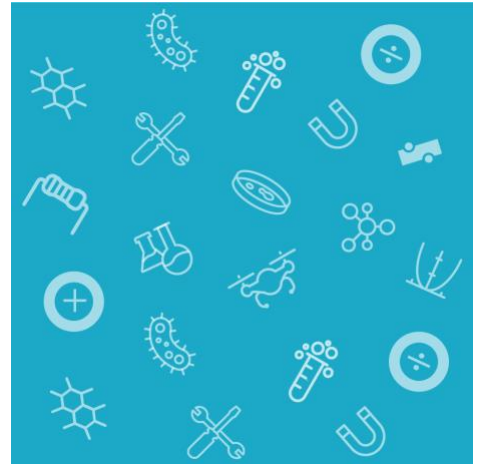IT STARTS HERE. ★

ARMY EDUCATIONAL OUTREACH PROGRAM

Unite

2018 Annual Program Evaluation Report
Executive Summary

June 2019

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2 | Executive Summary

Unite, an initiative in the AEOP portfolio, is a pre-collegiate, academic, summer program for rising 9th through 12th grade students from groups historically underserved in science, technology, engineering, and mathematics (STEM). Managed by the Technology Student Association (TSA), the program is designed to encourage and help prepare students to pursue college-level studies and, ultimately, careers in STEM fields.

In 2018, 19 college/university sites were funded through Unite/AEOP. Although Unite site programs differ from one another, they all must meet universal requirements. This results in a general consistency in student experiences and outcomes, with the flexibility for sites to design their program to meet the unique needs of their students.

Unite leverages university partnerships and their existing summer programs to collectively develop academically prepared students for post-secondary STEM studies. All Unite programs are designed to meet the following objectives:

1. Effectively show participants the real-world applications of math and science;
2. Raise participant confidence in the ability to participate in engineering activities;
3. Inspire participants to consider engineering majors in college;
4. Remove social barriers and negative attitudes about engineering;
5. Promote collaboration and problem-solving in a team environment;
6. Expose participants to STEM careers in the Army and DoD; and,
7. Increase the number of STEM graduates to fill the projected shortfall of scientists and engineers in national and Department of Defense (DoD) careers.

Unite 2018 Fast Facts	
Description	STEM Enrichment Activity - Pre-collegiate, engineering summer program at university host sites, targeting students from groups historically underserved and under-represented in STEM
Participant Population	Rising 9th – 12th grade students from groups historically underserved and under-represented in STEM
Number of Applicants	731
Number of Participants	429

Unite 2018 Fast Facts	
Number/Percentage of U2 Participants	379/88%
Placement Rate	59%
Number of Adults	401
Number of Army S&Es	27
Number of Army DoD Research Laboratories	4
Number of K-12 Teachers & University Educators	49 K-12; 103 university
Number of K-12 Schools	211
Number of K-12 Schools – Title I	84
Number of Colleges/Universities	19
Number of HBCU/MSIs	10
Other Collaborating Organizations	38
Total Cost	$757,752
Administrative/Overhead/Indirect costs	$125,848
Host Site Awards	$602,283
Travel	$14,896
Other costs	$14,725
Cost Per Student Participant	$1,766

Summary of Findings

The FY18 evaluation of Unite collected data about participants; their perceptions of program processes, resources, and activities; and indicators of achievement in outcomes related to AEOP and program objectives. A summary of findings is provided in the following table.

2018 Unite Evaluation Findings	
Priority #1: *Broaden, deepen, and diversify the pool of STEM talent in support of our Defense Industry Base*	
Participation in Unite increased in FY18	A new host site was added in 2018 for a total of 19 host sites for Unite. The program received applications from 731 students, 429 of whom were enrolled in the program, a 17% increase in enrollment compared to 2017.
	The student placement rate was higher in FY18 (59%) than in FY17 (43%) and FY16 (41%).
Most Unite students had not previously participated in any AEOP.	While 19% of students reported previously participating in Unite, only 1 or 2 students reported at registration that they had participated in another AEOP previously (Camp Invention and REAP). The majority of students (61%) reported never having participated in any AEOPs.
Unite continues to successfully serve students from groups historically underserved and underrepresented in STEM	A large majority of 2018 Unite students (88%) met the AEOP definition of underserved.
	Over a third (43%) of students identified themselves as Black or African American. This is a decrease from the 68% of students who identified as Black or African American in 2017.
	More than half of 2018 Unite participants (62%) were female, an increase over the 2017 when 46% of participants were female.
	More students (71%) indicated that they receive free or reduced-price lunch as compared to 2017 when 61% of students reported receiving free or reduced-price lunch.
	Over half of students (51%) reported that they did not have a parent or guardian who graduated from college, an increase from 31% in 2017.
	English was the first language for most Unite participants (81%) in 2018, although nearly one-fifth (18%) reported that English was not their first language.
Unite mentors reported significant gains in students' 21st Century Skills.	Participants demonstrated significant increases in 21st Century Skills from the beginning (pre-) to the end (post-) of their Unite experiences ($p<.001$) for all six of the 21st Century Skills areas. Students experienced the most growth in skills associated with Creativity and Innovation and Critical Thinking and Problem Solving.

Students reported engaging in STEM practices more frequently in Unite than in their typical school experiences; students whose parents or guardians did not attend college reported more frequent engagement than their peers whose parents or guardians did attend college.	Students reported significantly higher frequency of engagement in STEM practices scores in Unite as compared to in school (medium effect size), suggesting that Unite offers students more intensive STEM learning experiences than they would generally receive in school.
	No significant differences were found in reported frequency of engaging in STEM Practices in Unite by U2 classification, although students who did not have a parent or guardian who attended college reported significantly greater engagement with STEM Practices compared to students whose parents or guardians attended college (small effect size).
Students reported gains in their STEM knowledge as a result of participating in Unite, and minority and low-SES students reported larger gains than non-minority students.	More than 80% of students reported medium or large gains in each area of STEM knowledge about which they were asked.
	There were no differences in gains in STEM Knowledge by U2 classification although there were significant differences in STEM knowledge gains by race/ethnicity, with minority students reporting higher gains than non-minority students (small effect size) and by SES with low-SES students reporting higher gains (small effect size).
Students reported gains in their STEM competencies as a result of participating in Unite, and minority students reported larger gains than non-minority students.	About two-thirds or more of students reported medium or large gains in each STEM competency.
	There were no differences in gains in STEM Knowledge by U2 classification although there were significant differences in STEM competency gains by race/ethnicity, with minority students reporting significantly than non-minority students (medium effect size).
Students reported that Unite participation had positive impacts on their 21st Century Skills, and minority students reported larger gains than non-minority students.	A large majority (85% or more) of students reported medium or large gains in all 21st Century Skills items.
	There were no differences in gains in 21st Century Skills by U2 classification although there were significant differences in 21st Century Skill gains by race/ethnicity, with minority students reporting significantly higher gains than non-minority students (medium effect size).
Students reported gains in their STEM identities as a result of participating in Unite, and minority students reported larger gains than non-minority students.	More than three-quarters of students reported medium or large gains in each area of STEM identity.
	There were no differences in gains in STEM identity gains by U2 classification although there were significant differences in STEM identity gains by race/ethnicity, with minority students reporting significantly higher gains than non-minority students (medium effect size).

Priority #2: *Support and empower educators with unique Army research and technology resources.*	
Mentors used a range of mentoring strategies with students.	Most mentors reported using strategies associated with each of the five areas of effective mentoring about which they were asked. More than half of mentors reported using all strategies to help make learning activities relevant to students; more than two-thirds of mentors reported using each strategy to support the diverse needs of students as learners; nearly three-quarters or more of mentors reported using each strategy to support development of students' collaboration and interpersonal skills; two-thirds or more of mentors reported using all strategies listed to support students' engagement in authentic STEM activities; and half or more of mentors reported using each strategy to support students' STEM education and career pathways.
Unite students were satisfied with program features that they had experienced and identified a number of benefits of Unite. Students also offered various suggestions for program improvement.	More than 70% of students indicated they were at least somewhat satisfied with all Unite program features, and nearly all respondents (96%) made positive comments about their Unite experiences. Very few students indicated that they were "not at all" satisfied with any program feature (<5%).
	The most frequently mentioned benefits of Unite, each mentioned by nearly half of students, were the STEM learning they experienced and the career information they received.
	The most frequently mentioned suggestions for improvement, each mentioned by around a quarter of students, were including more hands-on content; offering more or better field trips and/or college visits; and making various improvements in scheduling, including providing a longer or shorter program, a less packed schedule, more time for sleep and/or a later start time, more breaks, and more free time.
Unite mentors satisfied with program features that they had experienced and identified a number of strengths of the Unite program. Mentors also offered various suggestions for program improvements.	More than half of mentors indicated they were at least somewhat satisfied with all Unite features they experienced, and a large majority (90%) had only positive comments about Unite. Very few mentors reported being "not at all" satisfied with any Unite program feature (<4%).
	The most frequently mentioned strength mentioned by 38% of mentors was students' STEM learning. Nearly a quarter of mentors cited teamwork and collaboration of students as a strength, as well as the opportunities Unite provides for underserved and underrepresented students, and the real-world and hands-on experiences in Unite as strengths of the program.
	Mentors offered a wide variety of suggestions for program improvement; however, none were mentioned by more than 18% of respondents. The most frequently mentioned suggestions (15%-18%) included providing more field trips and/or speakers or visitors, more outreach or advertising about the program, more hands-on content and/or more research

	experience for students and improving student selection processes and/or student accountability once enrolled in Unite.
Priority #3: *Develop and implement a cohesive, coordinated and sustainable STEM education outreach infrastructure across the Army*	
Both students and mentors learned about AEOP primarily through personal contacts or communications through their school or workplace.	Students most frequently learned about AEOP through someone who works at the school or university they attend (29%), someone who works with the program (25%), and a school or university newsletter, email, or website (24%).
	Being a past participant of Unite (32%) was the most frequently cited source of AEOP information for mentors, followed by someone who works with the program (32%), and someone who works at their school or university (28%).
Students were motivated to participate in Unite primarily by the learning opportunities and their interest in STEM.	The two reasons for participating in Unite most frequently chosen by students at registration were the desire to learn something new or interesting (65%) and interest in STEM (65%). Half of students cited having fun as a reason for participating.
Mentors discussed AEOPs with students, but with only limited reference to specific programs.	Mentors reported that they most frequently discussed Unite (70%) and REAP (53%) with their students. Fewer than half of mentors reported discussing any other specific AEOP with students.
Most students expressed interest in participating in various AEOPs in the future, but many had not heard of AEOPs for which they are eligible.	More than three-quarters of students (76%) expressed at least some interest in participating in Unite again. Slightly more than half of students (51%-58%) indicated being at least somewhat interested in participating in other AEOPs including SMART, REAP, and SEAP.
	About a quarter or more of students (23%-32%) reported not having heard about several programs for which they are or soon will be eligible such as SEAP, GEMS, JSHS, and GEMS Near Peer Mentors.
	The percentage of students who had not heard of other AEOPs for which they are eligible decreased by an average of 11 percentage points from 2017 levels, suggesting that 2018 participants may have had more exposure to information about other AEOPs.
	The most frequently student-reported (68%-76%) resources for learning about AEOPs were invited speakers or career events during Unite, participation in Unite, their Unite instructors, and the AEOP brochure.
	The most frequently mentor-reported (66%-74%) resources for informing students about AEOPs were participation in Unite, the Unite program administrator or site coordinator, and invited speakers or career events.

Students learned about STEM careers during Unite, although they learned about more STEM careers generally than STEM careers specifically within the DoD.	Nearly all students reported learning about at least one STEM job/career (98%) and at least one DoD STEM job/career (91%) while participating in Unite. Fewer students indicated they learned about 3 or more DoD STEM jobs/careers (60%) compared to STEM jobs/careers in general (91%).
	Students were most likely to cite (64%-68%) participation in Unite, invited speakers or career events, and their mentors as resources useful for learning about DoD careers.
	Mentors were most likely to cite (66%-74%) participation in Unite, the Unite program administrator or site coordinator, and invited speakers or career events as resources useful for informing students about DoD careers.
Students expressed positive opinions about DoD research and researchers, although many students did not have an opinion when asked about these topics.	About three-quarters of students agreed or strongly agreed to all items related to DoD research and researchers, indicating that they view DoD research and researchers positively.
	About 20% of students did not offer an opinion for items related to DoD research and researchers, suggesting that they may have limited familiarity with these topics.
Students reported that they were more likely to engage in various STEM activities in the future after participating in Unite.	Approximately 50% or more of Unite students reported an increased likelihood of engaging in each STEM activity about which they were asked. The activities in which most students reported increased likelihood (71%-72%) were taking an elective STEM class; working on a STEM project or experiment in a university or professional setting; participating in a STEM camp, club, or competition; and tinkering with a mechanical or electrical device.
Most Unite students planned to at least complete a Bachelor's degree and most reported that Unite increased their interest in STEM careers in various ways.	Nearly all students reported after participating in Unite that they intended to finish college (93%) and almost half (49%) reported aspiring to get more education after college.
	Nearly all (93%) of students indicated that Unite had a positive influence on their interest in STEM careers, citing the Unite activities, their hands-on experiences, the information they gained about STEM careers, and their first-hand experience with STEM careers for their increased interest.
Unite students reported that participating in the program impacted their confidence and interest in STEM and STEM careers. Minority students	Nearly two-thirds or more students reported that Unite contributed to each area relating to their confidence and interest in STEM. Almost all students (90%) indicated that Unite contributed to increases in their confidence in their STEM knowledge, skills, and abilities. A similarly large majority (88%) indicated that Unite contributed to their increased awareness of other

reported larger impacts than non-minority students	AEOPs, and 84% that Unite contributed to their increased interest in participating in other AEOPs. Large percentages of students (71%-80%) also reported that Unite impacted them in areas such as their interest in STEM degrees, their interest in pursuing STEM careers, and their interest in pursuing STEM careers with the Army or DoD. Minority students reported higher levels of overall Unite impact than non-minority students.

Responsiveness to FY17 Evaluation Recommendations

The primary purpose of the AEOP program evaluation is to serve as a vehicle to inform future programming and continuous improvement efforts with the goal of making progress toward the AEOP priorities. In previous years the timing of the delivery of the annual program evaluation reports has precluded the ability of programs to use the data as a formative assessment tool. The goal is for programs to be able to leverage the evaluation reports as a means to target specific areas for improvement and growth.

Evaluation recommendations from FY17 made to programs are highlighted along with a summary of efforts and outcomes reflected in the FY18 APR toward these areas.

AEOP Priority: Broaden, deepen, and diversify the pool of STEM talent in support of our Defense Industry Base

FY17 Recommendation: As in FY16, participants continue to report that personal connections (family member) is the primary way they learned about the program (25%). This was followed by other means of marketing: school or university communication (22%), someone who works with the program (22%), and someone who works at their school or university (21%). Unite should continue efforts to support site distribution of emails and newsletters locally.

Unite FY18 Efforts and Outcomes: Sites selected to receive 2018 funding appeared to have a compelling STEM program in place – one that could deliver a program that features STEM academics and hands-on activities, and that could expose students to STEM career information and professionals. Sites received AEOP videos, electronic AEOP and STEM career flyers, and information about connections to SWE mentors for the purpose of enhancing the recruitment process and increasing enrollment.

AEOP Priority: Support and empower educators with unique Army research and technology resources

FY17 Recommendation: None

Unite FY18 Efforts and Outcomes: N/A

AEOP Priority: Develop and implement a cohesive, coordinated and sustainable STEM education outreach infrastructure across the Army

FY17 Recommendation: As in FY16, most mentors reported they did not specifically discuss any other AEOPs with students (57%). However, 62% did report discussing REAP with students. Findings revealed that many students had not heard of SEAP (31%), JSHS (41%), and GEMS Near Peer Mentors (46%). It is recommended that Unite invest significant efforts in providing support for local sites to promote AEOPs widely.

Unite FY18 Efforts and Outcomes: This year, high emphasis was placed on instructors/mentors/undergraduate and graduate assistants gaining knowledge about AEOP opportunities and helping to transfer that knowledge to students. AEOP promotional videos were distributed electronically to sites for recruitment and education/training, as were electronic flyers about AEOP opportunities and STEM careers. Sites were encouraged to have REAP students on campus connect with Unite students, and this happened at a number of sites. A "meet and greet" of HSAP, URAP, and Unite students was proposed to be held at one site.

Recommendations for FY19 Program Improvement/Growth

Evaluation findings revealed that Unite experienced another successful year of programming in FY18. Unite added a new host site in FY18, growing to 19 sites, student applicant placement rate grew to 59%, and the overall percentage of underserved students was 88%, including 62% female participants. There was significant growth toward mastery for Unite participants in their assessed 21st Century Skills during the program, and more than 80% of participants reported large gains in STEM knowledge.

While the successes for Unite detailed above are commendable, there are some areas that have potential for growth and/or improvement. The evaluation team therefore offers the following recommendations for FY19 and beyond.

AEOP Priority: Broaden, deepen, and diversify the pool of STEM talent in support of our Defense Industry Base

No recommendations for FY19.

AEOP Priority: Support and empower educators with unique Army research and technology resources

The FY18 evaluation continued to provide evidence of the consistently positive impact of Unite on participants. However, students in the program shared that they would like to have more hands-on experiences/content in the program. The content for Unite is driven locally in most cases by the university and the focus of the proposal. It is our recommendation that Unite work with the evaluation team to refine the Request for Proposals (RFP) for Unite to incorporate a strategy to have more common hands-on experiences across the program that could be branded Unite activities, and/or a framework for local universities to use to plan required experiences to be determined for the program.

AEOP Priority: Develop and implement a cohesive, coordinated, and sustainable STEM education outreach infrastructure across the Army

As in FY16 and FY17, nearly half of mentors reported they did not specifically discuss any other AEOPs with students (48%). While improved slightly from FY17, this has been a recurring and persistent area of concern for Unite. It is recommended that Unite develop a centralized and required component of the program that includes activities that are specifically designed to introduce participants to the relevant AEOPs within their pipeline.

Full Report and Appendices

The full FY18 Unite evaluation report can be found at:

The instruments for the FY18 Unite evaluation can be found at: