
- I want to learn more about engineering.
- I do not think DoD STARBASE will help me do better in school. (Reverse Scored)
- A lot of good jobs use mathematics to solve problems.
- I think I will remember enjoying my time at DoD STARBASE.
- DoD STARBASE Instructors made learning about science, technology, engineering, and mathematics topics fun.

Nine additional drivers affected two target attitudes:

- Military bases are exciting.
- I like technology.
- Engineers help solve challenging problems.
- I like engineering.
- I would like to know more about science.
- I would be interested in a STARBASE club at my school if it were offered.
- I like learning how technology works.
- People who work for the military use technology in their jobs.
- I talk with my family about my plans for the future.

These outcomes suggest that DoD STARBASE instructors should continue to make learning fun, should continue to stress the value of engineering and science, and should continue to emphasize the positive features of military bases. Other drivers of student attitudes, such as liking science, and wanting to learn more about engineering and technology, are important predictors, too, but may follow from the more potent predictors. To the extent that academies are able to create a stimulating, rewarding, and supportive learning environment, positive student attitudes can be enhanced and reinforced, which may pay continuing dividends after DoD STARBASE attendance. These desirable 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.

"Thank you, DoD STARBASE, for teaching us how to make a prototype of a bridge. I loved it when you taught us how to make 3D objects and computer. I want to be an Aerospace Engineer because you inspired me to make robots to do things a human can't do in space. It's amazing a military base can inspire you to be something you never thought of being. Thank you for everything."

- STUDENT AT ST. FRANCIS SCHOOL, ATTENDING TEXAS STARBASE-AUSTIN

Assessment of Student Knowledge and Skills

The student knowledge and skills assessment included 20 multiple-choice items categorized in terms of the DoD STARBASE subject area that they most closely measure, plus one listing item. Table 28 reports the Knowledge Test items sorted into the specific subject areas.

Table 28: Knowledge Questions by Curriculum Area

Chemistry Science (E3.1.1.2)	
Item #	
1	Cleaner solvent characteristics
5	Composition of air
11	Physical change
15	States of matter
17	Atomic models
18	Water droplet
Engineering (E3.1.1.4)	
2	3D car model
3	Engineering design process
12	CAD software 1st step
Mathematics Operations & Applications (E3.1.1.5)	
4	A, B, C, D graph
6	Nanometers
10	Cell phone
16	Favorite fruit
19	Tourists by season
Physics (E3.1.1.1)	
7	Ball density
8	Two boats
14	Newton's laws
Technology (E3.1.1.3)	
9	Latitude/longitude coordinates
13	Nanoparticles
20	Finding friend's house graph
STEM Job Awareness	
21*	Who uses STEM concepts in their job? (Select all that apply)

** Item 21 assesses "STEM Job Awareness" by presenting 25 different occupations to students and asking them to select all the jobs that utilize STEM concepts. Results from Item 21 are not included in the Knowledge Test Mean, which is based on the percent of correct answers to the 20 Knowledge questions. Results from Item 21 are detailed in Table 34.*

INCREASES IN KNOWLEDGE SCORES BY SUBJECT AREA

Knowledge scores are calculated in terms of the percentage correct of the 20 items, as well as the percentage correct within the curriculum area. Table 29 shows the pre- and post-program assessment mean score in total and by curriculum area. Total knowledge scores went up by 26 percent. All categories, especially Physics (+35 percent) and Chemistry (+30 percent) showed significant increases post-program as compared to responses prior to participation in DoD STARBASE. The smallest post-program increases were in Mathematics (+20 percent) and STEM Job Awareness (+14 percent), which were nonetheless significant improvements.

Table 29: Pre/Post Knowledge Percent Correct Scores by Subject Area

Curriculum Area	# of Items	Pre-Program Percent Score	Post-Program Percent Score*	Gap
Knowledge Items Total	**20**	35.17%	61.51%	26.34%
Chemistry	6	30.49%	60.30%	29.81%
Engineering	3	33.86%	57.24%	23.38%
Mathematics	5	47.61%	67.28%	19.67%
Physics	3	34.38%	69.25%	34.87%
Technology	3	26.38%	50.81%	24.43%
STARBASE Program Evaluation	**25**	43.54%	57.60%	14.06%

** All subtotal post-program means are statistically significantly higher than pre-program means, $p < .001$.*

Table 30 presents the pre- and post-program mean scores, percent correct, and gap differences for the knowledge assessment since 2015. In 2011, 2015, and 2019 the content of the Knowledge Test was updated based on curriculum changes throughout the DoD STARBASE program to align with STEM National Standards. The assessment began measuring new concepts that were more challenging to the students, resulting in lower scores overall. The content changes implemented in 2011 were carried through to 2019, including the replacement of simple knowledge items by problem-solving application items. For example, instead of asking students to recall specific facts regarding the learning activity, the 2012-2019 assessments presented students with situations where they must apply the principles learned in order to answer the question from the facts provided. As a consequence of the difficulty of such questions, the 2015-2019 pre-program scores shown are 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 Knowledge Test has fluctuated somewhat through the years. That is because the assessment is evaluated annually to ensure all items on the assessment are showing statistical evidence of being effective, and that the content is aligned to the current objectives of the STARBASE program. This is important because the number of items on the Knowledge Test directly impacts the gap score potential since the pre- to post-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 central to Table 30 is that there is a demonstrable and significant increase in student knowledge as a result of attending DoD STARBASE. This acquisition of knowledge is indicated by the post-program average number of correct responses, which has consistently resulted in post-test mean scores that show most questions are answered correctly (i.e., average of 62 percent correct in 2018-2019 despite items that were more difficult, as indicated by the pre-test scores).

Table 30: Longitudinal History of Knowledge Enhancements (2015-2019)

Year	2015	2016	2017	2018	2019
# of Items	**17**	**17**	**18**	**17**	**20**
Pre-Program Score	7.62 (44.8%)	7.44 (43.8%)	7.33 (40.87%)	6.20 (36.47%)	7.03 (35.17%)
Post-Program Score	12.88 (78.1%)	11.73 (69.0%)	12.33 (68.47%)	11.34 (66.70%)	12.30 (61.51%)
Gap	+4.47 (26.3%)	+4.29 (25.2%)	+5.00 (27.61%)	+5.14 (37.23%)	+5.27 (26.34%)

KNOWLEDGE TEST SCORES AS A FUNCTION OF MILITARY ATTITUDES

Performance on the Knowledge Test was examined as a function of high and low military attitudes. Table 31 shows that those with high military attitude and those with low military attitude scores did not significantly differ in their pre-program mean knowledge ($F(1,646) = 1.24$, $p = .27$). In the post-program assessment, by contrast, those with high military attitudes displayed a stronger performance than those with low military attitudes ($F(1,646) = 3.79$, $p < .05$). Both the low and high military attitude groups had significant gains in knowledge scores pre- to post- program ($F(1,775) = 1,072$, $p < .0001$), but the high military attitude score group showed significantly greater improvement (+5.48 vs. +4.64, $F(1,775) = 7.36$, $p = .007$). This finding suggests that students who are more favorably disposed toward the military context of the STARBASE program tend to be more highly engaged with learning about STEM principles and concepts in an applied military setting.

Table 31: Pre/Post Knowledge Test Mean Scores for High and Low Military Attitude Students

Military Attitude	Sample Size	Pre-Program Mean	Std. Deviation	Post-Program Mean	Std. Deviation
High Military Attitude	355	6.82	2.53	12.30*	4.13
Low Military Attitude	293	7.04	2.53	11.68*	3.85

** Significant increase in post-program means at the 0.05 level (two-tailed).*

DoD STARBASE GRADUATES WHERE ARE THEY NOW?

A LETTER OF SUPPORT FROM GRADUATE 1LT (P) JOSHUA DOUGLAS ANDERSON

COMMANDER: BRAVO COMPANY 1-108TH AHB "SHADOW RIDERS"
SUPERVISORY INSTRUCTOR PILOT: ARMY AVIATION FLIGHT FACILITY #2, SALINA, KS

Ever since I can remember, I wanted to be in the armed forces.

I grew up on 80 of the most beautiful acres in Kansas, at least in my opinion. Hunting, fishing, and camping were all parts of my childhood, and being outdoors was my normal. In fact, I remember my mother purposely kicking my brother and me out of the house and telling us to not come back until the sun was setting. When you send two boys into the woods, it's not long until a fictitious war breaks out, with only GI Joes around to stop the capture of all that you hold dear (which consisted of your favorite pocketknife and your puppy).

Above, former STARBASE Salina student and now Blackhawk pilot 1LT Joshua Anderson gives back to the program by providing tours to students attending STARBASE from Hillsboro Elementary School.

Fast forward several years and my yearning to be a soldier continued to grow, which brings me to my 5th grade year. I was a participant in the Salina, Kansas, DoD STARBASE program. I remember learning about Bernoulli and his principles, building and launching rockets, and the best part – taking a tour of the Blackhawk helicopters at the Army Aviation Support Facility. It was this tour that solidified my desire to become a soldier.

Today, I am still involved with DoD STARBASE, but this time as a program volunteer hosting student tours of our military installation. I tell all the STARBASE tours that come through my facility that I really was recruited into the Army at 11 years old. I, like many others, went through necessary growth periods in my teenage years to really understand what I wanted to be in life. Regardless, I finally settled on becoming a soldier and fulfilled my dream in September of 2011. I graduated college, got married, and went right to the Military Entrance Processing Station (MEPS) to swear in. I graduated Basic Cadet Training (BCT) and went to Officer Candidate School (OCS). When it was time to choose a branch, I knew exactly what I wanted to be – a pilot.

Above, 1LT Joshua Anderson talks to students from Hillsboro Elementary School about the Blackhawk helicopter.

I recalled how I felt sitting in that UH60L Blackhawk and wanted to fly it for real. In 2014, I went to flight school at Ft. Rucker, Alabama, and graduated in 2016. I even got an Active Guard and Reserve (AGR) job at the same flight facility that I toured as a 5th grader.

In 2018, I deployed with my unit as a detachment commander of six Blackhawk helicopters in Northern Iraq and Northeast Syria, where I flew over 100 sorties and 250 combat hours, including air movement, hasty assaults, and medevac operations. I have seen some amazing things in the world and proudly served my country as a combat leader. Now I am proud to give back to the program by dedicating my time in helping with the facility tours. I truly believe it is because of programs like STARBASE that I became a soldier.

> "It was this tour that solidified my desire to become a soldier."
>
> - JOSHUA ANDERSON

RELATION OF ATTITUDE COMPONENTS TO KNOWLEDGE TEST SCORE

Pearson correlations between the seven Attitude Dimension scores and the Total Knowledge score were calculated. The seven 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, career, the military, and DoD STARBASE. Correlations are presented between the Pre-Program Attitudes and both Pre-Program and Post-Program Knowledge scores, and between Post-Program Attitudes and Post-Program Knowledge scores in Table 32. Among the Pre-Program Attitudes, Science Confidence ($r = .19$, $p < .001$), STEM Behavior & Motivation ($r = .17$, $p < .001$), and Future Planning ($r = .13$, $p < .001$) are the strongest predictors of Post-Program Knowledge scores.

Table 32: Relationships of Pre-Program and Post-Program Attitudinal Dimension Scores With Pre-Program and Post-Program 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
STEM Concept Awareness	.06*	.10**	.13**	.06*
Future Planning	.08**	.13**	.16**	.08**
Science Confidence	.15**	.19**	.25**	.10**
STEM Behavior & Motivation	.13**	.17**	.20**	.09**
Military Setting Endorsement	-.04	-.04	.03	-.02
Teacher Support for STEM	-.02	-.03	-.06*	-.02
STARBASE Program Evaluation	- .02	.08**	.13**	.09**

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

A secondary analysis looked at the correlation between pre-program Attitudes and the change in the Knowledge Score from pre- to post-program (i.e., the gap score). This analysis assesses whether students who come into the program with a higher level of STEM confidence and motivation also get a bigger boost from attending DoD STARBASE, or if those students who enter the program with less confidence and less motivation toward STEM topics benefit more from being exposed to the STEM curriculum at DoD STARBASE. It is not surprising that a student who shows high Science Confidence attitude, for example, also attains a high Knowledge Score at both the pre-test and post-test. The question is whether a confident student not only scores consistently high, but also achieves a greater gap score from pre-test to post-test than other students with lower initial STEM attitudes.

Results indicate that five of the seven attitude dimensions were significantly related to gap scores. The five significant predictors were deployed in a multiple regression to predict knowledge gains, and both pre-test STARBASE program evaluation ($\beta = .07$, $t = 2.37$, $p = .02$) and pre-test Science Confidence ($\beta = .06$, $t = 1.97$, $p = .05$) were significant independent predictors of gap scores. Thus, those who had a more positive attitude about the STARBASE program going in, and who were more confident about their own abilities made more gains in their greater mastery of STEM concepts than their peers. It may be that students with lower STEM-related attitude scores on the pre-test could benefit from helpful coaching to prevent them from falling further behind their more optimistic peers. These potential patterns seem appropriate to monitor in future years.

Additional correlations were conducted to examine the relationship between the pre-program Attitude Dimensions and specific post-program Knowledge Scores by curriculum area. Perhaps because of its high reliability and precision, the Total Attitude score tended to be a stronger predictor of the specific knowledge area scores than any of the individual Attitude Dimensions, with the exception of STEM Behavior and Motivation and Science Confidence, which also were strong predictors (see Table 33). In addition, Pre-Program Future Planning and STEM Concept Awareness were significant predictors of Post-Program scores on Chemistry, Engineering, Mathematics, and Physics. By contrast, Military Setting Endorsement and Teacher Support for STEM were not predictive of Post-Program Knowledge Scores.

Table 33: Pre-Program Attitude Dimensions and Post-Program Knowledge Scores

	Knowledge Total	Chemistry	Engineering	Mathematics	Physics	Technology	STEM Job Awareness
Attitude Total	**.16****	**.12****	**.14****	**.10****	**.12****	**.07****	**.10****
STEM Concept Awareness	.10**	.08**	.10**	.06*	.06*	.03	.03
Future Planning	.13**	.11**	.11**	.07**	.10**	.06*	.05
Science Confidence	.19**	.13**	.16**	.16**	.12**	.10**	.08**
STEM Behavior & Motivation	.17**	.12**	.17**	.11**	.12**	.10**	.18**
Military Setting Endorsement	-.04	-.03	-.03	-.04	-.01	-.04	-.01
Teacher Support for STEM	-.03	-.01	.01	-.05*	.01	-.04	.01

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

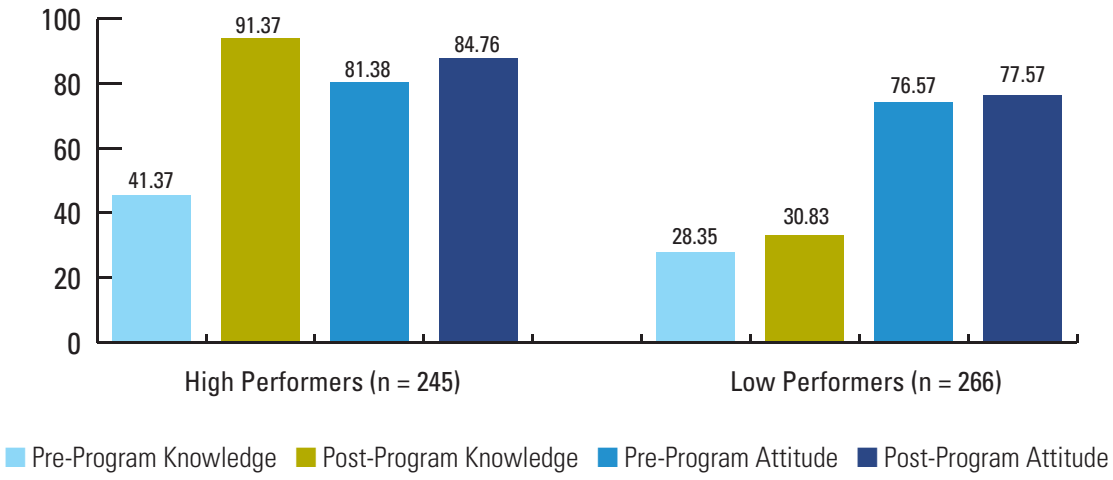
HIGH VERSUS LOW PERFORMERS ON POST-PROGRAM KNOWLEDGE TEST

This analysis illustrates the differences between students who are high as opposed to low performers on the post-program Knowledge Test. First, the sum of correct answers to the 20 knowledge items for each student was converted to a percentage score by dividing by 20. Then, performance was measured using the post-program total assessment score sample mean of 61.50 percent and standard deviation of 20.24 percent. High performance was considered to be a total score of 81.74 percent or higher (61.50 + 20.24). A total of 16.1 percent (n = 245) of the sample was classified as high performers. Low performance was defined to be a total score of 41.26 percent or lower (61.50 - 20.24). A total of 17.5 percent (n = 266) of the sample was classified as low performers.

Both the Low Performers and High Performers showed significant improvements after participating in the DoD STARBASE program. Similar to the past several years' results, those students who scored low on the post-assessment also had scored low on the pre-assessment and did not improve as much. The Low Performers' average gap score was a 13.02 percent increase from pre- to post-program, compared to the High Performers, who improved on average by 60.54 percent. The differences between the two groups in pre- and post-program total scores are statistically significant (Pre-test, $F(1,509) = 174.19$; Post-test, $F(1,509) = 11,874.61$; both results are significant at $p < .0001$).

Pre-program and post-program attitude scores also were converted to percentages by taking the average of the 31 primary items and dividing by 7 (the upper end of the rating scale). The pre- and post-program averages on the attitude surveys also were lower for low knowledge assessment performers. The low performing group had a significantly lower mean attitude rating both pre- and post-program (76.57 percent and 77.57 percent respectively, increase of +1.00 percent) as compared to the high performing group (81.38 percent and 84.76 percent respectively, increase of +3.38 percent); the difference between groups in attitude shift was significant ($F(1,509) = 8.38$, $p = .0004$). Knowledge differences were greater than attitude differences between the High Performer and Low Performer groups. These data are shown in Figure 2.

Figure 2: High Versus Low Knowledge Test Performers on Knowledge Test Score Percentages and Attitude Survey Percentages



STEM JOB AWARENESS: PERCEPTIONS OF STEM USE IN JOBS

A new knowledge item in 2015, which also was used in subsequent years, asked students "Who uses STEM concepts in their job? (Select all that apply)." Twenty-five jobs were listed (Table 34), and the average number nominated pre-program as STEM-related in 2018 was 10.88 (SD = 5.61). The post-program number of jobs that were seen as STEM-related was 14.40 (SD = 6.13), which was a 32 percent increase and statistically significant ($F(1,523) = 655.95$, $p < .0001$). Thus, participants gained a greater awareness of the variety of occupations in which STEM concepts may play a part as a result of their exposure to the DoD STARBASE program.

"I learned things that I never would have learned before. I like building molecules out of atoms. Now I understand the periodic table."

- STUDENT AT CORDOVA VILLA SCHOOL, ATTENDING STARBASE SACRAMENTO

Table 34: STEM Job Awareness (Pre-test - Post-test)

Accountant 39%-59%***	**Camera Operator** 53%-68%***	**Farmer** 25%-40%***	**Mail Carrier** 17%-29%***	**Police Officer** 50%-66%***
Actor/Actress 12%-25%***	**Car Designer** 80%-91%***	**Fireman** 40%-58%***	**Maintenance Worker** 41%-56%***	**School Counselor** 30%-43%***
Animal Breeder 25%-38%***	**Crime Scene Investigator** 50%-68%***	**Hair Designer/Barber** 22%-36%***	**Manager** 36%-52%***	**Sports Athlete** 19%-31%***
Architect 56%-68%***	**Construction Worker** 75%-85%***	**Housekeeper** 15%-25%***	**Mechanic** 76%-86%***	**Teacher** 68%-78%***
Nurse 48%-64%***	**Cook** 35%-53%***	**Lawyer** 41%-57%***	**Military Personnel** 60%-74%***	**Video Game Designer** 78%-88%***

*** $p < .001$

DoD STARBASE participants were most likely to recognize that a Car Designer and Video Game Designer use STEM concepts in their jobs and were least likely to make that connection for Housekeeper and Actor/Actress. Occupations that showed a big jump in participants' recognition of their use of STEM concepts include Accountant (+20 percent), Fireman (+18 percent), Manager (+16 percent), Nurse (+16 percent), and Military Personnel (+14 percent).

The statistically significant increase in participants' recognitions of the use of science, technology, engineering, and mathematics in a wide range of professions, including military service, provides further indication that the DoD STARBASE program is accomplishing its mission of heightening awareness by 5th grade students of the relevance of STEM in occupations and careers.

Conclusion

The 2018-2019 DoD STARBASE program was successful in achieving its major goals as measured by the assessment of STEM-related student attitudes and knowledge before and after attending the program. It produced measurable changes in students' positive attitudes toward science, technology, engineering, and mathematics. Those positive attitudes are likely to be helpful in encouraging learning about STEM topics throughout the students' academic careers.

In addition, the 2018-2019 DoD STARBASE program also yielded solid gains in students' understanding of STEM concepts as shown by test performance. Students completed the program with an increase in STEM information and skills, which also should be of benefit in their continuing school learning about STEM topics. The increase in knowledge performance was particularly noticeable in girls, who, as evidence shows, are somewhat less well prepared in the STEM domain than boys when they first come to DoD STARBASE. Girls seem eager to recruit others to the STARBASE program. Attention might be devoted to facilitating that in the future and monitoring its impact. Finally, the DoD STARBASE program appears to have supported the DoD sponsor's community outreach objective by creating a favorable impression of the U.S. military and the people who work for it among many of the participating students.

DoD STARBASE GRADUATES WHERE ARE THEY NOW?

A LETTER OF SUPPORT FROM GRADUATE ZACHARY CROOK

> "DoD STARBASE brought science to life for me."
>
> - ZACHARY CROOK

As a 6th grader, STARBASE made me feel like being a scientist could be cool, instead of the generic career goal of being a professional football player.

Two specific activities are remembered fondly: Circuit Boards and Navigation.

My first experience with electrical circuits was at STARBASE. That sparked an interest I was able to build upon in high school and that later enabled me to test well enough on the Armed Services Vocational Aptitude Battery (ASVAB) to qualify for my current career as an Avionics Technician for the new KC-46 Pegasus refueler in the United States Air Force. The hands-on learning we received, such as manipulating components to complete a circuit and turn on a light, inspired me to dig into electrical projects during my teenage years.

Left, Zach Crook

Above, Zachary pictured with his family upon completion of Air Force Basic Training in 2018 in San Antonio, Texas

We did another lesson on navigation at STARBASE that I specifically recall as my first experience with reading large maps and locating places, using latitudinal and longitudinal coordinates.

Something else I remember with detail was our STARBASE Class STEM Careers Tour to the F-15 Maintenance Hangar at Kingsley Field Air National Guard Base in Klamath Falls, Oregon. Both of my parents were in the Air Force, so simply being on Base was commonplace for me, but when my entire class had the opportunity to enter that hangar and see the jets up close, I loved to see their excitement and awe.

My enthusiasm for science is what has now driven me to further my education. Beginning next term, I will be a freshman at the College of the Air Force, studying for a Bachelor of Science degree with a major in geology. I intend to one day teach others to love science the way I do.

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 throughout the year. 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 teachers' personal characteristics including their experience and confidence with teaching Science, Technology, Engineering, and Mathematics (STEM)-related subject matter, as well as their opinions on a wide variety of topics related to the influence of DoD STARBASE regarding appropriateness of the curriculum, educational materials, and other STEM resources both within and beyond STARBASE, and perceived support from school, parents, and community. The survey also captures teachers' perceptions and opinions about the program's impact on student outcomes such as observing an increase in cooperativeness or raised interest in STEM activities, both while and after students attend STARBASE. Finally, the survey assesses changes in teachers' opinions about the STEM educational and career opportunities they choose to introduce and discuss with their classes. The results suggest that the changes in teacher perceptions over the years has resulted in substantially more students who are being exposed to, and possibly becoming more interested in, learning about STEM-related topics and professions.

In addition, the Teacher Survey analytics evaluate outcomes indicative of successful 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 65[34] out of 69 STARBASE Academies were active in collecting responses from 2,820 teachers who completed the survey between July 2018 and June 2019. Each of the academies received ratings from at least 8 teachers, with 52 of the academies attaining a sample of 30 or more. One academy reached 102 teacher responses, and three other top volume academies each had more than 80 teacher respondents. 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 goals.

[34] There were no teacher responses for CA - STARBASE Edwards, which was in its first year of operation. CA- STARBASE Vandenberg and FL - STARBASE Patrick had not yet begun operations during this reporting year. OR - Camp Rilea was reported with OR - STARBASE Portland.

ACADEMY REPRESENTATION

The 65 active academies with teachers participating in the survey were affiliated with five Military Components across the United States. The National Guard hosted the majority of academies and naturally had the largest number of teachers, 2,093 (74 percent), responding to the survey from 50 academies. The Air Force sponsored nine academies and yielded 445 (16 percent) completed surveys. This year STARBASE has teacher data from three new National Guard sponsored locations: STARBASE Idaho, STARBASE Indiana - Gary, STARBASE Minnesota - Duluth.

MILITARY COMPONENT (N = 2,820)

- 50 National Guard (N = 2,093)
- 9 Air Force (N = 445)
- 4 Air Force Reserve (N = 201)
- 1 Marine (N = 55)
- 1 Army (N = 26)

Teacher Demographics

For the 2018-2019 academic year, 2,820 school personnel completed the online DoD STARBASE Teacher Survey. As noted previously, response rate was higher with 190 additional teachers responding compared to the total responses from last year (N = 2,630). The following characteristics are consistent with respondents from the previous report. As indicated in Table 35, the majority were:

- Female (85%)
- Teach 5th Grade (91%)
- Between the ages of 30 and 50 years old (59%)
- Have more than 10 years of teaching experience (54%)

Table 35: Teacher Characteristics

Years Taught	Experience with DoD STARBASE	Grade Taught	Age Range	Gender
7% First year 15% 2-4 Years 14% 5-7 Years 10% 8-10 Years 17% 11-15 Years 37% Over 15 Years	40% First year 38% 2-4 Years 12% 5-7 Years 6% 8-10 Years 3% 11-15 Years >1% Over 15 Years	3% 4th Grade 91% 5th Grade 3% 6th Grade >3% Other response (e.g., Special class, assistant, all grades, administrator)	21% Under 30 years 30% 31-40 years 29% 41-50 years 17% 51-60 years 4% Over 60 years	85% Female 15% Male

A LETTER OF SUPPORT FROM DULUTH SUPERINTENDENT WILLIAM GRONSETH

Duluth Public School District 709

The partnership in Duluth, MN, and DoD STARBASE initiative between the 148th Fighter Wing and Duluth Public Schools has been a successful one. All 5th grade students were provided access to this unique learning opportunity. STARBASE Duluth provides real-time exposure as it relates to career fields in science, technology, engineering, and mathematics (STEM). The program engages students through the inquiry-based curriculum with its "hands-on, mind-on" experiential activities. Students are increasing their passion for learning and are building positive relationships with military and civilian personnel.

One Duluth teacher said, "I had pretty high expectations for the program...but I could not have anticipated the high quality of our experience."

A student stated, "After STARBASE I want to ask more questions like 'how is it doing that?,' 'where did that come from?' and figuring things out." I have personally observed the STARBASE program and can attest to its excellence. STARBASE, working with the 148th Fighter Wing, is poised to enhance integrated STEM within our schools focusing on students in the 5th grade. The difference this program makes in the lives of the students and families is significant.

Respectfully,

William Gronseth
Superintendent Duluth Public Schools ISD 709

Office of the Superintendent | 215 N. First Avenue East | Duluth, MN 55802 | P: 218.336.8752 | F: 218.336.8773

ISD 709 Duluth Public Schools

Other observations from Table 35 include:

- Only 7.1 percent of respondents indicated that they are in their first year of teaching, however, this translates into 200 teachers exposed to DoD STARBASE this year who are new to the profession.
- There were 1,137 teachers who went to STARBASE for the first time this year.
- Results in Table 35 are similar to those seen in recent years suggesting there is stability in the metrics that describe the flow of the STARBASE participating teacher population from year to year.
- About 1 percent of the teachers report having participated for 15 years or more in the program, while 40 percent indicated it was their first year participating in a DoD STARBASE program.
- This year and last year had more representation in the "first year" and "2-4 years" experience category at 78 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 3 shows the number of teachers responding to the survey over the past five years. There has generally been an increasing number of teachers from an increasing number of academies responding to the survey during the last five years, an almost 70 percent growth resulting from academy encouragement.

Figure 3: Annual Teacher Respondent Rate Since 2015

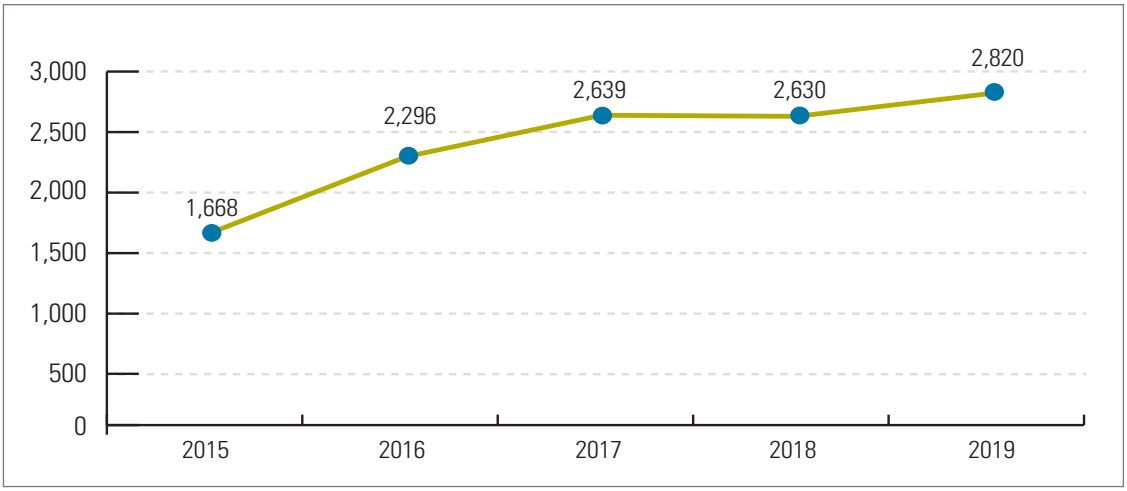
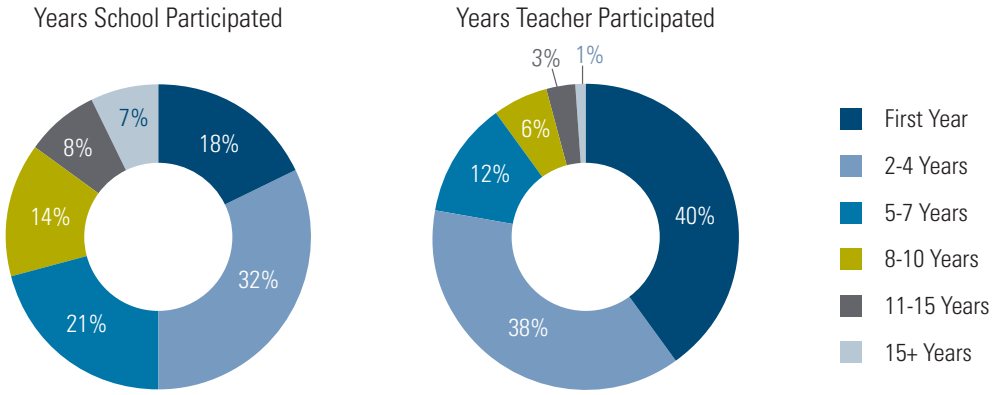


Figure 4 shows that approximately half of the schools (50 percent) have participated in the program for less than five years. The other portion (50 percent) of the schools have had five or more years with DoD STARBASE.

- This year, as in 2018, 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.)
- Nearly all (91 percent) of the teachers who don't know how many years their school has participated in DoD STARBASE have less than five years of experience in the program.

Figure 4: Years Participating in the DoD STARBASE Program



** Note: "I don't know" responses to this question were not included in the pie chart.*

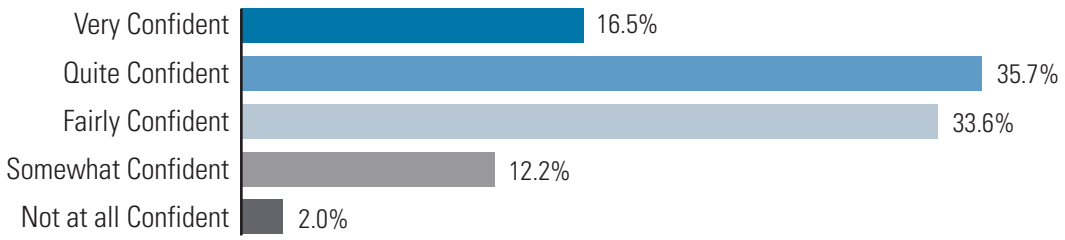
STEM-RELATED TEACHER EXPERIENCE/CONFIDENCE

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 seven 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 5).

- Eighty-two percent (N = 2,324) of the teachers reported that their college major and/or minor was ***not*** in a STEM-related discipline. Of the remaining 18 percent of responses, 10 percent said their major was in a STEM-related discipline, and 8 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 participate with their classes to DoD STARBASE. For example, nearly 92 percent of all teachers agree that the DoD STARBASE experience has influenced them to become skilled in STEM instruction – the rate is virtually the same for both new and experienced teachers (93.4 percent vs. 91.5 percent, respectively).

Figure 5: Confidence with Teaching STEM-Related Topics in the Classroom



A LETTER OF SUPPORT FROM SUPERINTENDENT OF THE YEAR

Dr. Curtis Jones, Jr.

BIBB COUNTY SCHOOL DISTRICT

STRENGTH OF CHARACTER AND COLLEGE OR CAREER READY

December 13, 2019

STARBASE Robins
Museum of Aviation
1942 Heritage Blvd.
Warner Robins, GA 31098

The Bibb County School District is proud to have a continuing partnership with STARBASE Robins to enrich our students' knowledge in the areas of science, technology, engineering, and mathematics. The experiences our fifth grade students receive at STARBASE Robins strengthens their content knowledge and most importantly their critical thinking skills through a focus on real-world applications and interdisciplinary learning activities. Each year our students and teachers comment on the exceptional inquiry and collaboration tasks students enjoy. STARBASE Robins fills a vital role in our district's vision for STEM education.

The mission of the Bibb County School District is to develop a highly trained staff and an engaged community dedicated to educating each student for a 21st century global society. The innovative instruction provided to students at STARBASE Robins aligns with this mission and supports our teachers with a model for developing engaging project-based instructional activities. Most importantly, the tasks provide our students with hands-on real-world experiences that deliver a firm foundation in the critical thinking skills required for the careers of the future.

In addition to the traditional 5th grade STARBASE Robins curriculum, our partnership allows for other enrichment activities for our students. STARBASE 2.0 collaborates with our middle school campuses to provide an outlet for STEM-focused students to pursue their interests alongside a mentor who guides them through more in-depth activities including competing in robotics competitions. Also, one of our elementary groups was able to meet and ask questions of the United States Air Force Thunderbirds aircrew during their recent visit which was all coordinated by STARBASE Robins.

STARBASE Robins and the Bibb County School District share a common goal to provide students with exciting and innovative educational opportunities that prepare them to be successful in future educational and career prospects. The partnership with STARBASE Robins is an integral support in fulfilling our vision of ensuring each student is college or career ready and we look forward to continuing this successful partnership for many years to come.

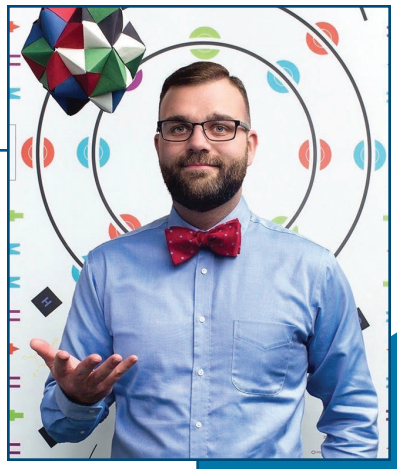
Sincerely,

Curtis L. Jones, Jr., Ed.D.
Superintendent

484 Mulberry Street • Macon, Georgia 31201 • Office (478) 765-8711 • Fax (478) 765-8549

A LETTER OF SUPPORT FROM TEACHER OF THE YEAR

Spencer Kiper



From the desk of

Spencer Kiper

2019 Louisiana State Teacher of the Year

STARBASE Louisiana
827 Twining Drive
Building 4238
Barksdale AFB, LA 71110

18 November 2019

To Whom It May Concern,

It is with sincerest gratitude and appreciation that I write this letter of support for STARBASE Louisiana and the impact of its fifth grade flagship and STARBASE 2.0 programs. As a teacher of ten years and global advocate for the continuation, growth, expansion, and access to quality Science, Technology, Engineering, and Mathematics programming for all children, I cannot in words begin to describe the impact that STARBASE Louisiana has had in my community for the past twenty years. It is an institution that local school systems rely heavily on to educate our children in ways that not only achieve the quantifiable metrics of increasing awareness of military and civilian STEM career opportunities, but also so much more than that. It is an immersive experience that resonates with our students deeply, and inspires them to become lifelong learners and the creative innovators, dreamers, and problem-solvers of tomorrow.

As a STEM enrichment educator, I was fortunate to have worked closely with STARBASE Louisiana near the beginning of my career to pilot and hone the STARBASE 2.0 program. What I witnessed was my students being challenged in ways that would not have been possible through traditional educational means. I witnessed my students taking on roles and responsibilities, working closely together through collaboration and sustained inquiry, all the while being guided by military mentors and professionals who volunteered their time to work with the youth in my class. It was apparent to the adults in the room that learning was taking place, but what I did not realize until some years later was that what we were truly building was a network of motivated young people who were inspired to actively seek out opportunities to stay engaged in STEM learning experiences as they headed into high school and even into college. The level of empowerment that I would grow to understand as a "byproduct" of the STARBASE experience is something that, as an educator, I revere more than anything.

The empowerment was not reserved for just the students. As a partner teacher with STARBASE Louisiana, I was able to glean so many ideas and inspiration of what quality STEM education could and should look like in a classroom. I aligned the goals of my school-based STEM program loosely to that of STARBASE, and what I quickly saw take shape was that quality STEM education programming does not just impact the minds in one classroom, but instead changes the culture of the school and ensures that all children have access to becoming the most creative, innovative, and inspired versions of themselves. Because of the work I did independently but in tandem with STARBASE Louisiana, I was named the 2019 Louisiana State Teacher of the Year, and now have the ability to inspire others just as STARBASE inspired me.

I proudly support STARBASE Louisiana, and look forward to seeing what the next twenty years has in store for the organization.

Respectfully,

Spencer Kiper

Teacher Attitudinal Ratings

Survey results show most participating teachers understand and embrace the mission of the DoD STARBASE program as evidenced by favorable attitudinal shifts, and in overall high approval ratings of 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 participation. The 44 items were aggregated into an Overall Index[35] 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 36). 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.

Table 36: Mean Overall Attitudinal Index Scores for the Teacher Survey (2015-2019)[36]

Overall Index	2015	2016	2017	2018	2019
Summative Mean Ratings	6.15	6.21	6.15	6.14	6.06

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. Table 37 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 36 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 = 1,683). 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.

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

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

Table 37: Teacher Survey Measurement Areas

Measurement Area	Definition	Number of Items*	Cronbach's Alpha**	Mean	Std. Deviation
Student/ Teacher Engagement	Engagement shown while attending DoD STARBASE	32	.94	6.10	0.67
STEM Concepts	Student interest in and understanding of STEM concepts	6	.85	6.34	0.66
Program Support	Support and resources provided to the teachers	6	.65	6.30	0.67
Confidence	Students' confidence with abilities and capabilities	3	.83	6.16	0.80
Behavioral-Motivational	Effort shown by teachers in reinforcing positive behaviors	5	.73	6.00	0.78
Teamwork	Students working with and supporting each other	3	.91	6.00	0.95
Future Planning	Students seeing future possibilities and opportunities	4	.92	5.86	0.96
Military and Career	Teacher's personal opinions on Military personnel and career options, and their perceptions of student opinions on same	5	.76	5.80	0.86
Post-Program Impact	Lasting impact of DoD STARBASE after the program ends	10	.91	6.03	0.81

** 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.*

*** Indicates measurement reliability in terms of internal consistency, or similarity, among contributing items. Values approaching or exceeding .90 reflect higher consistency; values approaching or below .70 suggest relatively more diverse subject content among items.*

"Our school is a high poverty school with limited resources. Our students would not have this level of STEM involvement at our school. We just can't afford the resources. DoD STARBASE is a fabulous opportunity for so many reasons: teamwork, hands-on investigations, depth of topics covered, and at no cost!"

- JEN HARPER, EDUCATOR AT CAVENDIS ELEMENTARY SCHOOL, ATTENDING STARBASE VERMONT-RUTLAND

DOD STARBASE IMPACT ON THE SCHOOL SYSTEM

The DoD STARBASE program directly influences students and teachers through personal interactions, yet also impacts the school system overall, 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 38 provides the trends in favorable responses to five items dating back to 2015 and one new item. The trends show generally more favorable responses since 2015 for some items and sustained high favorability rates for others.

Table 38: DoD STARBASE Impact on the School System

Item	Positive (Yes) Responses	Positive (Yes) Responses	Positive (Yes) Responses	Positive (Yes) Responses	Positive (Yes) Responses
Current Item	2015	2016	2017	2018	2019
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.)?	62.8%	66.1%	65.6%	67.5%	64.9%
Will you recommend DoD STARBASE to other teachers, principals, or school educators/ administrators?	99.4%	99.5%	99.6%	99.1%	99.5%
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	NA	90.0%
In your view, does the DoD STARBASE curriculum help you reach your state education standards?	94.2%	94.8%	98.0%	87.0%	85.2%
Do you or will you use DoD STARBASE materials/ applications in your own classroom?	85.5%	86.1%	90.9%	91.5%	90.7%
Do you or will you use DoD STARBASE take-home activities beyond your classroom?	65.8%	67.4%	71.3%	70.8%	70.7%

In an example of sustained high favorability over time, the item on recommending DoD STARBASE to other school officials was up slightly in 2019, maintaining a result very close to the last few years at 99.5 percent favorability.

Most teachers indicated that they received DoD STARBASE materials/activities and plan to use the materials in the classroom and/or as take-home activities. A new high favorability rate of 96.3 percent was achieved for teachers who have received STARBASE materials, when asked if they plan to use the STARBASE materials in their classroom. For the item asking about take-home activities, of those that did receive take-home activities for their students, 86 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 63 percent of teachers that received DoD STARBASE materials agreed.

A follow-up analysis was completed evaluating the response rates of teachers who said they did ***not*** receive materials from DoD STARBASE. The percentage that did not receive classroom materials remains lower than a few years ago (11.2 percent in 2015) and is similar to 2018, with 5.9 percent of teachers in 2019 saying they didn't receive materials. For take-home activities, approximately 18 percent of teachers reported no materials were available, which is slightly lower than 2015 (20.6 percent).

The responses show that most teachers have said they received classroom materials, and most plan to use them in their classrooms. Improving the communication about where to find the materials may help to reduce the number of teachers reporting they didn't receive the materials. Specifically, 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, Indiana - South Bend, Louisiana - Bayou State, Montana - Fort Harrison, Ohio Wright-Patt, Oklahoma City, South Carolina - Swamp Fox, South Dakota - NOVA Honor, South Dakota - Rapid City, and Wyoming. It should be noted that DoD STARBASE is a dynamic program that is conducted on site with the students and therefore, DoD STARBASE locations are NOT required to provide additional take-home materials.

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 last year, there was a decrease in that percentage, with 87 percent selecting this response in 2019 and 85 percent in 2018. 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." The "directly" or "indirectly" meets responses were selected by 99.3 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 2018 and 2019 the responses jumped to about 10 percent and 14 percent, respectively. 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, Georgia, Indiana, Kansas, Montana, Ohio, Oklahoma, Oregon, Texas, Vermont, Virginia, 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 19 respondents out of 2,820 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.

A new item added to the survey this 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 Connecticut, Idaho, Kansas, Massachusetts, Michigan, Montana, Ohio, Utah, Vermont, and Wyoming.

A LETTER OF SUPPORT FROM DR. REBECCA MURPHY

CENTENARY COLLEGE OF LOUISIANA

REBECCA MURPHY
ASSOCIATE PROFESSOR OF BIOLOGY
DEPARTMENT OF BIOLOGY

2911 CENTENARY BOULEVARD
SHREVEPORT, LA
71134-1188

I am writing to you in my capacity not only as an active research scientist and educator in a STEM field, but also as a DoD STARBASE 2.0 mentor of four years. I am honored to have the opportunity to express my support for this program.

I began mentoring with the program in Bossier Parish schools in 2015, at that point having only worked with students in higher education. Very early in this experience I was quite amazed by how very different a 6th grader's approach to scientific problems could be from my own. My long-congealed adult mind, constrained by years of training, initially found this distressing. However, the more time I spent in this program, the more I began to value this fresh perspective. The scientific challenges introduced in STARBASE give students a chance to have a realistic encounter with the scientific process on a small scale, and set up an environment where they can start building the more intangible, yet vital skills in communication and collaboration, creative planning and implementation, and perseverance. Moreover, my mentoring experiences have reinforced the need for these skills in the future and inspired me to reshape my own approach to teaching in the undergraduate classroom. STARBASE 2.0 has a much broader impact than the hour and a half spent at a school every other Wednesday afternoon, and I wish to illustrate this point further through specific examples from my time as a STARBASE mentor.

First, when a new project is introduced, the first sessions are dedicated to preliminary experiments exploring related physics-based concepts, like aerodynamics or buoyancy. Students work in teams to design prototypes and complete the experiments, which promotes teamwork as well as the importance of communicating their thoughts clearly and accepting new ideas. The collaborative nature of these activities is particularly important because more and more, we see elements of STEM merging with fine arts, design, and other traditionally separate fields. Because of these increasingly blurred lines, the need for a STEM trained work force and interdisciplinary collaboration for the future is clear. Furthermore, the importance of science communication to the public has become increasingly clear as new technology continues to emerge at an ever-increasing rate.

Though the importance of such communication is evident, scientists like myself often find it difficult to navigate the realm of public engagement. My experiences with STARBASE 2.0 have helped connect me to teachers and administrators for collaborative learning. One concrete result of this is the establishment of a community partnership agreement between STARBASE 2.0 and Centenary College of Louisiana in 2018. This agreement allows Centenary students to volunteer with STARBASE and allows them to participate in experiments with the STEM classes at Elm Grove Middle School and on our campus. Our students benefit by practicing their own communication skills, while younger students have guidance from college mentors. Interactions such as these have given me the confidence to participate in other public STEM events and driven development of communication-based curricula in my undergraduate courses.

"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."

- REBECCA L. MURPHY, PH.D.

Additionally, DoD STARBASE provides a link between creativity – imagining a new idea – and the logistics for bringing this new idea to life. Projects like the CO2 car competition require students to think through every step of their design – from sketches to computer simulations to actually shaping their car using tools. Experiencing this process from start to finish can be incredibly powerful, as it allows students to fully exercise their creativity, yet allows them to see that the application in reality may present logistical challenges. It has also meant an opportunity for students to experience failure and learn to work through it. The CO2 car project serves as a strong reminder for me that the theories underlying scientific concepts are important, but in the real world theories and hypotheses can mean very little without practical application. It has also reminded me to nurture student creativity in my own classroom. As a direct result of some of these experiences, I now incorporate more exploratory curricula for Centenary students that combines knowledge of science, creativity, and hands-on implementation in the form of novel experimental design, art, games, and other media.

As faculty in higher education, we often serve as a direct link between undergraduates and their ultimate career goals. It is therefore crucial that we keep up with important trends in valuable skills needed for the future. 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.

Over the past four years as a mentor, I have watched the program grow and change; constantly evolving to better reflect the scientific process. I have lived most of my life in Bossier Parish, and spent my childhood in the Bossier public school system. I often think about how formative a program like DoD STARBASE might have been for me at that age, and I now feel very proud that the schools I grew up in have access to STEM experiences such as this. STARBASE has obvious value to those students who participate, but I hope that the examples I have provided have adequately captured those attributes that are difficult to capture fully in data and reports – the broad impact that this program has on the surrounding community.

Respectfully,

Rebecca Murphy

REBECCA L. MURPHY, PH.D.
Associate Professor and Chair of the Biology Department
CELLULAR Coordinator
Centenary College of Louisiana
2911 Centenary Boulevard
Shreveport, LA 71104

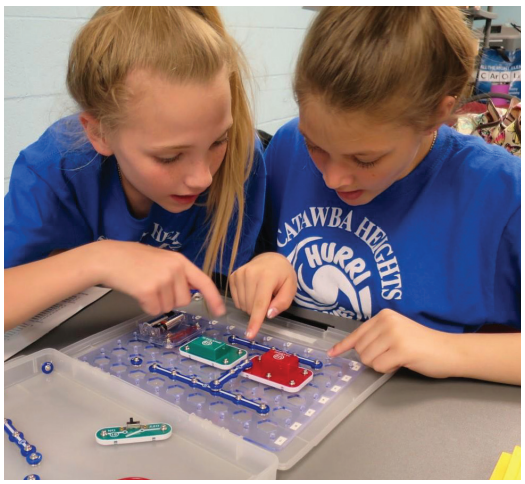
IMPACT OF SCHOOL AND TEACHER SUPPORT ON ATTITUDINAL RATINGS

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 39 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 = 6.90) indicates that participating schools perceive value from having students attend the program. Additionally, it is evident that parents are delighted their children are participating (6.37), and that principals are strong advocates for the program as well (6.03).

Teachers indicated that they would like to bring more supplemental resources from the DoD STARBASE program back to their classrooms (mean = 6.42), and that they plan to incorporate some of the teaching techniques they observed there into their classroom activities (6.26). There was a 90.7 percent agreement rate regarding intention to use materials from DoD STARBASE in the classroom, shown in Table 38 above, which also reinforces the desire for more STEM resources. As in the past, some teachers prefer DoD supplemental resources over other similar resources (5.8).

Table 39: Program Support Ranked from Most to Least Favorable

	Mean	Std. Deviation
My school plans to participate in the DoD STARBASE program again next year.	6.90	0.46
I would like more DoD STARBASE supplemental resources to take back to my classroom.	6.42	1.07
Parents are delighted that their children are participating in DoD STARBASE.	6.37	0.98
I plan to incorporate DoD STARBASE teaching techniques into my daily classroom activities.	6.26	1.05
My principal is a strong advocate of DoD STARBASE.	6.03	1.32
I prefer the supplemental resources DoD STARBASE provides to teachers over other similar sources.	5.80	1.30

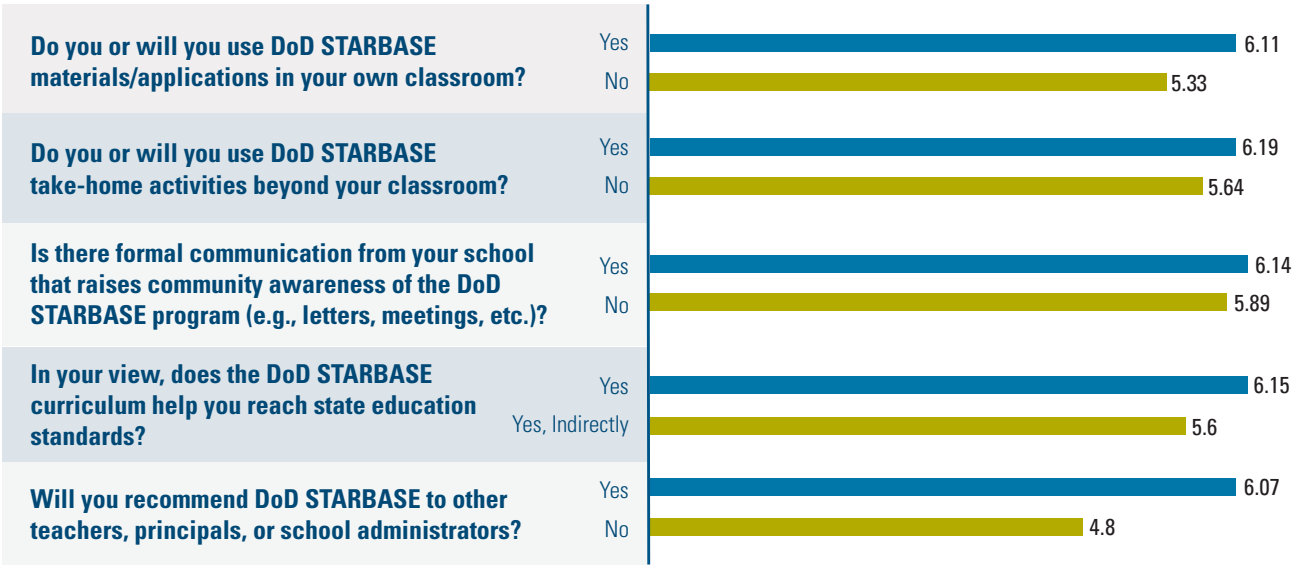


ANALYSIS OF OVERALL INDEX

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. Figure 6 shows the graphic presentation of the highlights, which include specific outcome comparisons based on the following analyses:

- Teachers who use or plan to use DoD STARBASE resource material and take-home activities have more favorable attitudes as measured by the Overall Index (6.11 and 6.19, respectively) compared to those who do not utilize these resources (5.33 and 5.64, respectively).
- Those teachers reporting that the DoD STARBASE curriculum directly helped them reach state education standards have more favorable overall attitudes (6.15) compared to those reporting only an indirect relationship (5.6).
- Schools with formal communication processes in place had higher teacher ratings (6.14) on the Overall Index than those with no formal communication (5.89) processes in place.
- Teachers who would recommend the DoD STARBASE program responded with higher overall ratings (6.07) as compared to those who would not recommend the program (4.80). Note, the number of teachers whot 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.

Figure 6: Mean Overall Attitude Rating by DoD STARBASE School System Impact Item Response



Note: Differences between the means are statistically significant ($p < .05$) based on a t-test.

MILITARY EXPERIENCE AND CAREER OPPORTUNITIES

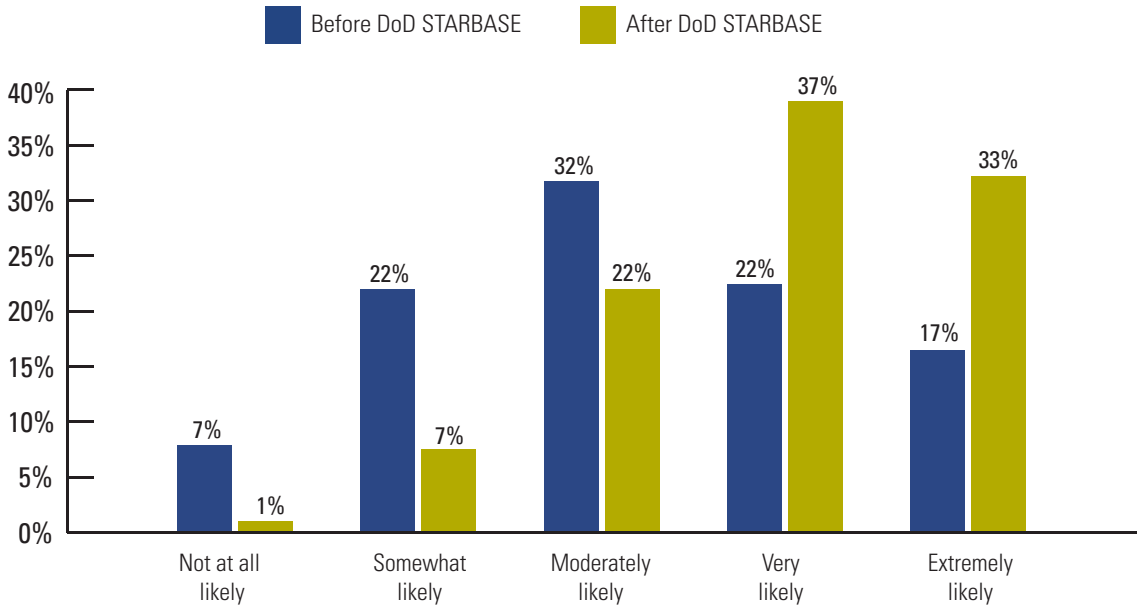
The majority of teachers (75 percent) involved in the DoD STARBASE program this year have had some type of exposure to a military base (Table 40). There is a small increase in the percentage of teachers returning to STARBASE (18.9 percent) from the past few years. This trend is also reflected in the higher percentage of teachers that report a combination of both STARBASE and non-STARBASE reasons behind their previous visits to a military base (22.8 percent). The percentage of teachers who visited a military base solely for other activities has fallen slightly (33.6 percent) in this time. Approximately one quarter of the teachers (24.7 percent) reported that this is their first experience with a military base and the DoD STARBASE program.

Table 40: Experience with a Military Base

	2015 (N=1,668)		2016 (N=2,296)		2017 (N=2,639)		2018 (N=2,630)		2019 (N=2,820)	
Response	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Never visited a military base before the current DoD STARBASE Program	424	25.4%	589	25.7%	633	23.9%	693	26.3%	696	24.7%
Yes, for prior DoD STARBASE programs only	232	13.9%	383	14.3%	399	15.1%	408	15.5%	533	18.9%
Yes, for activities not related to DoD STARBASE	590	35.4%	827	36.0%	929	35.2%	956	36.3%	947	33.6%
Yes, for DoD STARBASE and non-DoD STARBASE activities	330	19.8%	442	19.3%	558	21.2%	490	18.6 %	644	22.8%
Other	92	5.5%	110	4.8%	118	4.5%	83	3.2%	0	0%

For teachers, attending DoD STARBASE prompts some meaningful changes in perspective. For instance, 89 percent (N = 2,506) of the teachers reported that they became more aware of career opportunities (both uniformed and non-uniformed 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 75 percent increase (from 39 percent to 70 percent overall) in teachers who say they are Very likely (37 percent) or Extremely likely (33 percent) to recommend the military or DoD civilian careers after the program. Before the program only a total of 39 percent overall was so inclined (22 percent Very Likely and 17 percent Extremely Likely). Figure 7 displays the change in favorability based on percentage of responses within each of the response categories.

Figure 7: 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 doesn't take part in a program, they are likely to pass on their pro-STEM perspectives (enhanced by DoD STARBASE) to their students for the rest of their careers.

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 = 1,683). 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 41 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.

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 didn't 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.
- After the DoD STARBASE program, the students ask more questions about technology.
- Students who 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 the Science Fair and other STEM-related challenge programs (e.g., FIRST LEGO League, Odyssey of the Mind, Team America Rocketry Competition, etc.).

"Strengths are the lessons. Really **hit all standards in an engaging fun way.** Great teaching tips for me."

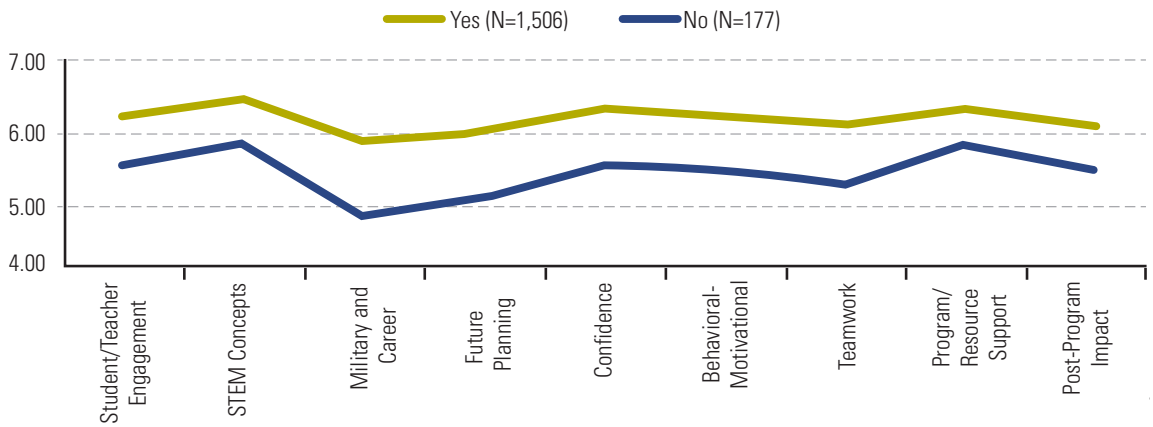
- EDUCATOR AT PALISADES PARK ELEMENTARY SCHOOL, ATTENDING STARBASE CHARLOTTE

Table 41: Means for Post-Program Impact Items

Post-Program Impact Item	2019 Mean
The students talk about DoD STARBASE long after the program has ended.	6.51
Attending DoD STARBASE helps students understand better that developing their current STEM skills/ abilities is necessary to have good future career choices.	6.36
Attending DoD STARBASE helps students understand better how STEM skills/abilities fit job requirements for certain career fields.	6.36
DoD STARBASE helps to improve cooperative learning in the classroom even after the program ends.	6.18
Attending DoD STARBASE helps students link their experience to careers in both military and non-military positions.	6.09
After the DoD STARBASE program, the students ask more questions about technology.	5.90
After DoD STARBASE, students are more interested in using computers for class-related learning activities.	5.87
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 Rocketry Competition, etc.).	5.87
Students who have attended DoD STARBASE seem to perform better on standardized state assessments.	5.72
After DoD STARBASE, students have better school attendance.	5.20

The average difference for the Post-Program Impact composite scale and the other student/teacher engagement measures are presented in Figure 8. Please note that the sample for all the composites is based on teachers who have at least one year of experience with DoD STARBASE (N = 1,683). The differences between the composite measures means were significantly lower for teachers who did not have increased awareness of DoD career opportunities.

Figure 8: Teacher Perceptions of Student Behavior Based on Teachers Becoming More Aware of Department of Defense Career Opportunities after Attending DoD STARBASE



Facilitating 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 mathematics (Table 42).

Table 42: STEM Awareness Historical Comparisons

	2015	2016	2017	2018	2019
DoD STARBASE has helped to improve the students' understanding of science.	6.64	6.69	6.72	6.72	6.69
More interested in learning about technology.	6.51	6.55	6.53	6.50	6.47
More interested in learning about science.	6.46	6.54	6.54	6.48	6.47
DoD STARBASE has helped to improve students' appreciation of how mathematics can be applied to a variety of situations.	6.49	6.49	6.48	6.45	6.44
More interested in learning about engineering.	6.17	6.26	6.28	6.23	6.20
More interested in learning about mathematics.	5.93	5.97	5.97	5.92	5.90

Concepts related to science were rated higher than mathematics, which has been the trend over previous years. Specifically, students were viewed as more interested in science and technology (6.47) compared to mathematics (5.90) according to teacher perceptions. Teachers also saw more improved understanding of science (6.69) compared to appreciation of how mathematics can be applied (6.44).

Examining Table 42 closely reveals that the mean favorability ratings on these items are slightly lower than in 2018. 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 mathematics 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 mathematics, in that order.

"DoD STARBASE helps our school actually
fit science into our instruction.
What a great partnership!"

- EDUCATOR AT WALTER LONG ELEMENTARY SCHOOL, ATTENDING STARBASE NELLIS

DEVELOPING CONTINUED STEM INTEREST

Teachers are also 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-five percent of respondents indicated that the best way to sustain interest is to promote an existing program (33 percent) or a new program (41 percent) in the school system (Table 43). They felt the least likely ways to maintain STEM interest were by promoting a new program at the national, state, or community level (17 percent) or through an existing community-based program (10 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 43: 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	1,146	41%
An existing school-based program	930	33%
Promoting a new program at the national, state, or community level	465	17%
An existing community-based program	279	10%

AVAILABLE STEM PROGRAMS

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 44). More than 30 percent of teachers report that there are "many" (14 percent) or "several" (19 percent) relevant STEM-awareness programs available to their students within their school and/or community. In contrast, approximately 16 percent said there were no other programs available. The most common response (51 percent) was teachers indicating they know of only a couple of relevant programs.

Table 44: 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?
14% many relevant STEM awareness programs 19% several relevant programs 51% only a couple of relevant programs 16% no other relevant programs	48% Yes 13% No 39% Not sure

These results are comparable to previous years; however, there was an increase in the percentage of teachers picking the most favorable response of "many" available STEM-relevant programs, which increased 5 percentage points from 2018 to 14 percent in 2019. 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 (up from 38 percent in 2017 and 43 percent in 2018), 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.

ADDITIONAL STEM RESOURCES

Teachers also identified specific STEM awareness programs, activities, resources, and equipment available to students within the school system and the community at large. Eighteen 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 9). In addition:

- Six hundred eighty-two teachers (24 percent) wrote in other STEM programs or activities.
- One hundred twenty-two teachers (4 percent) wrote in other resources or equipment. (Common examples: Maker Space, Project Lead the Way, STEM lab, or class at school).
- Eighty-two percent of the teachers (N = 2,306) 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 teachers report there are resources and/or equipment available in school for students to use (e.g., Mathematics activities, Specialty labs).
- As in 2018, 87 percent of teachers report computers are available for students in the classroom.

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 for participants to use in their own classrooms.

"This opportunity for students to experience STEM activities increases critical thinking, preparing them to try and solve real world problems. This is what schools need!"

- ROBBI JO MORGAN, EDUCATOR AT MCKINLEY ELEMENTARY SCHOOL, ATTENDING STARBASE NORTH DAKOTA

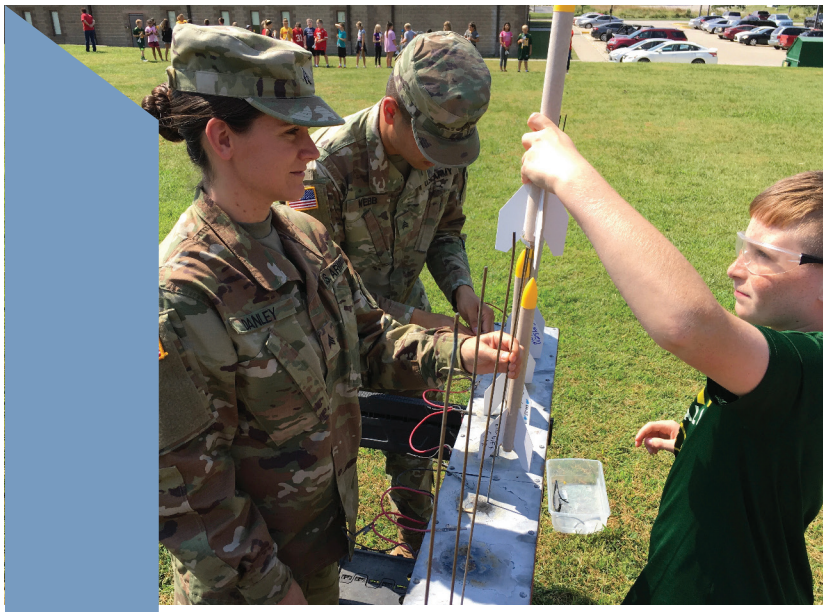
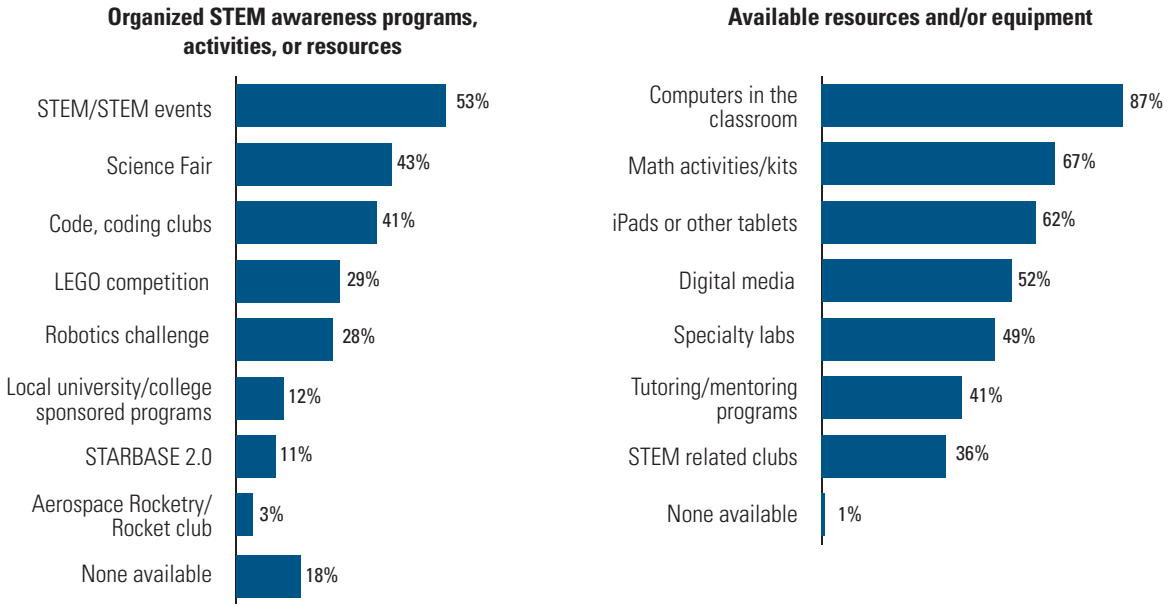


Figure 9: Organized STEM Programs and Available Resources for Students



Referring students to additional STEM-related programs or resources after DoD STARBASE is dependent upon availability and appropriateness to the student population. Therefore, it is important that teachers and educators have post DoD STARBASE programs available to continue to engage the students after the program has ended. Ninety-six percent of the teachers plan to always (47 percent), often (33 percent), or sometimes (16 percent) refer students to additional STEM-related programs or resources after the DoD STARBASE program has ended (Table 45).

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.

Table 45: 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.	2015 Percent	2016 Percent	2017 Percent	2018 Percent	2018 Percent
Always	46%	49%	46%	46%	47%
Often	33%	33%	36%	35%	33%
Sometimes	14%	13%	15%	16%	16%
Once or twice	2%	2%	3%	2%	3%
Not at all	1%	1%	1%	1%	1%
Other	3%	3%	NA	NA	NA

Drivers of Selected Target Ratings

Stepwise multiple regression analyses were performed to determine the important drivers of key teacher attitudes and ratings about DoD STARBASE. The key teacher ratings selected this year 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 was 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 for each regression are listed in order of magnitude and oftentimes provide a comprehensive listing for identifying actions that most influence program effectiveness. The drivers listed for the Post-Program Impact aggregate scale explain approximately 72 percent of the variance, or variability, across teachers in their perceptions of DoD STARBASE impact (as indicated by an R2 value of .718). 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 differences from the driver model of Post-Program Impact derived in 2018, with 44 percent overlap of the contributing teacher attitude items (four overlapping items are highlighted). A regression with the four drivers that are the same as last year resulted in significant set of drivers (R2 = .67). This time, teacher perceptions of students' focus on their future goals, a teacher's motivation to become more skilled in STEM instruction, better school attendance of students, and greater student interest in military and non-military careers, together with teacher plans to incorporate STARBASE teaching techniques were key factors in positive post-program attitudes. Teachers' perceptions that STARBASE reinforces many positive behaviors and teacher perceptions of students' confidence, interest in learning, and excitement about their futures are also important factors in determining positive opinions of DoD STARBASE impact.

DRIVERS OF POST-PROGRAM IMPACT5 (R2 = .718; P<.05)

- While attending DoD STARBASE, the students appear more ready to set future educational and career goals.
- The DoD STARBASE experience has influenced me to become more skilled in STEM instruction.
- During DoD STARBASE, students have better school attendance.
- I plan to incorporate DoD STARBASE teaching techniques into my daily classroom activities.
- While attending DoD STARBASE, the students appear more confident about what they can accomplish.
- DoD STARBASE reinforces many positive behaviors I try to teach my students.
- While attending DoD STARBASE, the students appear to have more questions about DoD and other non-military career opportunities.
- While attending DoD STARBASE, the students appear more interested in learning about engineering.
- While attending DoD STARBASE, the students appear more excited about their futures.

Table 46 provides a summary of the regression analyses for other key target ratings based on all attitudinal items within the Teacher Survey. The predictive models selected for analysis this year once again focus on students' attitudes about future career opportunities and their understanding of how STEM-related skills and abilities link to various career paths.

The top few drivers listed in the summary of each target rating predictor model below tend largely to be many of the same ones as in previous years. This helps to solidify a core set of teacher perceptions of student behaviors and their own attitudes that directly implicate the influence DoD STARBASE exerts on forming student aspirations for their future STEM-related educational pursuits and possible career directions.

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.

Table 46: Drivers of Key Target Ratings

Drivers of "Attending DoD STARBASE helps students link their experience to careers in both military and non-military positions" (R2 = .678*)
-Attending DoD STARBASE helps students understand better how STEM skills/abilities fit job requirements for certain career fields. -More interested in learning about military careers. -Attending DoD STARBASE helps students understand better that developing their current STEM skills/abilities is necessary to have good future career choices. -To have more questions about DoD and other non-military career opportunities. -Enjoyed coming to military base.
Drivers of "Attending DoD STARBASE helps students understand better how STEM skills/abilities fit job requirements for certain career fields" (R2 = .775*)
-Attending DoD STARBASE helps students understand better that developing their current STEM skills/abilities is necessary to have good future career choices. -Attending DoD STARBASE helps students link their experience to careers in both military and non-military positions. -Focus more on their future potential. -DoD STARBASE has helped to improve the students' understanding of science.

Table 46: Drivers of Key Target Ratings, Continued

Drivers of "Attending DoD STARBASE helps students understand better that developing their current skills/ abilities is necessary to have good future career choices" (R2 = .764*)
-Attending DoD STARBASE helps students understand better how STEM skills/abilities fit job requirements for certain career fields. -The students talk about DoD STARBASE long after the program has ended. -After the DoD STARBASE program, the students ask more questions about technology. -I plan to incorporate DoD STARBASE teaching techniques into my daily classroom activities. -Better at following directions.
Drivers of "Students are more interested in learning about military careers" (R2 = .730*)
-Have more questions about DoD and other non-military career opportunities. -More comfortable with military personnel. -More excited about their futures. -More interested in learning about engineering. -I plan to incorporate DoD STARBASE teaching techniques into my daily classroom activities. -Attending DoD STARBASE helps students link their experience to careers in both military and non-military positions. -Attending DoD STARBASE helps students understand better that developing their current STEM skills/abilities is necessary to have good future career choices.
Drivers of "Students are more ready to set future educational and career goals" (R2 = .799*)
-Focus more on their future potential. -More interested in learning about engineering. -More goal oriented. -More excited about their futures. -Attending DoD STARBASE helps students link their experience to careers in both military and non-military positions. -More willing to try new things.
Drivers of "Students seem to have more questions about DoD and other non-military career opportunities after DoD STARBASE" (R2 = .706*)
-More interested in learning about military careers. -Focus more on their future potential. -Attending DoD STARBASE helps students link their experience to careers in both military and non-military positions. -More interested in learning about engineering.
Drivers of "Students seem to focus more on their future potential after DoD STARBASE" (R2 = .803*)
-More ready to set future educational and career goals. -More excited about their futures. -Have more questions about DoD and other non-military career opportunities. -Better at following directions. -More interested in learning about engineering.

** Statistically significant Multiple Correlations ($p < .05$)*

Conclusions

The DoD STARBASE program continues to provide STEM-related academic activities and exposure to future opportunities for both students and their teachers all across the country. Survey results consistently show favorable shifts in teachers' opinions of their own awareness of STEM-related opportunities for students, as well as their opinions on the positive and lasting outcomes DoD STARBASE has on their students, as evidence for the ongoing success of the DoD STARBASE program.
For some participating schools, DoD STARBASE is the primary STEM program that is available to students. The DoD STARBASE program enables the students to link these concepts to real-world applications. The program has influenced and instilled 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. 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 students:[34]

- Have improved understanding of science (mean = 6.69), improved appreciation of applying mathematics (6.44), and more interest in learning technology (6.47)
- Talk about DoD STARBASE long after the program ended (6.51)
- Understand better how STEM skills/abilities fit job requirements for certain career fields (6.36)
- Understand better that developing their current skills/abilities is necessary to have good future career choices (6.36)
- DoD STARBASE helps to improve cooperative learning in the classroom even after the program ends (6.18)

Students at DoD STARBASE participate in activities with DoD sponsored instructors that have specialized training in STEM concepts. 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 technically 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 that may not have the background or formal education and training in STEM fields (only 18 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 92 percent of participating teachers are influenced to become skilled in STEM instruction, and about 94 percent of respondents say they plan to incorporate DoD STARBASE techniques in their classrooms. Consequently, these teachers are likely to continue to support the mission of DoD STARBASE, both during and beyond the program, for the rest of their teaching careers. The fact that DoD STARBASE has such a positive impact on adult teacher participants is important evidence that the program is succeeding in its goal of promoting STEM interest in students across the USA.

[37] Likert scale based on response options from 1 (Disagree) to 7 (Agree).

"DoD STARBASE is an example that personifies the National Guard investment to the future of our state and nation through the STEM Program. This program encourages our youth to involve themselves in Science, Technology, Engineering, and Mathematics and this is critical to their future and the future of our state."

- BG "KIP" CLARK, ASSISTANT ADJUTANT GENERAL, AIR NATIONAL GUARD HEADQUARTERS, STARBASE INDIANA-INDIANAPOLIS

APPENDICES 2019

DoD STARBASE
A Department of Defense Youth Program

APPENDIX A: DEFINITIONS FOR STATISTICAL ANALYSES WITHIN THIS REPORT

The following section provides a list of the statistical formulas that were used to calculate the data presented in this report.

1. Mean – Average value of a variable
   Xbar = ∑X/N
   xbar = the sample mean; xbar is generally represented by a capital "X" with a bar or line over the top
   ∑X = the sum of all values of X
   N = the sample size

2. Standard deviation – Measure of the average deviation of each score from the mean
   s = [∑xi-xbar2/n-1]1/2
   n = the sample size

3. t-test – Tests the difference between two means
   t = Xbar1 – Xbar2/sx1bar-x2bar
   sx1bar-x2bar = the standard deviation of the difference between the two variables

4. F-test – Tests the differences between multiple group means
   F = MSb/MSw
   MSb = ∑ nk(Xbark – Xbar)2/(K – 1)
   MSw = ∑[∑ (Xik – Xbark)2]/(N-K)
   Xik = the value of the variable obtained by the ith person in the kth group
   Xbark = the mean of the kth group
   Xbar = the grand mean overall of all groups
   nk = the size of the kth group
   N = the total sample size of all groups
   K = the total number of groups

5. Pearson's Correlation – Determines the relationship between two variables
   r12 = [[∑Y1*Y2 – ∑Y1*∑Y2/N]/N-1]/sy1sy2
   r = the statistical relationship of two variables
   Y = the values of the variables
   s = the standard deviation of the variables

6. Multiple Correlation (R) – Represents the correlation or statistical relationship between a set of variables and a single variable

7. Regression Equation – Determines what combination of variables can best predict the outcome for the dependent variable
   Y = a + b1*X1 + b2*X2 + ... + bp*Xp
   Y = the predicted value of the dependent variable
   a = the intercept value of Y when X=0
   b = the regression coefficients for the predictors
   X = the value of the predictor variable

APPENDIX B: EXPRESSED ATTITUDINAL DIFFERENCES BY GENDER

Dimension/Item	Boy's Pretest	Boy's Post-test	Boy's Post-Pre Gap	Girl's Pretest	Girl's Post-test	Girl's Post-Pre Gap
Total program attitudes	5.60	5.74	0.14	5.47	5.57	0.10
Science, Technology, Engineering, and Mathematics (STEM) Awareness	6.21	6.22	0.01	5.79	5.70	-0.09
I want to learn more about technology.	6.15	6.10	-0.05	5.67	5.52	-0.15
I like technology.	6.42	6.43	0.01	6.09	6.02	-0.07
I like learning how technology works.	6.06	6.14	0.08	5.60	5.58	-0.02
Future Planning	5.29	5.43	0.14	4.91	5.00	0.09
I like engineering.	5.26	5.59	0.33	4.83	5.04	0.21
I want to learn more about engineering.	5.45	5.49	0.04	5.11	5.00	-0.11
Jobs that use mathematics, engineering, technology and science are exciting.	5.59	5.65	0.06	5.30	5.41	0.11
I am interested in being a scientist or engineer.	4.61	4.71	0.1	3.97	4.05	0.08
I enjoy learning about science, technology, mathematics, and engineering topics.	5.65	5.83	0.18	5.41	5.50	0.09
When I finish school, I would like to get a job that has something to do with mathematics, science, technology, or engineering.	5.20	5.34	0.14	4.86	5.04	0.18
Science Confidence	5.49	5.65	0.16	5.42	5.52	0.10
I am good at science.	5.05	5.38	0.33	4.99	5.22	0.23
Learning about science is easy for me.	4.78	5.15	0.37	4.72	5.01	0.29
I am good at mathematics.	5.54	5.63	0.09	5.11	5.22	0.11
I like doing science experiments.	6.28	6.32	0.04	6.47	6.51	0.04
I would like to know more about science.	5.83	5.83	0	5.82	5.67	-0.15
STEM Motivation & Behavior	5.80	6.06	0.26	5.76	5.98	0.22
Engineers help solve challenging problems.	5.55	6.12	0.57	5.62	6.01	0.39
Mathematics is really useful for solving engineering problems.	5.80	6.06	0.26	5.69	5.91	0.22
Mathematics is important for developing new technology.	5.95	6.18	0.23	5.78	6.01	0.23
I am aware of some jobs that use mathematics, science, engineering, or technology.	5.77	6.05	0.28	5.86	6.07	0.21
Most people use science, technology, mathematics, or engineering skills every day.	5.82	6.05	0.23	6.03	6.11	0.08
Scientists work on things that make life better.	5.93	6.12	0.19	5.86	5.99	0.13
A lot of good jobs use mathematics to solve problems.	5.72	5.96	0.24	5.66	5.85	0.19
People who work for the military use technology in their jobs.	5.87	6.05	0.18	5.49	5.89	0.40
Learning about science, engineering, technology, and math will help me in my daily life.	5.85	5.95	0.10	5.90	5.93	0.03

APPENDIX B: EXPRESSED ATTITUDINAL DIFFERENCES BY GENDER, CONTINUED

Dimension/Item	Boy's Pretest	Boy's Post-test	Boy's Post-Pre Gap	Girl's Pretest	Girl's Post-test	Girl's Post-Pre Gap
Military Setting Endorsement	5.78	5.84	0.06	5.68	5.78	0.10
Military bases are exciting.	5.98	5.97	-0.01	5.64	5.72	0.08
A military base is a good place to work.	5.13	5.28	0.15	5.19	5.37	0.18
People who work for military do lots of different things.	6.25	6.28	0.03	6.21	6.27	0.06
Teacher Support for STEM	4.74	4.87	0.13	4.92	4.91	-0.01
Teachers at my school are excited about science.	5.10	5.03	-0.07	5.26	5.11	-0.15
Teachers at my school talk about why technology is important.	4.38	4.70	0.32	4.58	4.69	0.11
Program Evaluation	5.56	5.73	0.17	5.69	5.79	0.10
I would be interested in a STARBASE club at my school if it were offered.	5.58	5.47	-0.11	5.72	5.56	-0.16
I do not think DoD STARBASE will help me do better in school. (Reverse Scored)	4.88	4.98	0.10	5.01	5.09	0.08
I think I will remember enjoying my time at DoD STARBASE.	6.18	6.19	0.01	6.35	6.31	-0.04
Additional Items						
I talk with my family about my plans for the future.	5.25	5.19	-.06	5.50	5.40	-.10
DoD STARBASE is boring. (Reverse Scored)		5.11			5.04	
At DoD STARBASE, I learned a lot of things that I can use.		6.28			6.28	
I will tell others about my DoD STARBASE experience.		5.74			6.01	
DoD STARBASE instructors made learning about science, technology, engineering, and mathematics topics fun.		6.23			6.23	
I think almost any kid would have fun learning at DoD STARBASE.		5.87			5.05	

APPENDIX C: PCA ANALYSIS OF ATTITUDE DIMENSIONS

Items were assigned to Attitude Dimensions based on their highest loadings on the seven factors shown below. Factors are listed in order of contribution to the results.

1. Loadings of Attitude Items on Seven Factors, 2015

	2015						
Attitude Items	Future Planning	Science Confidence	Program Evaluation	STEM Behavior/ Motivation	Military Setting Endorse	STEM Concept Awareness	Math-ematics Confidence
I would take engineering classes if offered.	0.736						
I am interested in being a scientist or engineer.	0.723						
I like engineering.	0.692						
I want to learn more about engineering.	0.675						
When I finish school, I would like to get a job where I could use STEM.	0.628			0.421			
I would like a job in a science-related area.	0.586	0.5					
I enjoy learning about STEM topics.	0.57						
STEM jobs are exciting.	0.565			0.408			
I like science.		0.781					
I am good at science.		0.768					
Learning about science is easy for me.		0.754					
I would like to take more science classes.	0.413	0.67					
I would like to join a science club at my school.	0.397	0.629					
DoD STARBASE is boring. (Reversed Scored)			0.761				
DoD STARBASE instructors made learning about STEM topics fun.			0.738				
I would tell my friends to come to DoD STARBASE.			0.724				
At DoD STARBASE, I learned a lot of things that I can use.			0.61				
I do not think DoD STARBASE will help me do better in school. (Reversed Scored)			0.516				
Most people use STEM skills every day.				0.609			
I think learning about STEM topics will help me in my daily life.	0.38			0.605			

APPENDIX C: PCA ANALYSIS OF ATTITUDE DIMENSIONS, CONTINUED

1. Loadings of Attitude Items on Seven Factors, 2015, Continued

Attitude Items	Future Planning	Science Confidence	Program Evaluation	STEM Behavior/ Motivation	Military Setting Endorse	STEM Concept Awareness	Math-ematics Confidence
I am aware of some STEM careers.	0.342			0.602			
Scientists work on things that will make life better.				0.554			
Engineers help solve challenging problems.				0.527			
Military bases are exciting.					0.731		
A military base is a good place to work.					0.708		
People who work on a military base do lots of different things.				0.365	0.648		
People who work for the military use technology in their jobs.				0.383	0.586		
I have enjoyed coming to a military base.			0.514		0.538		
I like technology.						0.784	
I want to learn more about technology.	0.358					0.697	
I like figuring out how to use technology gear (tablets, smart phones, etc.).						0.665	
I would take classes on technology if available.	0.535					0.602	
I like mathematics.							0.901
I would like to take more mathematics classes.							0.806
I am good at mathematics.							0.775
I need to do well in mathematics to get the kind of job I want.							0.391

In the interest of simplicity, loadings below .34 are not shown.

"It was great working with the DoD STARBASE 2.0 students **while they gained a lot with working with us mentors; we gained just as much**, if not more, working with them and getting to know them."

- CPT CHRIS EARP-PITKINS, STARBASE WRIGHT-PATT

APPENDIX C: PCA ANALYSIS OF ATTITUDE DIMENSIONS, CONTINUED

2. Loadings of Attitude Items on Seven Factors, 2016

	2016						
Attitude Items	Future Planning	Science Confidence	Program Evaluation	STEM Behavior/ Motivation	Military Setting Endorse	STEM Concept Awareness	Mathematics Confidence
I am interested in being a scientist or engineer.	0.736						
I like engineering.	0.723						
I want to learn more about engineering.	0.742						
When I finish school, I would like to get a job where I could use STEM (Science, Technology, Engineering, and Mathematics).	0.587			0.374			
I enjoy learning about STEM (Science, Technology, Engineering, and Mathematics) topics.	0.496		0.41				
STEM (Science, Technology, Engineering, and Mathematics) jobs are exciting.	0.561						
I like science.		0.777					
I am good at science.		0.795					
Learning about science is easy for me.		0.758					
I would like to learn more about science.		0.704					
I would join a science club at my school if it was offered.	0.401	0.594					
DoD STARBASE is boring. (Reversed Scored)			0.791				
DoD STARBASE instructors made learning about STEM (Science, Technology, Engineering, and Mathematics) topics fun.			0.743				
I will tell others about my DoD STARBASE experience.			0.638				
At DoD STARBASE, I learned a lot of things that I can use.			0.663				
I do not think DoD STARBASE will help me do better in school. (Reversed Scored)			0.642				

APPENDIX C: PCA ANALYSIS OF ATTITUDE DIMENSIONS, CONTINUED

2. Loadings of Attitude Items on Seven Factors, 2016, Continued

Attitude Items	Future Planning	Science Confidence	Program Evaluation	STEM Behavior/ Motivation	Military Setting Endorse	STEM Concept Awareness	Math-ematics Confidence
Most people use STEM (Science, Technology, Engineering, and Mathematics) skills every day.				0.726			
I think learning about STEM (Science, Technology, Engineering, and Mathematics) topics will help me in my daily life.				0.559			
I am aware of some STEM (Science, Technology, Engineering, and Mathematics) jobs.				0.551			
Scientists work on things that will make life better.				0.465			
Engineers help solve challenging problems.					0.495		
Military bases are exciting.			0.426		0.564		
A military base is a good place to work.					0.613		
People who work for the military do lots of different things.				0.355	0.580		
People who work for the military use technology in their jobs.				0.446	0.562		
I have enjoyed coming to a military location.			0.615				
My teacher is excited about science.*					0.553		
My teacher thinks technology is important.*					0.538		
I like technology.						0.801	
I want to learn more about technology.						0.735	
I like figuring out how to use technology (computers, tablets, smart phones, etc.).						0.702	
I like mathematics.							0.904
I would like to learn more about mathematics.							0.860
I am good at mathematics.							0.809
I must do well in mathematics to get the kind of job I want.							0.466

** New items were not used on the factor to maximize similarity to 2015 results.*

APPENDIX C: PCA ANALYSIS OF ATTITUDE DIMENSIONS, CONTINUED

3. Loadings of Attitude Items on Seven Factors, 2017

	2017						
Attitude Items	Future Planning	Science Confidence	Program Evaluation	STEM Behavior/ Motivation	Military Setting Endorse	STEM Concept Awareness	Teacher Support
I am interested in being a scientist or engineer.	0.737						
When I finish school, I would like to get a job that has something to do with mathematics, science, technology, or engineering.	0.694						
I want to learn more about engineering.	0.657						
I like engineering.	0.627						
I enjoy learning about science, technology, mathematics, and engineering topics.	0.562						
Jobs that use mathematics, engineering, technology, and science are exciting.	0.551						
I am good at science.		0.824					
Learning about science is easy for me.		0.775					
I would like to know more about science.	0.374	0.457					
I am good at mathematics.		0.395					
I like doing science experiments.		0.390					
I think almost any kid would have fun learning at DoD STARBASE.			0.763				
DoD STARBASE instructors made learning about science, technology, engineering, and mathematics topics fun.			0.752				
DoD STARBASE is boring. (Reverse Scored)			0.744				
I think I will remember enjoying my time at DoD STARBASE.			0.717				
I will tell others about my DoD STARBASE experience.			0.665				
At DoD STARBASE, I learned a lot of things that I can use.			0.661				
I would be interested in a STARBASE club at my school if it were offered.			0.636				
I do not think DoD STARBASE will help me do better in school. (Reverse Scored)			0.514				

APPENDIX C: PCA ANALYSIS OF ATTITUDE DIMENSIONS, CONTINUED

3. Loadings of Attitude Items on Seven Factors, 2017, Continued

Attitude Items	Future Planning	Science Confidence	Program Evaluation	STEM Behavior/ Motivation	Military Setting Endorse	STEM Concept Awareness	Teacher Support
A lot of good jobs use mathematics to solve problems.				0.619			
Mathematics is important for developing new technology.				0.617			
Mathematics is really useful for solving engineering problems.				0.607			
Most people use science, technology, mathematics, or engineering skills every day.				0.583			
Scientists work on things that make life better.				0.541			
People who work for the military use technology in their jobs.				0.539			
Learning about science, engineering, technology, and mathematics will help me in my daily life.				0.527			
I am aware of some jobs that use mathematics, science, engineering, or technology.				0.526			
Engineers help solve challenging problems.				0.464			
A military base is a good place to work.					0.709		
Military bases are exciting.					0.637		
People who work for the military do lots of different things.				0.425	0.528		
I like technology.						0.786	
I want to learn more about technology.						0.704	
I like learning how technology works.						0.641	
Teachers at my school are excited about science.							0.764
Teachers at my school talk about why technology is important.							0.719

APPENDIX C: PCA ANALYSIS OF ATTITUDE DIMENSIONS, CONTINUED

4. Loadings of Attitude Items on Seven Factors, 2018

	2018						
Attitude Items	Program Evaluation	STEM Behavior/ Motivation	Future Planning	Science Confidence	STEM Concept Awareness	Military Setting Endorse	Teacher Support
I think almost any kid would have fun learning at DoD STARBASE.	.778						
I think I will remember enjoying my time at DoD STARBASE.	.776						
DoD STARBASE is boring. (Reverse Scored)	.765						
DoD STARBASE instructors made learning about science, technology, engineering, and mathematics topics fun.	.763						
I would be interested in a STARBASE club at my school if it were offered.	.659						
At DoD STARBASE, I learned a lot of things that I can use.	.654						
I will tell others about my DoD STARBASE experience.	.610						
I do not think DoD STARBASE will help me do better in school. (Reverse Scored)	.524						
Mathematics is important for developing new technology.		.654					
Mathematics is really useful for solving engineering problems.		.652					
Most people use science, technology, mathematics, or engineering skills every day.		.646					
A lot of good jobs use mathematics to solve problems.		.578					
Engineers help solve challenging problems.		.564					
I am aware of some jobs that use mathematics, science, engineering, or technology.		.538					
Learning about science, engineering, technology, and mathematics will help me in my daily life.	.359	.528	.339				
Scientists work on things that make life better.		.507					
I am good at mathematics.		.261					

** New items were not used on the factor to maximize similarity to 2015 results.*

APPENDIX C: PCA ANALYSIS OF ATTITUDE DIMENSIONS, CONTINUED

4. Loadings of Attitude Items on Seven Factors, 2018, Continued

Attitude Items	Program Evaluation	STEM Behavior/ Motivation	Future Planning	Science Confidence	STEM Concept Awareness	Military Setting Endorse	Teacher Support
I am interested in being a scientist or engineer.			.749				
When I finish school, I would like to get a job that has something to do with mathematics, science, technology, or engineering.			.748				
I want to learn more about engineering.			.678		.347		
I like engineering.			.649		.340		
I enjoy learning about science, technology, mathematics, and engineering topics.			.593	.360			
Jobs that use mathematics, engineering, technology, and science are exciting.		.325	.569				
I am good at science.				.782			
Learning about science is easy for me.				.773			
I like doing science experiments.				.571			
I would like to know more about science.	.307		.391	.559			
I like technology.					.832		
I want to learn more about technology.			.344		.757		
I like learning how technology works.					.730		
A military base is a good place to work.						.691	
Military bases are exciting.						.659	
People who work for military do lots of different things.		.349				.659	
People who work for the military use technology in their jobs.		.413				.548	
Teachers at my school are excited about science.							.764
Teachers at my school talk about why technology is important.							.752

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 7 iterations.

APPENDIX C: PCA ANALYSIS OF ATTITUDE DIMENSIONS, CONTINUED

5. Loadings of Attitude Items on Seven Factors, 2019

2019							
Attitude Items	Program Evaluation	STEM Behavior/ Motivation	Future Planning	Stem Concept Awareness	Science Confidence	Military Setting Endorsement	Teacher Support
DoD STARBASE is boring. (Reverse Scored)	0.797						
DoD STARBASE instructors made learning about science, technology, engineering, and mathematics topics fun.	0.778						
I think I will remember enjoying my time at DoD STARBASE.	0.775						
I think almost any kid would have fun learning at DoD STARBASE.	0.762						
At DoD STARBASE, I learned a lot of things that I can use.	0.711						
I would be interested in a STARBASE club at my school if it were offered.	0.652						
I will tell others about my DoD STARBASE experience.	0.601						
I do not think DoD STARBASE will help me do better in school. (Reverse Scored)	0.559						
Mathematics is important for developing new technology.		0.621					
A lot of good jobs use mathematics to solve problems.		0.620					
Most people use science, technology, mathematics, or engineering skills every day.		0.585					
Mathematics is really useful for solving engineering problems.		0.583					
Scientists work on things that make life better.		0.570					
Learning about science, engineering, technology, and mathematics will help me in my daily life.	0.373	0.554					
Engineers help solve challenging problems.		0.502					
I am aware of some jobs that use mathematics, science, engineering, or technology.		0.488					
People who work for the military use technology in their jobs.		0.487				0.461	

APPENDIX C: PCA ANALYSIS OF ATTITUDE DIMENSIONS, CONTINUED

5. Loadings of Attitude Items on Seven Factors, 2019, Continued

Attitude Items	Program Evaluation	STEM Behavior/ Motivation	Future Planning	Stem Concept Awareness	Science Confidence	Military Setting Endorsement	Teacher Support
I am good at mathematics.		0.300			0.325		
I am interested in being a scientist or engineer.			0.777				
I want to learn more about engineering.			0.768				
I like engineering.			0.751				
When I finish school, I would like to get a job that has something to do with mathematics, science, technology, or engineering.			0.576				
I enjoy learning about science, technology, mathematics, and engineering topics.			0.531				
Jobs that use mathematics, engineering, technology, and science are exciting.			0.486				
I like technology.				0.817			
I want to learn more about technology.				0.755			
I like learning how technology works.				0.710			
I am good at science.					0.830		
Learning about science is easy for me.					0.824		
I would like to know more about science.			0.394		0.457		
I like doing science experiments.	0.360				0.410		
A military base is a good place to work.						0.716	
People who work for military do lots of different things.		0.387				0.618	
Military bases are exciting.						0.599	
Teachers at my school are excited about science.							0.730
Teachers at my school talk about why technology is important.							0.730
I talk with my family about my plans for the future.							0.582

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 7 iterations.

APPENDIX D: INTERCORRELATIONS AMONG STUDENT CHARACTERISTICS AND ATTITUDE DIMENSIONS

	Gender	Grade	I heard about DoD STARBASE before I knew I was coming here	I know someone that went through DoD STARBASE before me	I have met military people before coming to DoD STARBASE	Military Attitudes
Gender	1	-0.001	0.022	0.015	-0.030	-0.032
Grade	-0.001	1	-0.009	0.045	.101**	-0.025
I heard about DoD STARBASE before I knew I was coming here	0.022	-0.009	1	.387**	0.020	0.008
I know someone that went through DoD STARBASE before me	0.015	0.045	.387**	1	.057*	-0.011
I have met military people before coming to DoD STARBASE	-0.030	.101**	0.020	.057*	1	.112**
Military Attitudes	-0.032	-0.025	0.008	-0.011	.112**	1
Attitudes Total (post)	-.092**	-0.035	0.017	-0.029	.059*	.621**
STEM Concepts (post)	-.213**	-0.036	-0.042	-.073**	-0.018	.331**
Future Planning (post)	-.160**	-0.033	0.002	-0.032	0.010	.401**
Science Confidence (post)	-.063*	-0.007	0.037	-0.020	0.050	.347**
Behavior-Motive (post)	-.052*	0.002	0.037	0.031	.114**	.584**
Military Base Endorsement (post)	-0.027	-0.006	0.003	-0.024	.099**	.908**
Teacher Support for STEM	0.016	-0.015	.056*	0.009	-0.003	.244**
Overall Evaluation (post)	0.029	-.053*	0.000	-0.036	0.035	.402**
Knowledge Total (post)	-0.014	0.049	.068**	.094**	.095**	.079**
Chemistry (post)	-0.042	0.031	0.045	0.037	.065*	.081**
Engineering (post)	0.016	-0.008	0.022	.076**	0.049	.056*
Mathematics (post)	-0.015	.055*	0.050	.076**	.111**	0.014
Physics (post)	0.033	0.032	.058*	0.039	0.033	.067**
Technology (post)	0.003	.060*	.062*	.119**	.051*	0.039
STEM Job Awareness (post)	.067**	.059*	0.027	.078**	.100**	.058*
Talk to parent about future	-0.018	-0.016	-0.013	-0.046	.172**	0.046

*** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).*

APPENDIX D: INTERCORRELATIONS AMONG STUDENT CHARACTERISTICS AND ATTITUDE DIMENSIONS, CONTINUED

	Attitudes Total	STEM Concepts	Future Planning	Science Confidence	Behavior-Motive	Military Base
Gender	-.092**	-.213**	-.160**	-.063*	-.052*	-0.027
Grade	-0.035	-0.036	-0.033	-0.007	0.002	-0.006
I heard about DoD STARBASE before I knew I was coming here	0.017	-0.042	0.002	0.037	0.037	0.003
I know someone that went through DoD STARBASE before me	-0.029	-.073**	-0.032	-0.020	0.031	-0.024
I have met military people before coming to DoD STARBASE	.059*	-0.018	0.010	0.050	.114**	.099**
Military Attitudes	.621**	.331**	.401**	.347**	.584**	.908**
Attitudes Total (post)	1	.658**	.841**	.724**	.776**	.606**
STEM Concepts (post)	.658**	1	.582**	.483**	.411**	.327**
Future Planning (post)	.841**	.582**	1	.595**	.581**	.396**
Science Confidence (post)	.724**	.483**	.595**	1	.476**	.319**
Behavior-Motive (post)	.776**	.411**	.581**	.476**	1	.491**
Military Base Endorsement (post)	.606**	.327**	.396**	.319**	.491**	1
Teacher Support for STEM	.397**	.161**	.270**	.212**	.292**	.239**
Overall Evaluation (post)	.753**	.370**	.479**	.423**	.421**	.423**
Knowledge Total (post)	.193**	.126**	.155**	.248**	.199**	0.033
Chemistry (post)	.167**	.112**	.132**	.195**	.155**	.051*
Engineering (post)	0.016	-0.008	0.022	.076**	0.049	.056*
Mathematics (post)	-0.015	.055*	0.050	.076**	.111**	0.014
Physics (post)	.150**	.062*	.139**	.145**	.171**	0.041
Technology (post)	.127**	.067**	.109**	.159**	.129**	0.014
STEM Job Awareness (post)	.073**	-0.002	.073**	0.048	.214**	0.003
Talk to parent about future	0.047	0.037	0.040	.069**	0.005	0.049

*** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).*

APPENDIX D: INTERCORRELATIONS AMONG STUDENT CHARACTERISTICS AND ATTITUDE DIMENSIONS, CONTINUED

	Teacher Support for STEM	Overall Evaluation	Knowledge Total	Chemistry	Engineering	Math-ematics
Gender	0.016	0.029	-0.014	-0.042	0.016	-0.015
Grade	-0.015	-.053*	0.049	0.031	-0.008	.055*
I heard about DoD STARBASE before I knew I was coming here	.056*	0.000	.068**	0.045	0.022	0.050
I know someone that went through DoD STARBASE before me	0.009	-0.036	.094**	0.037	.076**	.076**
I have met military people before coming to DoD STARBASE	-0.003	0.035	.095**	.065*	0.049	.111**
Military Attitudes	.244**	.402**	.079**	.081**	.056*	0.014
Attitudes Total (post)	.397**	.753**	.193**	.167**	.127**	.107**
STEM Concepts (post)	.161**	.370**	.126**	.112**	.121**	.076**
Future Planning (post)	.270**	.479**	.155**	.132**	.109**	.071**
Science Confidence (post)	.212**	.423**	.248**	.195**	.171**	.186**
Behavior-Motive (post)	.292**	.421**	.199**	.155**	.156**	.111**
Military Base Endorsement (post)	.239**	.423**	0.033	.051*	0.002	-0.020
Teacher Support for STEM	1	.199**	-.056*	-0.034	-0.018	-.065*
Overall Evaluation (post)	.199**	1	.125**	.121**	0.036	.077**
Knowledge Total (post)	-.056*	.125**	1	.827**	.653**	.695**
Chemistry (post)	-0.034	.121**	.827**	1	.426**	.395**
Engineering (post)	-0.018	0.036	.653**	.426**	1	.323**
Mathematics (post)	-.065*	.077**	.695**	.395**	.323**	1
Physics (post)	-0.043	.105**	.597**	.387**	.298**	.292**
Technology (post)	-0.030	.086**	.657**	.424**	.339**	.377**
STEM Job Awareness (post)	0.004	-0.032	.258**	.168**	.213**	.209**
Talk to parent about future	0.004	0.038	-0.025	-0.002	-0.028	0.000

*** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).*

APPENDIX D: INTERCORRELATIONS AMONG STUDENT CHARACTERISTICS AND ATTITUDE DIMENSIONS, CONTINUED

	Physics	Technology	STEM Job Awareness	Talk to parent about future
Gender	0.033	0.003	.067**	-0.018
Grade	0.032	.060*	.059*	-0.016
I heard about DoD STARBASE before I knew I was coming here	.058*	.062*	0.027	-0.013
I know someone that went through DoD STARBASE before me	0.039	.119**	.078**	-0.046
I have met military people before coming to DoD STARBASE	0.033	.051*	.100**	.172**
Military Attitudes	.067**	0.039	.058*	0.046
Attitudes Total (post)	.150**	.127**	.073**	0.047
STEM Concepts (post)	.062*	.067**	-0.002	0.037
Future Planning (post)	.139**	.109**	.073**	0.040
Science Confidence (post)	.145**	.159**	0.048	.069**
Behavior-Motive (post)	.171**	.129**	.214**	0.005
Military Base Endorsement (post)	0.041	0.014	0.003	0.049
Teacher Support for STEM	-0.043	-0.030	0.004	0.004
Overall Evaluation (post)	.105**	.086**	-0.032	0.038
Knowledge Total (post)	.597**	.657**	.258**	-0.025
Chemistry (post)	.387**	.424**	.168**	-0.002
Engineering (post)	.298**	.339**	.213**	-0.028
Mathematics (post)	.292**	.377**	.209**	0.000
Physics (post)	1	.297**	.161**	-0.030
Technology (post)	.297**	1	.197**	-0.040
STEM Job Awareness (post)	.161**	.197**	1	-.056*
Talk to parent about future	-0.030	-0.040	-.056*	1

*** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).*

APPENDIX E: DOD STARBASE STUDENT ASSESSMENT 2018 - 2019

DoD STARBASE Student Assessment 2018-2019

ASSIGNED STUDENT NUMBER			
A	B	C	D
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

My school grade is: 1 2 3 4 5 6 7 8 9

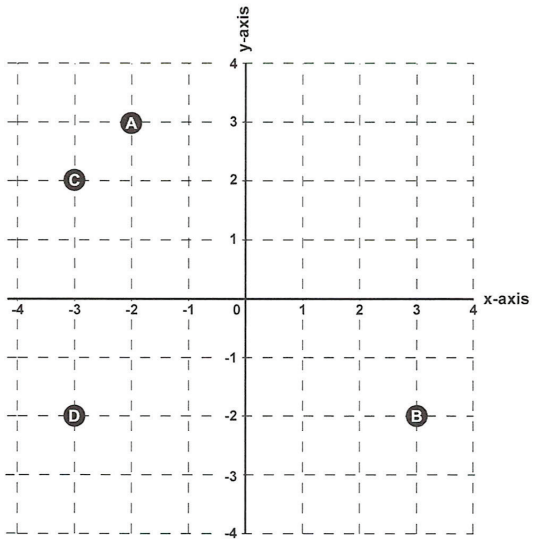
I am a: ○ Boy ○ Girl

I have met military people before coming to DoD STARBASE.	N No	Y Yes
I heard about DoD STARBASE before I knew I was coming here.	N No	Y Yes
I know someone that went through DoD STARBASE before me.	N No	Y Yes
My parent or guardian is in the military.	N No	Y Yes

1. 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?
   - A Density
   - B Viscosity
   - C Solubility
   - D Magnetism

2. Which of the following can **NOT** be learned from constructing a 3-D model of a car?
   - A What the volume and mass of the real car will be.
   - B What gas mileage the car will get.
   - C How all the parts will fit together.
   - D What colors would look nice on the car.

3. An Engineering team is meeting for the first time. According to the Engineering Design Process, what will they be doing first?
   - A Specifying requirements.
   - B Brainstorming solutions.
   - C Defining the problem.
   - D Constructing a hypothesis.



4. In the graph above, find the letter that is at coordinates (3, -2). Is it A, B, C, or D?
   - A A
   - B B
   - C C
   - D D

Wait for your instructor to read the directions and questions.

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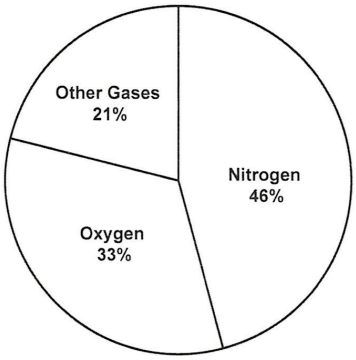
APPENDIX E: DOD STARBASE STUDENT ASSESSMENT 2018 - 2019, CONTINUED

5. Which pie chart represents the correct composition of air?

Ⓐ



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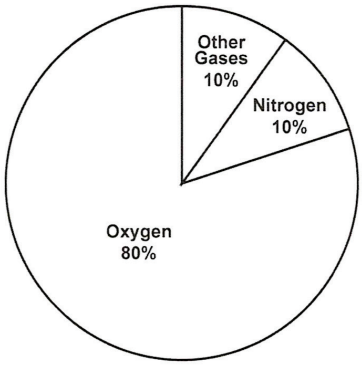
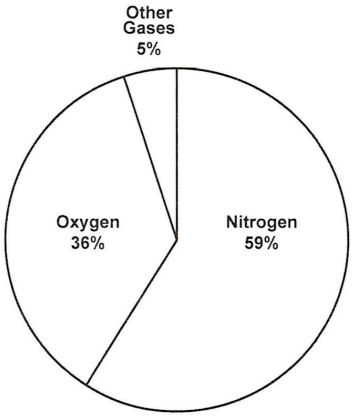
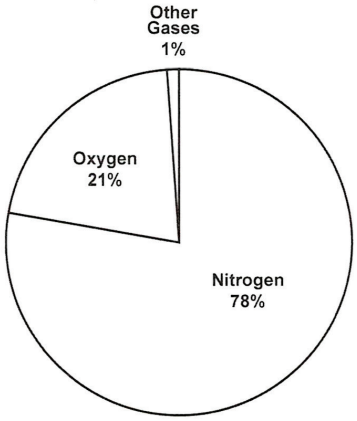


Ⓒ

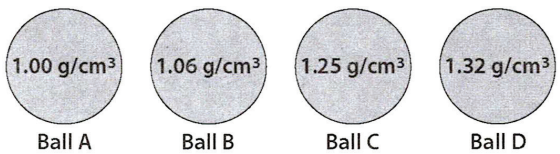


Ⓓ



6. Which of the following is typically measured in nanometers?

Ⓐ An ant
Ⓑ A seed
Ⓒ The flu virus
Ⓓ A single dog hair



7. Based on the density shown for each ball above, which one will float on salt water if the density of salt water is 1.02 g/cm^3?

Ⓐ Ball A
Ⓑ Ball B
Ⓒ Ball C
Ⓓ Ball D

8. Two boats are floating by each other and passing cargo from one boat to the other. Based on Bernoulli's Principle, what happens if water is forced between the two boats?

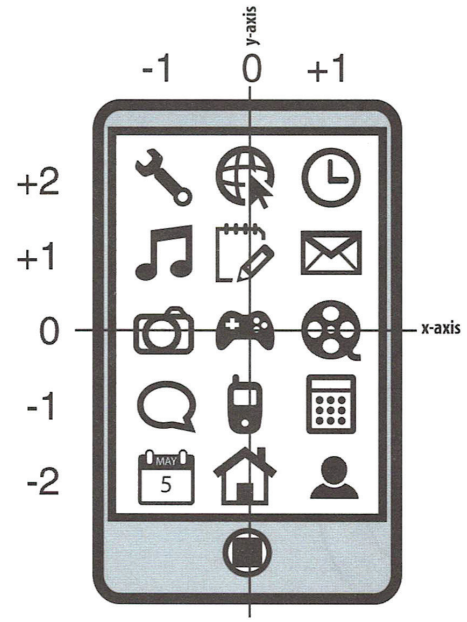
Ⓐ The boats will move toward each other.
Ⓑ The boats will move away from each other.
Ⓒ Neither boat will move.
Ⓓ The movement of the boats depends on the strength of the force exerted.

9. Which of the following would be a good reason to use latitude and longitude coordinates?

Ⓐ Analyze the weather pattern of a region.
Ⓑ Find the specific location of a building.
Ⓒ Determine the terrain of an area.
Ⓓ Determine the depth of a lake.

Wait for your instructor to read the directions and questions.

APPENDIX E: DOD STARBASE STUDENT ASSESSMENT 2018 - 2019, CONTINUED



10. What feature will open when you touch the screen on this smartphone at coordinates -1, +1 ?

Ⓐ Telephone Ⓑ Calculator

Ⓒ Music Ⓓ Email

11. Which of the following is an example of physical change?

Ⓐ Mixing baking soda and vinegar together producing bubbles and foam.
Ⓑ Lighting a piece of paper on fire producing ashes.
Ⓒ Knocking a glass cup off the counter and shattering it on the floor.
Ⓓ Mixing ingredients and baking a cake.

12. When using computer design software to build a model, the first step is to...

Ⓐ Define the shape that will be extruded or revolved.
Ⓑ Document the dimensions of the part.
Ⓒ Communicate with the manufacturing engineers.
Ⓓ Apply interesting borders to the design.

13. Which of the following is true about nanoparticles (nano-sized objects)?

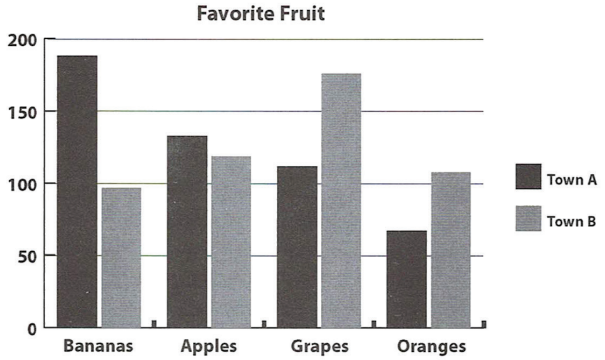
Ⓐ They can be viewed with a strong magnifying glass.
Ⓑ They measure between 1 and 100 millimeters.
Ⓒ They include buckyballs.
Ⓓ They are only naturally occurring objects.

14. 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.

15. Which of the following states of matter has the least amount of kinetic energy?

Ⓐ Solid
Ⓑ Liquid
Ⓒ Gas
Ⓓ Plasma



16. A store asked 1,000 customers from two different towns about what their favorite fruit is. Based on the bar graph above, which fruit should the store in Town B buy the least of?

Ⓐ Bananas
Ⓑ Apples
Ⓒ Grapes
Ⓓ Oranges

Wait for your instructor to read the directions and questions.

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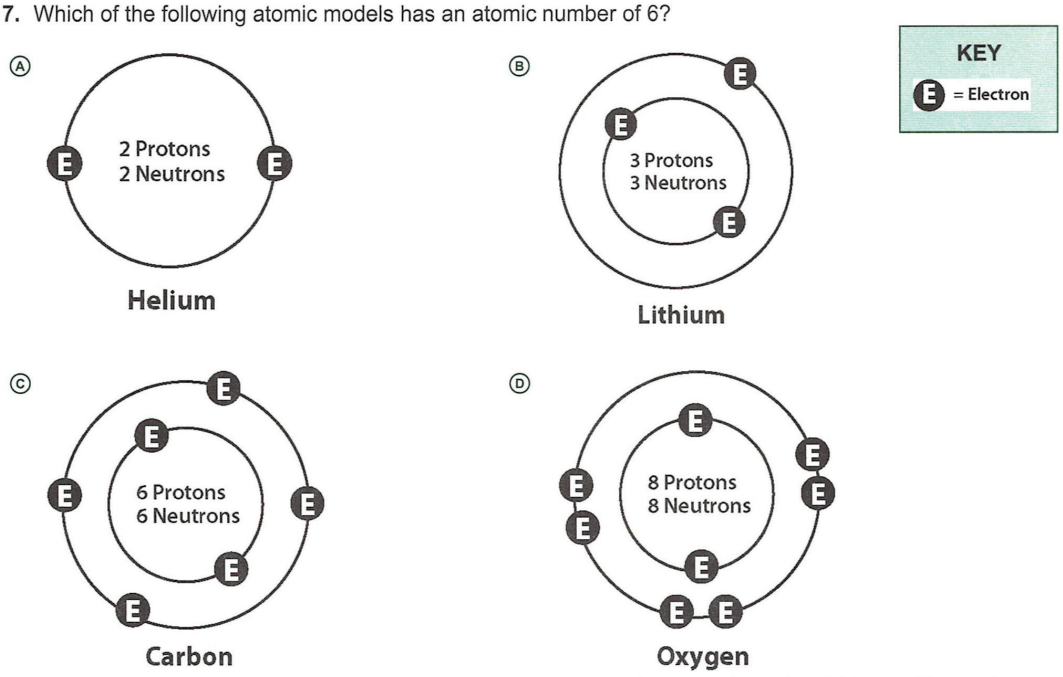
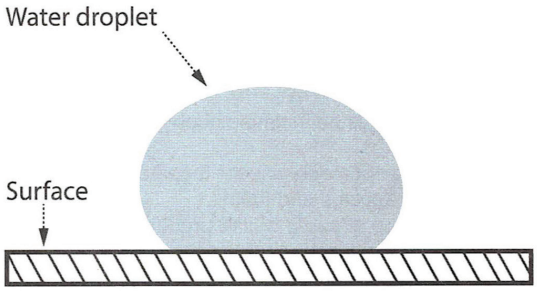
APPENDIX E: DOD STARBASE STUDENT ASSESSMENT 2018 - 2019, CONTINUED

17. Which of the following atomic models has an atomic number of 6?



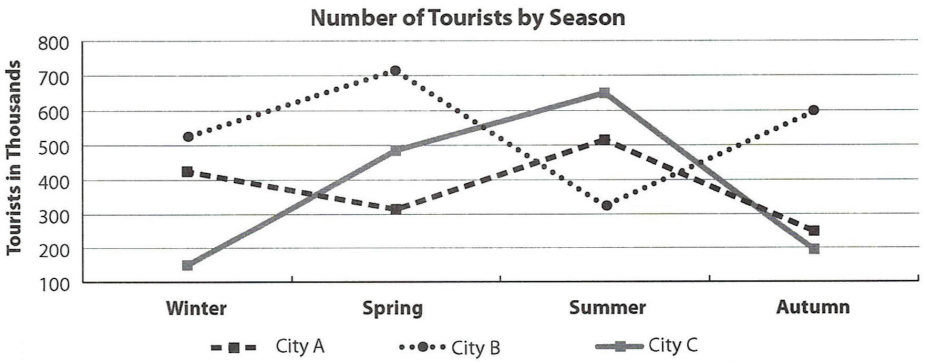
18. While testing how well a surface repels water you observe that a water droplet forms a round shape on the surface, as shown here. The best conclusion drawn from this observation is that the surface is:

Ⓐ Very cold
Ⓑ Hydrophobic
Ⓒ Hydrophilic
Ⓓ Glass



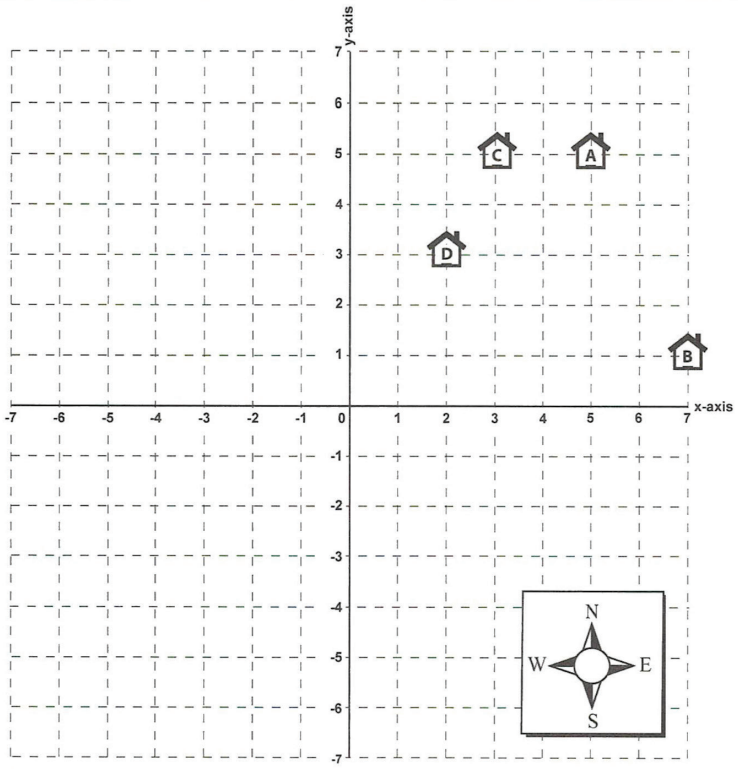
19. If you wanted to visit City A when the city has the fewest tourists, during which season would you want to visit?

Ⓐ Winter
Ⓑ Spring
Ⓒ Summer
Ⓓ Autumn



Wait for your instructor to read the directions and questions.

APPENDIX E: DOD STARBASE STUDENT ASSESSMENT 2018 - 2019, CONTINUED



Each line represents 1 kilometer

20. To answer this question first locate a starting point at coordinates (-1, 3). From there track your progress as you walk two kilometers North, then go 1 kilometer West and stop for lunch. After lunch, you head to your friend's house which is five kilometers to the East. Where does your friend live?

Ⓐ House A
Ⓑ House B
Ⓒ House C
Ⓓ House D

21. Who uses science, technology, math, and engineering concepts in their job? *(Select all that apply)*

○ Accountant	○ Construction worker	○ Lawyer	○ Nurse
○ Actor/actress	○ Cook	○ Mail carrier	○ Police officer
○ Animal breeder	○ Farmer	○ Maintenance worker	○ School counselor
○ Architect	○ Fireman	○ Manager	○ Sports athlete
○ Camera operator	○ Hair designer/barber	○ Mechanic	○ Teacher
○ Car designer	○ Housekeeper	○ Military personnel	○ Video game designer
○ Crime scene investigator			

Wait for your instructor to read the directions and questions.

APPENDIX E: DOD STARBASE STUDENT ASSESSMENT 2018 - 2019, CONTINUED

What is your opinion?



Questions 1 through 20 should be answered by everyone.	Strongly Disagree (1)	Disagree (2)	Slightly Disagree (3)	(?) Uncertain (4)	Slightly Agree (5)	Agree (6)	Strongly Agree (7)
1. I am good at science.	1	2	3	4	5	6	7
2. Learning about science is easy for me.	1	2	3	4	5	6	7
3. Military bases are exciting.	1	2	3	4	5	6	7
4. I am good at math.	1	2	3	4	5	6	7
5. I want to learn more about technology.	1	2	3	4	5	6	7
6. I like technology.	1	2	3	4	5	6	7
7. Teachers at my school are excited about science.	1	2	3	4	5	6	7
8. Engineers help solve challenging problems.	1	2	3	4	5	6	7
9. A military base is a good place to work.	1	2	3	4	5	6	7
10. I like doing science experiments.	1	2	3	4	5	6	7
11. Teachers at my school talk about why technology is important.	1	2	3	4	5	6	7
12. I like engineering.	1	2	3	4	5	6	7
13. I want to learn more about engineering.	1	2	3	4	5	6	7
14. Math is really useful for solving engineering problems.	1	2	3	4	5	6	7
15. I would like to know more about science.	1	2	3	4	5	6	7
16. Math is important for developing new technology.	1	2	3	4	5	6	7
17. Jobs that use math, engineering, technology, and science are exciting.	1	2	3	4	5	6	7
18. I would be interested in a STARBASE club at my school if it was offered.	1	2	3	4	5	6	7
19. I am interested in being a scientist or engineer.	1	2	3	4	5	6	7
20. I am aware of some jobs that use math, science, technology, or engineering.	1	2	3	4	5	6	7

Wait for your instructor to read the directions and questions.

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APPENDIX E: DOD STARBASE STUDENT ASSESSMENT 2018 - 2019, CONTINUED

What is your opinion?



Questions 21 through 32 should be answered by everyone.	Strongly Disagree (1)	Disagree (2)	Slightly Disagree (3)	(?) Uncertain (4)	Slightly Agree (5)	Agree (6)	Strongly Agree (7)
21. Most people use science, technology, math, or engineering skills every day.	1	2	3	4	5	6	7
22. I enjoy learning about science, technology, math, and engineering topics.	1	2	3	4	5	6	7
23. People who work for the military do lots of different things.	1	2	3	4	5	6	7
24. I like learning how technology works.	1	2	3	4	5	6	7
25. I **do not** think DoD STARBASE will help me do better in school.	1	2	3	4	5	6	7
26. Scientists work on things that make life better.	1	2	3	4	5	6	7
27. A lot of good jobs use math to solve problems.	1	2	3	4	5	6	7
28. People who work for the military use technology in their jobs.	1	2	3	4	5	6	7
29. When I finish school, I would like to get a job that has something to do with math, science, technology, or engineering.	1	2	3	4	5	6	7
30. Learning about science, engineering, technology, and math will help me in my daily life.	1	2	3	4	5	6	7
31. I think I will remember enjoying my time at DoD STARBASE.	1	2	3	4	5	6	7
32. I talk with my family about my plans for the future.	1	2	3	4	5	6	7

Questions 33 through 37 should only be answered AFTER completing the STARBASE Program.

33. DoD STARBASE is boring.	1	2	3	4	5	6	7
34. At DoD STARBASE, I learned a lot of things that I can use.	1	2	3	4	5	6	7
35. I will tell others about my DoD STARBASE experience.	1	2	3	4	5	6	7
36. DoD STARBASE Instructors made learning about science, technology, engineering, and math topics fun.	1	2	3	4	5	6	7
37. I think almost any kid would have fun learning at DoD STARBASE	1	2	3	4	5	6	7

Glossary

Academy: See DoD STARBASE 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 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 and 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 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 2019 begins on October 1, 2018, and ends on September 30, 2019.

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 2007-08 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 - 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. See also Special education school, Vocational school, Alternative school, Charter school, and Traditional public school.

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 1 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.

"I enjoyed coming to DoD STARBASE and working with the students. It was a wonderful experience to impact the next generation and to inspire them to seek STEM careers in the military."

- MSGT CINDY WILLIS, STARBASE WICHITA

DoD STARBASE Directory

ALABAMA

MONTGOMERY

STARBASE Maxwell*
Service Component: Air Force
Military Location:
Maxwell Air Force Base
Address:
60 W. Maxwell Boulevard, Bldg 835
Montgomery, Alabama 36112
Tel: 334-953-4072
Director: Ramona Cox
Email: SB.Maxwell@dodstarbase.org
Website: www.starbasemaxwell.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 1,938

SCHOOL DISTRICTS SERVED:
- AUTAUGA COUNTY
- ELMORE COUNTY PUBLIC
- MAXWELL AIR FORCE BASE
- MONTGOMERY PUBLIC

ARIZONA

TUCSON

STARBASE Arizona
STARBASE Arizona
Service Component: Air Force
Military Location: Davis-Monthan
Air Force Base
Address:
5355 E. Granite Street, Bldg 2441
Davis-Monthan Air Force Base
Tucson, Arizona 85707
Tel: 520-591-6680
Director: Mikelle Cronk
Email: SB.Arizona@dodstarbase.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 828

SCHOOL DISTRICTS SERVED:
- AMPHITHEATER UNIFIED
- SUNNYSIDE UNIFIED
- TUCSON UNIFIED
- VAIL UNIFIED

CALIFORNIA

EDWARDS

STARBASE Edwards
Service Component: Air Force
Military Location:
Edwards Air Force Base
Address:
1595 Baily Avenue
Edwards AFB, California 93524
Tel: 661-494-1331
Director: Amira Flores
Email: SB.Edwards@dodstarbase.org
Website: TBD

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 399
- SUPPLEMENTAL PROGRAMS: 35

SCHOOL DISTRICTS SERVED:
- MUROC JOINT UNIFIED
- MOJAVE UNIFIED
- WESTSIDE UNION

LOS ALAMITOS

STARBASE Los Alamitos*
Service Component: National Guard
Military Location: Los Alamitos
Joint Forces Military Base
Address:
11525 Freedom Way, Bldg 262
Los Alamitos, California 90720
Tel: 562-795-1473
Director: Stacey Hendrickson
Email: SB.LosAlamitos@dodstarbase.org
Website: www.starbasecomputerla.wixsite.
com/starbase

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 3,328
- SUPPLEMENTAL PROGRAMS: 219

SCHOOL DISTRICTS SERVED:
- CYPRESS UNIFIED
- FULLERTON UNIFIED
- LONG BEACH UNIFIED
- LOS ANGELES UNIFIED
- OCEAN VIEW UNIFIED
- PRIVATE SCHOOLS
- SANTA ANA UNIFIED
- WESTMINSTER

SACRAMENTO

STARBASE Sacramento*
Service Component: National Guard
Military Location: Okinawa Street Armory
Address:
8400 Okinawa Street, Suite 1
Sacramento, California 95828
Tel: 916-854-1265
Director: Jon Herrera
Email: SB.Sacramento@dodstarbase.org
Website: www.starbasesacramento.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 1,950

SCHOOL DISTRICTS SERVED:
- ELK GROVE UNIFIED
- FOLSOM CORDOVA UNIFIED
- ROBLA
- SACRAMENTO UNIFIED

VANDENBERG

STARBASE Vandenburg
Service Component: Air Force
Military Location: Vandenburg Air Force Base
Address:
806 13th Street
Vandenburg, CA 93437
Tel: 805-605-8934
Acting Contact: Matthew Guida
Email: SB.Vandenberg@dodstarbase.org
Opening: April 2020

** Indicates location also coordinates a DoD STARBASE 2.0 Program.*

COLORADO

COLORADO SPRINGS

STARBASE Peterson*
Service Component: Air Force
Military Location: Peterson Air Force Base
Address:
710 Loring Street, Bldg 850
Colorado Springs, Colorado 80914
Tel: 719-556-9500
Fax: 719-556-9538
Director: Patty Smathers
Email: SB.Peterson@dodstarbase.org
Website: None

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 1,324
- SUPPLEMENTAL PROGRAMS: 44

SCHOOL DISTRICTS SERVED:
- COLORADO SPRINGS #11
- ELLICOT #22
- FALCON #49
- HARRISON #2
- INDEPENDENT
- STATE CHARTER SCHOOL INSTITUTE

CONNECTICUT

HARTFORD

STARBASE Connecticut - Windsor Locks*
Service Component: National Guard
Military Location: Bradley Air National Guard Base
Address:
85 Light Lane, Unit 300
Windsor Locks, Connecticut 06096
Tel: 860-292-4678
Director: Ted Garner
Email: SB.CT-WindsorLocks@dodstarbase.org
Website: www.starbase-ct.com

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 575
- SUPPLEMENTAL PROGRAMS: 32

SCHOOL DISTRICTS SERVED:
- CAPITAL REGION EDUCATION COUNCIL
- HARFORD PUBLIC
- JUMOKE ACADEMY
- WINDSOR LOCKS
- WINDSOR PAROCHIAL

WATERBURY

STARBASE Connecticut - Waterbury*
Service Component: National Guard
Military Location: Off-base
Address:
750 Chase Parkway, Ekstrom 307
Waterbury, Connecticut 06708
Tel: 203-575-8271
Director: Ted Garner
Email: SB.CT-Waterbury@dodstarbase.org
Website: www.starbase-ct.com

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 695
- SUPPLEMENTAL PROGRAMS: 6

SCHOOL DISTRICTS SERVED:
- WATERBURY PAROCHIAL
- WATERBURY PUBLIC

FLORIDA

JACKSONVILLE

STARBASE Florida
Service Component: National Guard
Military Location: 125th Fighter Wing FANG
Address:
14300 FANG Drive
Jacksonville, Florida 32218
Tel: 904-741-7320
Director: Bruce A. Griner Jr.
Email: SB.Florida@dodstarbase.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 1,351

SCHOOL DISTRICTS SERVED:
- DUVAL COUNTY PUBLIC
- FLORIDA LEAGUE OF CHRISTIAN SCHOOLS
- ST. AUGUSTINE DIOSESE OF CATHOLIC SCHOOLS

COCOA BEACH

STARBASE Patrick
Service Component: Air Force
Military Location: Patrick Air Force Base
Address: TBD
Tel: 321-494-4670
Acting Contact: Glenn Smith
Email: SB.Patrick@dodstarbase.org
Opening: TBD

GEORGIA

MARIETTA

Peach State STARBASE*
Service Component: National Guard
Military Location: Clay National Guard Center
Address:
1000 Halsey Avenue, Bldg 53
Marietta, Georgia 30060
Tel: 678-569-3568
Director: John McKay
Email: SB.PeachState@dodstarbase.org
Website: peachstatestarbase.com

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 942
- SUPPLEMENTAL PROGRAMS: 52

SCHOOL DISTRICTS SERVED:
- COBB COUNTY
- HOMESCHOOL GROUP
- MARIETTA CITY

SAVANNAH

STARBASE Savannah
Service Component: Army
Military Location: Hunter Army Air Field
Address:
134 MacArthur Circle, Bldg 617
Savannah, Georgia 31409
Tel: 912-315-3749
Director: Betty L. G. Morgan
Email: SB.Savannah@dodstarbase.org
Website: savannahstarbase.weebly.com/index.html

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 669

SCHOOL DISTRICTS SERVED:
- CANDLER COUNTY
- SAVANNAH-CHATHAM COUNTY

** Indicates location also coordinates a DoD STARBASE 2.0 Program.*

WARNER ROBINS

STARBASE Robins*
Service Component: Air Force Reserve
Military Location: Robins Air Force Base/ Air Force Reserve Command
Address:
STARBASE ROBINS at the Museau of Aviation
1842 Heritage Boulevard
Warner Robins, Georgia 31099
Tel: 478-926-1769
Director: Wesley Fondal, Jr.
Email: SB.Robins@dodstarbase.org
Website: www.starbaserobins.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 1,957
- SUPPLEMENTAL PROGRAMS: 66

SCHOOL DISTRICTS SERVED:
- DOOLY
- HOUSTON
- JEFFERSONVILLE
- PRIVATE SCHOOLS
- TWIGGS

HAWAII

KEAAU

STARBASE Hawaii
Service Component: National Guard
Military Location: Keaau Armory
Address:
16-512 Volcano Highway
Keaau, Hawaii 96749
Tel: 808-982-4298
Director: Kelly McVinnie
Email: SB.Hawaii@dodstarbase.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 682
- SUPPLEMENTAL PROGRAMS: 97

SCHOOL DISTRICTS SERVED:
- HAWAII DEPARTMENT OF EDUCATION
- HILO PRIVATE SCHOOLS

IDAHO

BOISE

STARBASE Idaho
Service Component: National Guard
Military Location: Gowen Field
Address:
4474 W. Dehaviland
Boise, Idaho 83705
Tel: 208-258-6654
Director: James Heuring
Email: SB.Idaho@dodstarbase.org
Website: imd.idaho.gov/starbase/

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 1,397
- SUPPLEMENTAL PROGRAMS: 492

SCHOOL DISTRICTS SERVED:
- CALDWELL
- EMMETT
- MIDDLETON
- NAMPA

INDIANA

FORT WAYNE

STARBASE Indiana - Fort Wayne*
Service Component: National Guard
Military Location: 122nd Fighter Wing Air National Guard
Address:
3005 W. Ferguson Road
Fort Wayne, Indiana 46809
Tel: 260-478-3712
Director: Evan Smith
Email: SB.IN-FortWayne@dodstarbase.org
Website: www.starbasein.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 1,485
- SUPPLEMENTAL PROGRAMS: 96

SCHOOL DISTRICTS SERVED:
- EAST ALLEN COUNTY
- FORT WAYNE COMMUNITY
- FORT WAYNE LUTHERAN
- FORT WAYNE-SOUTH BEND CATHOLIC DIOCESE
- LUTHERAN SCHOOLS PARTNERSHIP
- HUNTINGTON COUNTY COMMUNITY
- PRIVATE SCHOOLS

GARY

STARBASE Indiana - Gary
Service Component: National Guard
Military Location: Gary Indiana National Guard Armory 133th Engineer Battalion
Address:
2501 E. 15th Avenue
Gary, Indiana 46402
Tel: 219-718-4706
Director: Ava R. Marshall-Ligon
Email: SB.IN-Gary@dodstarbase.org
Website: www.starbasein.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 1,172
- SUPPLEMENTAL PROGRAMS: 643

SCHOOL DISTRICTS SERVED:
- CHRISTIAN SCHOOLS
- GARY COMMUNITY SCHOOL CORPORATION
- MERRILVILLE COMMUNITY SCHOOL CORPORATION
- SCHOOL CITY OF EAST CHICAGO

INDIANAPOLIS

STARBASE Indiana - Indianapolis*
Service Component: National Guard
Military Location: Joint Forces Headquarters, Stout Field
Address:
2002 S. Holt Road
Indianapolis, Indiana 46241
Tel: 317-247-3502
Director: Brande Morgan
Email: SB.IN-Indianapolis@dodstarbase.org
Website: www.starbasein.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 1,149
- SUPPLEMENTAL PROGRAMS: 227

SCHOOL DISTRICTS SERVED:
- FRANKLIN TOWNSHIP COMMUNITY SCHOOL CORPORATION
- INDIANAPOLIS PUBLIC
- MSD DECATUR TOWNSHIP
- CONCEPT SCHOOLS
- ROMAN CATHOLIC

** Indicates location also coordinates a DoD STARBASE 2.0 Program.*

SOUTH BEND

STARBASE Indiana - South Bend*
Service Component: National Guard
Military Location: South Bend Armory
Address:
1901 Kemble Avenue
South Bend, Indiana 46613
Tel: 317-247-3000
Director: Matt Bellina
Email: SB.IN-SouthBend@dodstarbase.org
Website: www.starbasein.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 1,245
- SUPPLEMENTAL PROGRAMS: 93

SCHOOL DISTRICTS SERVED:
- MISHAWAKA
- PLYMOUTH
- SOUTH BEND COMMUNITY CORPORATION

KANSAS

KANSAS CITY

STARBASE Kansas City*
Service Component: National Guard
Military Location: 2nd 137th Infantry Regiment Combined Arms Battalion
Address:
100 S. 20th Street
Kansas City, Kansas 66102-5604
Tel: 785-646-7864
Fax: 913-279-7859
Director: Karen Whitacre
Email: SB.KansasCity@dodstarbase.org
Website: www.kansasstarbase.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 1,202
- SUPPLEMENTAL PROGRAMS: 188

SCHOOL DISTRICTS SERVED:
- BASEHOR LINWOOD
- EASTON UNIFIED
- KANSAS CITY KANSAS
- LAWRENCE PUBLIC
- LEAVENWORTH UNIFIED
- SHAWNEE MISSION

MANHATTAN

STARBASE Manhattan
Service Component: National Guard
Military Location: 130th Field Artillery Brigade
Address:
721 Levee Drive
Manhattan, Kansas 66502-5085
Tel: 785-646-4690
Fax: 785-539-7810
Director: Rebecca Catlin
Email: SB.Manhattan@dodstarbase.org
Website: www.kansasstarbase.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 912
- SUPPLEMENTAL PROGRAMS: 117

SCHOOL DISTRICTS SERVED:
- ASSOCIATION OF CHRISTIAN SCHOOLS INTERNATIONAL
- BLUE VALLEY UNIFIED
- CHAPMAN
- GEARY COUNTY SCHOOLS UNIFIED
- MANHATTAN-OGDEN UNIFIED
- MORRIS COUNTY
- PRAIRIE HILLS
- ROCK CREEK
- VERMILLION UNIFIED
- WABAUNSEE
- WAMEGO UNIFIED

SALINA

STARBASE Salina*
Service Component: National Guard
Military Location: Great Plains Joint Training Center
Address:
2929 Scanlan Avenue, Bldg 365
Salina, Kansas 67401
Tel: 785-646-3313
Director: Dixie Tipling
Email: SB.Salina@dodstarbase.org
Website: www.kansasstarbase.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 1,112
- SUPPLEMENTAL PROGRAMS: 127

SCHOOL DISTRICTS SERVED:
- CLIFTON - CLYDE UNIFIED
- ELI-SALINE UNIFIED
- FLORENCE UNIFIED
- HILLSBORO UNIFIED
- MCPHERSON UNIFIED
- MOUNDRIDGE UNIFIED
- SALINA UNIFIED
- SALINA DIOCESE
- SOUTHERN CLOUD UNIFIED
- SYLVAN UNIFIED
- TWIN VALLEY UNIFIED
- WITCHITA DIOCESE
- USD 239
- USD 327
- USD 419
- USD 444
- USD 473

TOPEKA

STARBASE Topeka*
Service Component: National Guard
Military Location: 69th Troop Command
Address:
Armed Forces Reserve Center
7116 SE Forbes Avenue, Bldg 688
Topeka, Kansas 66619
Tel: 785-646-3990
Director: Brent Mumford
Email: SB.Topeka@dodstarbase.org
Website: www.kansasstarbase.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 1,427
- SUPPLEMENTAL PROGRAMS: 262

SCHOOL DISTRICTS SERVED:
- AUBURN WASHINGTON COMMUNITY UNIFIED
- BALDWIN CITY PUBLIC
- BURLINGAME PUBLIC
- JEFFERSON WEST UNIFIED
- MISSION VALLEY PUBLIC
- OSKALOOSA PUBLIC
- PERRY-LECOMPTON PUBLIC
- SANTA FE TRAIL UNIFIED
- SEAMAN UNIFIED
- SHAWNEE HEIGHTS
- TOPEKA PUBLIC
- WABAUNSEE PUBLIC
- WEST FRANKLIN PUBLIC

** Indicates location also coordinates a DoD STARBASE 2.0 Program.*

WICHITA

STARBASE Wichita*
Service Component: National Guard
Military Location: McConnell Air Force Base
Address:
52870 Jayhawk Drive, Bldg 50
Wichita, Kansas 67221
Tel: 316-759-8911
Director: Tony McDonald
Email: SB.Wichita@dodstarbase.org
Website: www.kansasstarbase.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 828
- SUPPLEMENTAL PROGRAMS: 124

SCHOOL DISTRICTS SERVED:
- ANDOVER PUBLIC
- ASSOCIATION OF CHRISTIAN SCHOOLS INTERNATIONAL
- CATHOLIC DIOCESE OF WICHITA
- CIRCLE PUBLIC
- DERBY PUBLIC
- WICHITA PUBLIC

LOUISIANA

BATON ROUGE

Bayou State STARBASE
Service Component: National Guard
Military Location: Off-base
Address:
Gillis Long
13770 Highway 77
Rosedale, Louisiana 70772
Tel: 225-238-0250
Director: Regina Devillier Corcoran
Email: SB.BayouState@dodstarbase.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 989

SCHOOL DISTRICTS SERVED:
- EAST BATON ROUGE PARISH
- IBERVILLE PARISH
- POINTE COUPEE PARISH
- WEST BATON ROUGE PARISH

BOSSIER CITY

STARBASE Louisiana*
Service Component: Air Force Reserve
Military Location: Barksdale Air Force Base
Address:
827 Twining Drive, Bldg 4238
Barksdale AFB, Louisiana 71110
Tel: 318-529-3521
Director: Laurie Ilgenfritz
Email: SB.Louisiana@dodstarbase.org
Website: www.starbasela.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 2,125

SCHOOL DISTRICTS SERVED:
- BOSSIER PARISH
- CADDO PARISH
- CATHOLIC DIOCESE OF SHREVEPORT
- INDEPENDENT SCHOOLS

NEW ORLEANS

STARBASE Jackson Barracks*
Service Component: National Guard
Military Location: Jackson Barracks
Address:
6400 St Claude Avenue
New Orleans, Louisiana 70117
Tel: 504-278-8440
Director: John Meche
Email: SB.JacksonBarracks@dodstarbase.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 1,324

SCHOOL DISTRICTS SERVED:
- ORLEANS PARISH
- PLAQUEMINES PARISH
- ST. BERNARD PARISH

PINEVILLE

Pelican State STARBASE*
Service Component: National Guard
Military Location: Camp Beauregard
Address:
609 F. Street
Pineville, Louisiana 71360
Tel: 318-290-5252
Director: Nancy Brinkerhoff-Force
Email: SB.PelicanState@dodstarbase.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 788
- SUPPLEMENTAL PROGRAMS: 174

SCHOOL DISTRICTS SERVED:
- AMERICAN MONTESSORI SOCIETY
- GRANT PARISH
- NATIONAL CATHOLIC EDUCATIONAL ASSOC.
- RAPIDES PARISH

MASSACHUSETTS

BEDFORD

STARBASE Hanscom*
Service Component: Air Force
Military Location: Hanscom Air Force Base
Address:
98 Barksdale Street, Bldg 1530
Hanscom AFB, Massachusetts 01731
Director: Peter Holden
Email: SB.Hanscom@dodstarbase.org
Website: starbasehanscom.live

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 691
- SUPPLEMENTAL PROGRAMS: 20

SCHOOL DISTRICTS SERVED:
- AYER-SHIRLEY REGIONAL
- BILLERICA PUBLIC
- LEOMINSTER PUBLIC
- LINCOLN PUBLIC
- LOWELL PUBLIC
- MALDEN PUBLIC
- PEABODY PUBLIC

MICHIGAN

ALPENA

STARBASE Alpena*
Service Component: National Guard
Military Location: Alpena Combat Readiness Training Center
Address:
5884 A Street, Bldg 4
Alpena, Michigan 49707
Tel: 989-354-6332
Fax: 989-354-6353
Director: Steven Tezak
Email: SB.Alpena@dodstarbase.org
Website: www.starbasealpena.org

** Indicates location also coordinates a DoD STARBASE 2.0 Program.*

NUMBER OF STUDENTS SERVED:

- BASIC PROGRAM: 642
- SUPPLEMENTAL PROGRAMS: 44

SCHOOL DISTRICTS SERVED:

- ALCONA COMMUNITY
- ALPENA PUBLIC
- CRAWFORD AUSABLE
- FAIRVIEW AREA
- HILLMAN COMMUNITY
- POSEN CONSOLIDATED

BATTLE CREEK

STARBASE Battle Creek*
Service Component: National Guard
Military Location: 110th Wing Battle Creek Air National Guard
Address:
3595 Mustang Avenue
Battle Creek, Michigan 49037
Tel: 269-969-3219
Director: Bruce Medaugh
Email: SB.BattleCreek@dodstarbase.org

NUMBER OF STUDENTS SERVED:

- BASIC PROGRAM: 1,438
- SUPPLEMENTAL PROGRAMS: 24

SCHOOL DISTRICTS SERVED:

- BATTLE CREEK AREA CATHOLIC SCHOOLS
- BATTLE CREEK PUBLIC
- BELLEVUE PUBLIC
- COLON PUBLIC
- DELTON KELLOGG PUBLIC
- GALESBURG-AUGUSTA COMMUNITY
- HASTINGS AREA
- HOPKINS PUBLIC
- LAKEWOOD PUBLIC
- LAWTON COMMUNITY
- MAR LEE
- MAPLE VALLEY
- PENNFIELD
- THORNAPPLE KELLOGG PUBLIC
- THREE RIVERS COMMUNITY

MOUNT CLEMENS

STARBASE One
Service Component: National Guard
Military Location: Selfridge National Guard Base
Address:
27310 D Street, Bldg 1051
Harrison Township, Michigan 48045
Tel: 586-239-4884
Fax: 586-239-5663
Director: Rick Simms
Email: SB.One@dodstarbase.org
Website: starbaseone.org

NUMBER OF STUDENTS SERVED:

- BASIC PROGRAM: 1,765
- SUPPLEMENTAL PROGRAMS: 50

SCHOOL DISTRICTS SERVED:

- ANCHOR BAY PUBLIC
- ARMADA AREA
- CHARTER - NEW HAVEN
- CHARTER - WARREN
- DETROIT COMMUNITY
- ECORSE PUBLIC
- LAMPHERE PUBLIC
- L'ANSE CREUSE PUBLIC
- NEW HAVEN COMMUNITY
- PRIVATE SCHOOL - CLINTON TWP
- PRIVATE SCHOOL - ST. CLAIR SHORES
- RICHMOND COMMUNITY
- RIVER ROUGE PUBLIC
- SOUTH LAKE

MINNESOTA

DULUTH

STARBASE Minnesota-Duluth
Service Component: National Guard
Military Location: 148th Fighter Wing
Address:
4630 Mustang Drive, Bldg 252
Duluth, Minnesota 55811
Tel: 218-788-7288
Director: Charity S. Johnson
Email: SB.MN-Duluth@dodstarbase.org
Website: www.starbasemn.org

NUMBER OF STUDENTS SERVED:

- BASIC PROGRAM: 1,506
- SUPPLEMENTAL PROGRAMS: 166

SCHOOL DISTRICTS SERVED:

- DULUTH CATHOLIC SCHOOL SYSTEM
- DULUTH PUBLIC
- TRIBAL SCHOOL

ST. PAUL

STARBASE Minnesota - St Paul*
Service Component: National Guard
Military Location: 133rd Airlift Wing
Address:
659 Mustang Avenue
St. Paul, Minnesota 55111
Tel: 612-713-2530
Fax: 612-713-2540
Director: Kim Van Wie
Email: SB.MN-StPaul@dodstarbase.org
Website: www.starbasemn.org

NUMBER OF STUDENTS SERVED:

- BASIC PROGRAM: 3,122
- SUPPLEMENTAL PROGRAMS: 501

SCHOOL DISTRICTS SERVED:

- ANOKA-HENNEPIN PUBLIC
- EDEN PRAIRIE
- HOPKINS PUBLIC
- MINNEAPOLIS PUBLIC
- NORTH ST. PAUL, OAKDALE, MAPLEWOOD PUBLIC
- OSSEO
- PRIVATE SCHOOLS
- ROSEMOUNT - APPLE VALLEY - EAGAN PUBLIC
- ST. PAUL CHARTER SCHOOL
- ST. PAUL PUBLIC

MONTANA

GREAT FALLS

STARBASE Great Falls*
Service Component: National Guard
Military Location: Montana Air National Guard 120th Airlift Wing
Address:
2800 Airport Avenue B
Great Falls, Montana 59404
Tel: 406-791-0806
Fax: 406-791-0339
Director: Wendy Fechter
Email: SB.GreatFalls@dodstarbase.org

** Indicates location also coordinates a DoD STARBASE 2.0 Program.*

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 806
- SUPPLEMENTAL PROGRAMS: 120

SCHOOL DISTRICTS SERVED:
- AUGUSTA PUBLIC
- CASCADE PUBLIC
- CENTERVILLE PUBLIC
- GREAT FALLS PUBLIC
- HIGHWOOD PUBLIC
- PRIVATE
- SUN VALLEY PUBLIC
- VAUGHN PUBLIC

HELENA

STARBASE Fort Harrison*
Service Component: National Guard
Military Location: Fort William Henry Harrison
Address:
121 Mitchell Way
Fort Harrison, Montana 59636
Tel: 406-324-3727
Fax: 406-324-3735
Director: Wendy Fechter
Email: SB.FortHarrison@dodstarbase.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 724
- SUPPLEMENTAL PROGRAMS: 273

SCHOOL DISTRICTS SERVED:
- CLANCY
- EAST HELENA PUBLIC
- HELENA PUBLIC
- TOWNSEND K - 12 SCHOOLS
- WHITE SULFUR SPRINGS

NEVADA

LAS VEGAS

STARBASE Nellis
Service Component: Air Force Reserve
Military Location: Nellis Air Force Base
Address:
2841 Kinley Drive, Bldg 1619
Nellis AFB
Las Vegas, Nevada 89191
Tel: 702-652-0887
Acting Director: Capt. Kalaeone Needham
Email: SB.Nellis@dodstarbase.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 1,012
- SUPPLEMENTAL PROGRAMS: 20

SCHOOL DISTRICTS SERVED:
- CLARK COUNTY

NEW MEXICO

ALBUQUERQUE

STARBASE New Mexico *
Service Component: Air Force
Military Location: Kirtland Air Force Base
Address:
1401 Maxwell Street, Bldg 1900
Kirtland, New Mexico 87117
Tel: 505-846-8042
Fax: 505-846-8932
Director: Esti Gutierrez
Email: SB.NewMexico@dodstarbase.org
Website: afrlnm.com/STEM/missions/dod-starbase-nm/

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 1,209
- SUPPLEMENTAL PROGRAMS: 75

SCHOOL DISTRICTS SERVED:
- ALBUQUERQUE SCHOOL OF EXCELLENCE
- ALBUQUERQUE PUBLIC
- EASTERN NAVAJO EDUCATION LINE OFFICE
- GRANTS-CIBOLA COUNTY
- LOS LUNAS PUBLIC
- MAGDELENA MUNICIPAL
- MORIARTY-EDGEWOOD

NORTH CAROLINA

CHARLOTTE

STARBASE Charlotte*
Service Component: National Guard
Military Location: NC Air National Guard-Charlotte Base
Address:
4930 Minuteman Way
Charlotte, North Carolina 28208
Tel: 704-398-4819
Director: Thomas Brown
Email: SB.Charlotte@dodstarbase.org
Website: facebook.com/starbasecharlotte/

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 1,378
- SUPPLEMENTAL PROGRAMS: 18

SCHOOL DISTRICTS SERVED:
- BURKE COUNTY
- CHARLOTTE-MECKLENBURG SCHOOL SYSTEM
- GASTON COUNTY
- LINCOLN COUNTY
- LINCOLN CHARTER SCHOOLS
- MADISON COUNTY
- WAKE COUNTY
- YANCEY COUNTY
- YADKIN COUNTY

WILMINGTON

STARBASE Ft. Fisher*
Service Component: National Guard
Military Location: NC Ft Fisher National Guard Training Center
Address:
116 Air Force Way
Kure Beach, North Carolina 28449
Tel: 910-520-9990
Director: Thomas Brown
Email: SB.FtFisher@dodstarbase.org
Website: www.facebook.com/starbasefortfisher/

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 1,318

SCHOOL DISTRICTS SERVED:
- BRUNSWICK COUNTY
- NEW HANOVER COUNTY
- COASTAL PREPARATORY ACADEMY

NORTH DAKOTA

MINOT

STARBASE North Dakota
Service Component: Air Force
Military Location: Minot Air Force Base
Address:
101 C Street
Minot AFB, North Dakota 58704
Tel: 701-727-3439
Director: Jon Dawson
Email: SB.NorthDakota@dodstarbase.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 662
- SUPPLEMENTAL PROGRAMS: 21

** Indicates location also coordinates a DoD STARBASE 2.0 Program.*

SCHOOL DISTRICTS SERVED:

- BURLINGTON
- MINOT PUBLIC
- SOUTH PRAIRIE

OHIO

DAYTON

STARBASE Wright-Patt*
Service Component: Air Force
Military Location: Wright-Patterson Air Force Base
Address:
156 Spinning Road
Dayton, Ohio 45431
Tel: 937-938-4859
Director: Daniel Andrews
Email: SB.Wright-Patt@dodstarbase.org
Website: www.wpafbstem.com

NUMBER OF STUDENTS SERVED:

- BASIC PROGRAM: 2,577
- SUPPLEMENTAL PROGRAMS: 6,500

SCHOOL DISTRICTS SERVED:

- ARCHDIOCESE OF CINCINNATI
- BEAVERCREEK CITY
- FAIRBORN CITY
- GREEN VIEW LOCAL
- HUBER HEIGHTS CITY
- JEFFERSON TOWNSHIP LOCAL
- KETTERING CITY
- MAD RIVER LOCAL
- NEW LEBANON LOCAL
- YELLOW SPRINGS VILLAGE

OKLAHOMA

ELK CITY

STARBASE Oklahoma - Burns Flat*
Service Component: National Guard
Military Location: NA
Address:
9131 E. Viper Street, Bldg 031
Tulsa, Oklahoma 74115
Tel: 918-833-7757
Director: Rita Miller
Email: SB.OK-BurnsFlat@dodstarbase.org
Website: www.starbaseok.org

NUMBER OF STUDENTS SERVED:

- BASIC PROGRAM: 310
- SUPPLEMENTAL PROGRAMS: 30

SCHOOL DISTRICTS SERVED:

- ARAPAHO/BUTLER PUBLIC
- BURNS FLAT-DILL CITY PUBLIC
- CANUTE PUBLIC
- ERICK PUBLIC
- HAMMON PUBLIC
- LEEDEY PUBLIC
- MERRITT PUBLIC
- SENTINEL PUBLIC
- SWEETWATER PUBLIC

LAWTON

STARBASE OKLAHOMA - FORT SILL*
Service Component: National Guard
Military Location: Fort Sill Army Base
Address:
1721 Macomb Road
Fort Sill, Oklahoma 73503
Tel: 918-833-7757
Director: Rita Miller
Email: SB.OK-FortSill@dodstarbase.org
Website: www.starbaseok.org

NUMBER OF STUDENTS SERVED:

- BASIC PROGRAM: 1,561
- SUPPLEMENTAL PROGRAMS: 271

SCHOOL DISTRICTS SERVED:

- BOONE-APACHE PUBLIC
- CENTRAL HIGH PUBLIC
- CHATTANOOGA PUBLIC
- COMANCHE PUBLIC
- CYRIL PUBLIC
- DUNCAN PUBLIC
- EMPIRE PUBLIC
- FLETCHER PUBLIC
- FLOWER MOUND PUBLIC
- GERONIMO PUBLIC
- HOME SCHOOL GROUP
- INDIAHOMA PUBLIC
- LAWTON PUBLIC
- PRIVATE SCHOOLS
- STERLING PUBLIC
- TEMPLE PUBLIC

OKLAHOMA CITY

STARBASE Oklahoma - Tinker AFB*
Service Component: National Guard
Military Location: Tinker Air Force Base
Address:
9131 E. Viper Street, Bldg 031
Oklahoma City, Oklahoma 74115
Tel: 918-833-7757
Director: Rita Miller
Email: SB.OK-Tinker@dodstarbase.org
Website: www.starbaseok.org

NUMBER OF STUDENTS SERVED:

- BASIC PROGRAM: 1,107
- SUPPLEMENTAL PROGRAMS: 793

SCHOOL DISTRICTS SERVED:

- CHOCTAW - NICOMA PARK
- CROOKED OAK PUBLIC
- CRUTCHO PUBLIC
- DIBBLE PUBLIC
- EDMOND PUBLIC
- MID-DEL PUBLIC
- OKLAHOMA CITY
- PRIVATE SCHOOLS

TULSA

STARBASE Oklahoma – Tulsa*
Service Component: National Guard
Military Location: Tulsa National Guard Base
Address:
9131 E. Viper Street, Bldg 031
Tulsa, Oklahoma 74115
Tel: 918-833-7757
Director: Rita Miller
Email: SB.OK-Tulsa@dodstarbase.org
Website: www.starbaseok.org

NUMBER OF STUDENTS SERVED:

- BASIC PROGRAM: 1,282
- SUPPLEMENTAL PROGRAMS: 1,295

SCHOOL DISTRICTS SERVED:

- AVANT PUBLIC
- BEGGS PUBLIC
- BOWRING PUBLIC
- CANEY VALLEY PUBLIC
- HOME SCHOOL
- HOMINY PUBLIC
- KANSAS PUBLIC
- OSAGE HILLS PUBLIC

** Indicates location also coordinates a DoD STARBASE 2.0 Program.*

- OWASSO PUBLIC
- PRIVATE SCHOOLS
- PRYOR PUBLIC
- TULSA PUBLIC
- UNION PUBLIC
- VERDIGRIS PUBLIC
- WOODALL PUBLIC

OREGON

KLAMATH FALLS

STARBASE Kingsley*
Service Component: National Guard
Military Location: Kingsley Air Base
Address:
302 Bong Street, Suite 19
Klamath Falls, Oregon 97603
Tel: 541-885-6472
Director: Denise Kortes
Email: SB.Kingsley@dodstarbase.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 902
- SUPPLEMENTAL PROGRAMS: 544

SCHOOL DISTRICTS SERVED:
- KLAMATH COUNTY
- KLAMATH FALLS CITY

PORTLAND

STARBASE Portland
Service Component: National Guard
Military Location: Portland National Guard
Address:
6801 NE Cornfoot Road, Bldg 165
Portland, Oregon 97218
Tel: 503-972-8630
Director: Denise Kortes
Email: SB.Portland@dodstarbase.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 1,430
- SUPPLEMENTAL PROGRAMS: 490

SCHOOL DISTRICTS SERVED:
- BEAVERTON
- CANBY
- HILLSBORO
- HOME SCHOOL GROUP
- PARKROSE
- PORTLAND PUBLIC
- REYNOLDS

WARRENTON

STARBASE Camp Rilea
Service Component: National Guard
Military Location: Camp Rilea Armed Forces Training Center
Address:
91272 Hwy 101
Warrenton, Oregon 97146-7262
Tel: 503-972-8630
Director: Denise Kortes
Email: SB.CampRilea@dodstarbase.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 283
- SUPPLEMENTAL PROGRAMS: 66

SCHOOL DISTRICTS SERVED:
- ASTORIA
- KNAPPA
- WARRENTON-HAMMOND

PUERTO RICO

CAROLINA

STARBASE Puerto Rico*
Service Component: National Guard
Military Location: 156AW Muniz ANG Base
Address:
200 Avenue, Jose A. Tony Santana
Carolina, Puerto Rico 00979-1514
Tel: 787-253-5100 X-2539502
Director: Urbano Ayala
Email: SB.PuertoRico@dodstarbase.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 1,560

SCHOOL DISTRICTS SERVED:
- AGUADILLA
- ARECIBO
- BAYAMÓN
- BARRANQUITAS
- CANÓVANAS
- CAROLINA
- CAYEY
- COROZAL
- GUAYNABO
- GUAYAMA
- GURABO
- JUNCOS
- MANATI
- MAYAQUEZ
- PONCE
- SAN JUAN
- SANTA ISABEL
- UTUADO
- VEGA ALTA
- YABUCOA

SOUTH CAROLINA

BEAUFORT

STARBASE MCAS Beaufort
Service Component: Marine Corps
Military Location: Marine Corps Air Station Beaufort
Address:
1011 Geiger Boulevard
Beaufort, South Carolina 29904
Tel: 843-322-5586
Acting Contact: Ralph Lataille
Email: SB.Beaufort@dodstarbase.org
Re-Opening: Spring 2020

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: NOT REPORTED

SCHOOL DISTRICTS SERVED:
- BEAUFORT COUNTY
- PRIVATE

COLUMBIA

STARBASE Swamp Fox*
Service Component: National Guard
Military Location: McEntire Joint National Guard Base
Address:
1325 South Carolina Road, Stop 39
Eastover, South Carolina 29044
Tel: 803-647-8126
Director: John M. Motley, Jr.
Email: SB.SwampFox@dodstarbase.org
Website: www.scstarbase.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 1,434
- SUPPLEMENTAL PROGRAMS: 20

SCHOOL DISTRICTS SERVED:
- CALHOUN COUNTY PUBLIC
- DIOCESE OF CHARLESTON
- LEXINGTON #1
- LEXINGTON #2
- LEXINGTON - RICHLAND #5

** Indicates location also coordinates a DoD STARBASE 2.0 Program.*

- RICHLAND #1
- SOUTH CAROLINA INDEPENDENT SCHOOL ASSOCIATION
- SUMTER

SOUTH DAKOTA

RAPID CITY

STARBASE NOVA Honor
Service Component: National Guard
Military Location: Camp Rapid
Address:
2823 West Main Street
Camp Rapid, Bldg 801
Rapid City, South Dakota 57702
Tel: 605-737-6083
Director: Polly Unterbrunner
Email: SB.NOVAHonor@dodstarbase.org
Website: sdstarbase.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 721

SCHOOL DISTRICTS SERVED:
- CUSTER
- EAGLE BUTTE
- EDGEMONT
- HOT SPRINGS
- KADOKA AREA
- LYMAN COUNTY
- MEADE
- NEW UNDERWOOD
- OGLALA LAKOTA COUNTY
- PRIVATE INDIAN BOARDING SCHOOL
- PRIVATE INDIAN RESERVATION SCHOOL
- SHANNON COUNTY
- STANLEY COUNTY PUBLIC

STARBASE Rapid City*
Service Component: National Guard
Military Location: Camp Rapid
Address:
2823 West Main Street
Camp Rapid, Bldg 801
Rapid City, South Dakota 57702
Tel: 605-737-6083
Director: Polly Unterbrunner
Email: SB.RapidCity@dodstarbase.org
Website: sdstarbase.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 862
- SUPPLEMENTAL PROGRAM: 59

SCHOOL DISTRICTS SERVED:
- DOUGLAS
- RAPID CITY

SIOUX FALLS

STARBASE NOVA Courage
Service Component: National Guard
Military Location: South Dakota National Guard
Address:
801 W. National Guard Drive
Sioux Falls, South Dakota 57104
Tel: 605-367-4930 or 605-929-0075
Director: Donna Van Veldhuizen
Email: SB.NOVACourage@dodstarbase.org
Website: www.sdstarbase.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 684
- SUPPLEMENTAL PROGRAMS: 250

SCHOOL DISTRICTS SERVED:
- ANDES CENTRAL
- ARMOUR
- AVON
- BIG STONE
- BROWNS VALLEY
- DE SMET
- HARRISBURG
- HURON
- IROQUOIS
- ROSHOLT
- SISSETON
- SUMMIT
- WAGNER COMMUNITY
- WAUBAY
- WEBSTER
- WILMONT

STARBASE Sioux Falls*
Service Component: National Guard
Military Location: South Dakota National Guard
Address:
801 W. National Guard Drive
Sioux Falls, South Dakota 57104
Tel: 605-367-4930 or 605-929-0075
Director: Donna Van Veldhuizen
Email:SB.SiouxFalls@dodstarbase.org
Website: www.sdstarbase.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 732
- SUPPLEMENTAL PROGRAMS: 636

SCHOOL DISTRICTS SERVED:
- GARRETSON
- SIOUX FALLS

TEXAS

AUSTIN

Texas STARBASE-Austin*
Service Component: National Guard
Military Location: Camp Mabry
Address:
2200 W. 35th Street, Bldg 31
Austin, Texas 78703
Tel: 512-782-3454
Director: Patrick M. Yonnone
Email: SB.TX-Austin@dodstarbase.org
Website: starbaseaustin.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 1,582
- SUPPLEMENTAL PROGRAMS: 90

SCHOOL DISTRICTS SERVED:
- AUSTIN INDEPENDENT
- DEL VALLE INDEPENDENT
- DIOCESE OF AUSTIN
- HUTTO INDEPENDENT
- LOCKHART INDEPENDENT
- MANOR INDEPENDENT
- PFLUGERVILLE INDEPENDENT
- ROUND ROCK INDEPENDENT

HOUSTON

Texas STARBASE Houston*
Service Component: National Guard
Military Location: 147th Attack Wing (TXANG), Ellington Field
Address:
14657 Sneider Street, Bldg 1055
Houston, Texas 77034
Tel: 281-929-2034
Director: Loraine L. Guillen
Email: SB.TX-Houston@dodstarbase.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 1,617
- SUPPLEMENTAL PROGRAMS: 30

** Indicates location also coordinates a DoD STARBASE 2.0 Program.*

SCHOOL DISTRICTS SERVED:

- ARCHDIOCESES OF GALVESTON
- GALENA PARK INDEPENDENT
- HOME SCHOOL
- HOUSTON INDEPENDENT
- HUMBLE INDEPENDENT
- LA PORTE INDEPENDENT
- PASADENA INDEPENDENT
- SHELDON INDEPENDENT
- SOUTHWESTERN ASSOCIATION OF EPISCOPAL SCHOOLS

SAN ANGELO

STARBASE Goodfellow
Service Component: Air Force
Military Location: Goodfellow Air Force Base, TX
Address:
221 Texan Street, Bldg 901
Goodfellow AFB, Texas 77034
Tel: 325-654-4740
Director: Jesus Longoria, Jr
Email: SB.Goodfellow@dodstarbase.org
Website: starbasegoodfellow.org

NUMBER OF STUDENTS SERVED:

- BASIC PROGRAM: 1,592
- SUPPLEMENTAL PROGRAMS: 76

SCHOOL DISTRICTS SERVED:

- BRONTE INDEPENDENT
- CHRISTOVAL INDEPENDENT
- MILES INDEPENDENT
- PRIVATE SCHOOLS
- SAN ANGELO INDEPENDENT
- TEXAS LEADERSHIP CHARTER ACADEMY
- VERIBEST INDEPENDENT
- WALL INDEPENDENT

SAN ANTONIO

STARBASE Kelly
Service Component: Air Force Reserve
Military Location: JBSA-Lackland
Address:
203 Galaxy Road, Suite 112
JBSA-Lackland, Texas 78236
Tel: 210-925-5397
Director: Katherine Kiolbassa-Spalding
Email: SB.Kelly@dodstarbase.org

NUMBER OF STUDENTS SERVED:

- BASIC PROGRAM: 1,592
- SUPPLEMENTAL PROGRAMS: 76

SCHOOL DISTRICTS SERVED:

- ARCHDIOCESE OF SAN ANTONIO CATHOLIC SCHOOLS
- EDGEWOOD INDEPENDENT
- SOUTHWEST INDEPENDENT SCHOOL
- SOUTH SAN ANTONIO INDEPENDENT

UTAH

OGDEN

STARBASE Hill
Service Component: Air Force
Military Location: Hill Air Force Base
Address:
5731 E Avenue
Hill AFB, Utah 84056
Tel: 801-586-7493
Director: David Amparon
Email: SB.Hill@dodstarbase.org
Website: www.starbasehill.com

NUMBER OF STUDENTS SERVED:

- BASIC PROGRAM: 1,407
- SUPPLEMENTAL PROGRAMS: 45

SCHOOL DISTRICTS SERVED:

- DAVIS COUNTY
- OGDEN
- WEBER

VERMONT

RUTLAND

STARBASE Vermont - Rutland*
Service Component: National Guard
Military Location: Armed Forces Reserve Center
Address:
2143 Post Road
Rutland, Vermont 05701
Tel: 802-786-3820
Director: Dan Myers
Email: SB.VT-Rutland@dodstarbase.org
Website: www.starbasevt.org

NUMBER OF STUDENTS SERVED:

- BASIC PROGRAM: 698
- SUPPLEMENTAL PROGRAMS: 998

SCHOOL DISTRICTS SERVED:

- ADDISON CENTRAL SUPERVISORY UNION
- ADDISON RUTLAND SUPERVISORY UNION
- ARLINGTON
- BENNINGTON RUTLAND SUPERVISORY UNION
- DIOCESE OF BURLINGTON
- GREATER RUTLAND SUPERVISORY UNION
- MILL RIVER UNIFIED
- OTTER VALLEY UNIFIED UNION
- QUARRY VALLEY UNIFIED
- RUTLAND CENTRAL SUPERVISORY UNION
- RUTLAND NORTHEAST SUPERVISORY UNION
- SOUTHWEST VERMONT SUPERVISORY UNION
- SLATE VALLEY MODIFIED UNION
- TWO RIVERS SUPERVISORY UNION
- WHITE RIVER VALLEY
- WINDHAM CENTRAL SUPERVISORY UNION
- WINDSOR SOUTHEAST SUPERVISORY UNION

SOUTH BURLINGTON

STARBASE Vermont - South Burlington*
Service Component: National Guard
Military Location: Vermont Air National Guard
Address:
62 NCO Drive, Bldg 90
South Burlington, Vermont 05403-5873
Tel: 802-660-5201
Director: Dan Myers
Email: SB.VT-SouthBurlington@dodstarbase.org
Website: www.starbasevt.org

NUMBER OF STUDENTS SERVED:

- BASIC PROGRAM: 939
- SUPPLEMENTAL PROGRAMS: 558

SCHOOL DISTRICTS SERVED:

- ADDISON NORTHEAST SUPERVISORY UNION
- BURLINGTON DIOCESE
- BURLINGTON
- CHITTENDEN CENTRAL SUPERVISORY UNION

** Indicates location also coordinates a DoD STARBASE 2.0 Program.*

- CHAMPLAIN VALLEY
- ESSEX TOWN
- FRANKLIN CENTRAL SUPERVISORY UNION
- FRANKLIN NORTHWEST SUPERVISORY UNION
- FRANKLIN WEST SUPERVISORY UNION
- GRAND ISLE SUPERVISORY UNION
- LAMOILLE NORTH SUPERVISORY UNION
- MOUNT ABRAHAM UNIFIED
- ROMAN CATHOLIC DIOCESE
- SOUTH BURLINGTON
- WASHINGTON SOUTH SUPERVISORY UNION
- WINOOSKI

VIRGINIA

WINCHESTER

Winchester STARBASE Academy*
Service Component: National Guard
Military Location: Virginia National Guard; 3rd Battalion; 116th Infantry Regiment
Address:
181 Pendleton Drive
Winchester, Virginia 22602
Tel: 540-686-4964
Director: Susan Corrigan
Email: SB.Wincester@dodstarbase.org
Website: www.starbasewinchester.com

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 1,182
- SUPPLEMENTAL PROGRAMS: 221

SCHOOL DISTRICTS SERVED:
- CATHOLIC DIOCESE OF ARLINGTON
- CLARKE COUNTY PUBLIC
- FREDERICK COUNTY PUBLIC
- INDEPENDENT
- THE UNIVERSITY SENATE OF THE UNITED METHODIST CHURCH

WEST VIRGINIA

CHARLESTON

STARBASE West Virginia - Charleston
Service Component: National Guard
Military Location: McLaughlin ANGB
Address:
1679 Coonskin Drive
Charleston, West Virginia 25311
Tel: 304-341-6440
Director: Robin Barnette
Email: SB.WV-Charleston@dodstarbase.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 1,640

SCHOOL DISTRICTS SERVED:
- PUTNAM COUNTY PUBLIC

MARTINSBURG

STARBASE Martinsburg*
Service Component: National Guard
Military Location: 167th Airlift Wing
Address:
222 Sabre Jet Boulevard, Bldg 120
Martinsburg, West Virginia 25405
Tel: 304-616-5501
Director: Sherra Triggs
Email: SB.Martinsburg@dodstarbase.org
Website: starbasemartinsburg.webs.com

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 2,163
- SUPPLEMENTAL PROGRAMS: 450

SCHOOL DISTRICTS SERVED:
- BERKELEY COUNTY
- JEFFERSON COUNTY

WISCONSIN

MILWAUKEE

STARBASE Wisconsin
Service Component: National Guard
Military Location: U.S. Army Reserve Center
Address:
5130 W. Silver Spring Drive, Bldg 301
Milwaukee, Wisconsin 53218
Tel: 414-535-5786
Director: John W. Puttre
Email: SB.Wisconsin@dodstarbase.org
Website: www.starbasewi.org

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 795

SCHOOL DISTRICTS SERVED:
- MILWAUKEE PUBLIC

WYOMING

CHEYENNE

Wyoming STARBASE Academy
Service Component: National Guard
Military Location: Wyoming National Guard F.E. Warren Air Force Base
Address:
5410 Bishop Boulevard
Cheyenne, Wyoming 82009
Tel: 307-777-8191
Director: Germaletta Brown
Email: SB.Wyoming@dodstarbase.org
Website: starbase.wyo.gov

NUMBER OF STUDENTS SERVED:
- BASIC PROGRAM: 1,188
- SUPPLEMENTAL PROGRAMS: 515

SCHOOL DISTRICTS SERVED:
- LARAMIE COUNTY #1
- LARAMIE COUNTY #2

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DoD STARBASE
A Department of Defense Youth Program

For more information contact:

Office of the Assistant Secretary of Defense/Reserve Affairs (OASD/M&RA)
1500 Defense Pentagon
Washington, DC 20301-1500
Phone: 703.693.8630

www.DoDSTARBASE.org