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ARMY EDUCATIONAL OUTREACH PROGRAM

Unite

2019 Annual Program Evaluation Report Executive Summary

July 2020



1 | AEOP Consortium Contacts

U.S. Army Contacts

Matthew Willis, Ph.D.

Director for Laboratory Management
Office of the Deputy Assistant Secretary
of the Army for Research and Technology
matthew.p.willis.civ@mail.mil

Jack Meyer

Army Educational Outreach Program (AEOP) Director
Office of the Deputy Assistant Secretary of the Army
for Research and Technology
jack.m.meyer2.ctr@mail.mil

AEOP Cooperative Agreement Manager

Christina Weber

AEOP Cooperative Agreement Manager
U.S. Army Combat Capabilities Development
Command (CCDC)
christina.l.weber.civ@mail.mil

Battelle Memorial Institute—Lead Organization

David Burns

Project Director, AEOP CA
Director of STEM Innovation Networks
burnsd@battelle.org

Unite Program Administrators

Hillary Lee

Unite Program Director
Technology Student Association
hlee@tsaweb.org

Roseanne White, Ph.D.

Principal Investigator
Technology Student Association
rwhite@tsaweb.org

Evaluation Team Contacts—NC State University

Carla C. Johnson, Ed.D.

Evaluation Director, AEOP CA
carlajohnson@ncsu.edu

Toni A. Sondergeld, Ph.D.

Assistant Director, AEOP CA
tonisondergeld@metriks.com

Janet B. Walton, Ph.D.

Assistant Director, AEOP CA
jwalton2@ncsu.edu

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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 rising 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 2019, 19 college/university sites were funded through Unite/AEOP. Although Unite site programs differ from one another in terms of how they are executed, they all must meet AEOP's 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 2019 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 9 th – rising 12th grade students from groups historically underserved and under-represented in STEM	
	Cvent data	Site reports
Number of Applicants	714	807
Number of Participants	356	440
Number/Percentage of U2 Participants	334/94%	440/100%
Placement Rate	50%	54%*
Number of Adults	366	
Number of Army S&Es	25	
Number of Army DoD Research Laboratories	2	
Number of K-12 Teachers & University Educators	133	
Number of K-12 Schools	189	
Number of K-12 Schools – Title I	92	
Number of Colleges/Universities	27**	
Number of HBCU/MSIs	13***	
Other Collaborating Organizations	125	
Total Cost	\$706,997	
Total Travel	\$17,792	
Participant Travel	\$0	
Total Awards	\$188,500	
Student Awards/Stipends	\$182,900	
Adult/Teacher/Mentor Awards	\$5,600	
Cost Per Student	\$1,607	

Note:

*The placement rate in the **Site reports** column is based on the number of site-reported applicants (807) divided by the number of site-reported participants (440).

** This number is based on Unite sites (which is 19) and other higher education institutions that collaborated in some capacity with the 2019 Unite sites.

*** This number is based on Unite sites that are designated HBCU/MSI (which is 10) and the number of collaborating universities that are designated HBCU/MSI (which is 3).

Summary of Findings

The FY19 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.

2019 Unite Evaluation Findings	
Priority #1: <i>Broaden, deepen, and diversify the pool of STEM talent in support of our Defense Industry Base</i>	
Participation in Unite increased as compared to FY18.	Unite received applications from 807 students, 440 of whom were enrolled in the program, a 54% placement rate. This represents a 9% increase in applications and a 3% increase in enrollments as compared to FY18 when 731 students applied and 429 were enrolled.
Few Unite students had previously participated in any AEOP other than Unite.	While 29% of students reported previously participating in Unite, only between two and eight students reported at registration that they had participated in another AEOP (Camp Invention, JSHS, SEAP, and HSAP). Nearly half of students (44%) reported never having participated in any AEOPs, although nearly a third (31%) indicated that they had participated in a STEM program in the past.
Unite continues to successfully serve students from groups historically underserved and underrepresented in STEM	A large majority of Unite students (94%) met the AEOP definition of underserved in FY19, an increase from FY18 (88%).
	Over a third of students (48%) identified themselves as Black or African American. This is an increase from the 43% of students who identified as Black or African American in 2018.
	More than half of Unite participants (58%) were female in FY19, a slight decrease from FY18 when 62% of participants were female.
	Nearly three-quarters of FY 19 students (74%) indicated that they receive free or reduced-price lunch, a slight increase from FY18 (71%).
	Half of Unite students (50%) reported that they did not have a parent or guardian who graduated from college, a slight decrease from 51% in FY18.
	As in FY18, English was the first language for most Unite participants, although there was a slight increase in FY19 (81% in FY18; 89% in FY19).
Unite mentors reported significant gains in students' 21st Century skills.	Unite students demonstrated significant increases in 21 st Century skills from the beginning (pre-) to the end (post-) of their Unite experiences ($p < .001$) for all six of the 21 st Century Skills areas. As in FY18, students demonstrated the most growth in skills associated with Creativity and Innovation and Critical Thinking and Problem Solving.

<p>Students reported engaging in STEM practices more frequently in Unite than in their typical school experiences; there was no difference in U2 students' overall engagement as compared to non-U2 students, however there were significant differences within three of the subgroups comprising U2 status.</p>	<p>Students reported significantly higher frequency of engagement in STEM practices 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.</p>
	<p>No significant differences were found in reported frequency of engaging in STEM Practices in Unite by overall U2 classification, although significant differences were found within three of the subgroups that comprise the U2 classification.</p>
	<p>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).</p>
	<p>Students from urban and rural areas reported significantly greater engagement with STEM Practices compared to students from suburban and other school locations (small effect size).</p>
	<p>Students from racial/ethnic minority groups qualifying for U2 status reported significantly less engagement in STEM practices as compared to other students (small effect size).</p>
<p>Students reported gains in their STEM knowledge as a result of participating in Unite; there were no differences in knowledge gain between U2 students and other students.</p>	<p>Three-quarters (75%) or more of Unite students reported medium or large gains in each area of STEM knowledge about which they were asked.</p>
	<p>There were no differences in gains in STEM knowledge between U2 students overall and non-U2 students and no differences in any subgroup of the U2 classification.</p>
<p>Students reported gains in their STEM competencies as a result of participating in Unite; urban and rural students reported larger gains than suburban students.</p>	<p>About two-thirds or more of students reported medium or large gains in each area of STEM competency.</p>
	<p>There were no differences in gains in STEM competencies between U2 students overall and non-U2 students.</p>
	<p>There was a significant difference in STEM competencies gains by school location, with urban and rural students reporting significantly higher gains compared to suburban students (small effect size).</p>
<p>Students reported that Unite participation had positive impacts on their 21st Century skills, and urban and rural students reported larger gains than suburban students.</p>	<p>At least half (51% or more) of students reported medium or large gains in all 21st Century skills items, and a large majority (85% or more) reported medium or large gains in several areas.</p>
	<p>There were no differences in gains in 21st Century skills between U2 students overall and non-U2 students.</p>

	There was a significant difference in Unite's impact on 21 st Century skills gains by school location, with urban and rural students reporting significantly higher gains compared to suburban students (small effect size).
Students reported gains in their STEM identities as a result of participating in Unite, and ELL reported students reported larger gains than those for whom English is a first language.	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 between U2 students overall and non-U2 students.
	ELL students reporting higher gains than non-ELL students in their STEM identities (small 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. About two-thirds or more of mentors reported using all strategies to help make learning activities relevant to students; more than three-quarters of mentors reported using each strategy to support the diverse needs of students as learners; more than 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 two-thirds 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.	Three-quarters or more of students indicated they were at least somewhat satisfied with all Unite program features, and nearly all respondents (94%) made positive comments about their Unite experiences. Very few students indicated that they were "not at all" satisfied with any program feature (<4%).
	The most frequently mentioned benefits of Unite, each mentioned by nearly half of students, were the career information they received and their STEM learning.
	The most frequently mentioned suggestions for improvement, each mentioned by around a quarter to a third of students, were increasing the number of hands-on activities or projects; providing more classes, topics, or choice of topics; and providing more or better field trips.
Unite mentors satisfied with program features that they had	More than half of mentors indicated they were at least somewhat satisfied with all Unite features they experienced, and a large majority

experienced and identified a number of strengths of the Unite program. Mentors also offered various suggestions for program improvements.	(94%) made positive comments about Unite. Very few mentors reported being “not at all” satisfied with any Unite program feature ($\leq 1\%$). The most frequently mentioned strength, mentioned by 29% of mentors, was students’ hands-on experiences with STEM. Over a quarter (27%) also mentioned the value of the program’s support of sites and the resources provided. Other benefits mentioned by 19%-24% of mentors included students’ exposure to STEM, STEM learning, the career information students receive, and the diversity of Unite. Mentors offered a wide variety of suggestions for program improvement. The most frequently mentioned improvements were to provide more funding for programs (23%), more or better field trips (21%), or more or better speakers (19%).
Priority #3: <i>Develop and implement a cohesive, coordinated and sustainable STEM education outreach infrastructure across the Army</i>	
Both students and mentors learned about AEOP primarily through communications through their school or workplace or through personal contacts.	Students most frequently learned about AEOP through a school or university newsletter, email, or website (34%); someone who works at the school or university they attend (28%); and someone who works with the program (20%).
	Mentors most frequently learned about AEOP through someone who works at their school or university (39%); a school or university newsletter, email, or website (31%); and having been a past participant of Unite (31%).
Students were motivated to participate in Unite primarily by the learning opportunities and their interest in STEM.	The two motivators most frequently reported by students were the desire to learn something new or interesting (63%) and interest in STEM (61%). Slightly more than half of students (56%) cited having fun as a reason for participating.
Mentors discussed AEOPs with students, but with only limited reference to specific programs.	Two thirds of mentors reported discussing Unite with their students. Less than half reported discussing any of the other AEOPs explicitly, however, 62% indicated they talked to their students about AEOP generally.
Most students expressed interest in participating in Unite again, although fewer expressed interest in participating in other AEOPs in the future and many had not heard of AEOPs for which they are or will soon be eligible.	More than three-quarters of students (77%) expressed at least some interest in participating in Unite again. Less than half of the students indicated being at least somewhat interested in participating in any other AEOP. Between a quarter and a third of students indicated they had not heard of the other AEOPs.
	The most frequently student-reported resources for learning about AEOPs were participation in Unite (79%) and Unite instructors (75%).

	The most frequently mentor-reported resources for informing students about AEOPs were participation in Unite (72%), the Unite program administrators (71%), and invited speakers (71%).
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 most (79%) had learned about at least one DoD STEM job/career while participating in Unite. Fewer students indicated they learned about 3 or more DoD STEM jobs/careers (61%) compared to STEM jobs/careers in general (86%).
	Students most often reported that their Unite mentors (72%) and participation in Unite (72%) were impactful resources for their awareness of DoD STEM careers.
	A large majority (91%) of students indicated that participating in Unite had a positive impact on their interest in pursuing STEM careers, citing the Unite activities, their mentors and program speakers, their hands-on experiences, and the information they gained about STEM careers.
	Mentors were most likely to cite participation in Unite (72%), Unite program administrators (73%), and invited speakers (71%) as at least somewhat useful resources for exposing students to DoD STEM 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 that they were more likely to engage in STEM activities after participating in Unite. The activities that most students reported they were likely to participate in after Unite were taking an elective STEM class (74%) and using a computer to design or program something (73%).
Most students planned to at least complete a bachelor's degree after participating in Unite.	Nearly all students reported after participating in Unite that they intended to finish college (95%) and over half (51%) reported aspiring to get more education after college.

Unite students reported that participating in the program impacted their confidence and interest in their STEM abilities and interest in STEM.	A large majority of students (80% or more) reported that Unite had impacted them in various ways, although slightly fewer expressed interest in pursuing a STEM career with the Army or DoD (68%). Almost all students indicated that Unite contributed to increases in their confidence in their STEM knowledge, skills, and abilities (92%). Similarly, 87% of students indicated that Unite contributed to their increased awareness of other AEOPs, and 83% that Unite contributed to their increased interest in participating in other AEOPs.
	There were no differences in Unite’s impact between U2 students overall and non-U2 students and no differences in any subgroup of the U2 classification.

Recommendations for FY20 Program Improvement/Growth

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. 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 findings revealed that Unite experienced another successful year of programming in FY19. Unite was delivered in 19 sites for FY19 and was able to include over 50% of the applicants, with a 94% participation rate for underserved students overall. There was significant growth toward mastery for Unite participants in their assessed 21st Century skills in all six areas during the program, and more than 70% 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 FY20 and beyond.

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

No recommendations for FY20.

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

As in FY19, Unite students 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 the past three years (FY16-FY18), less than half of mentors reported they did not specifically discuss any other AEOPs with students. 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.