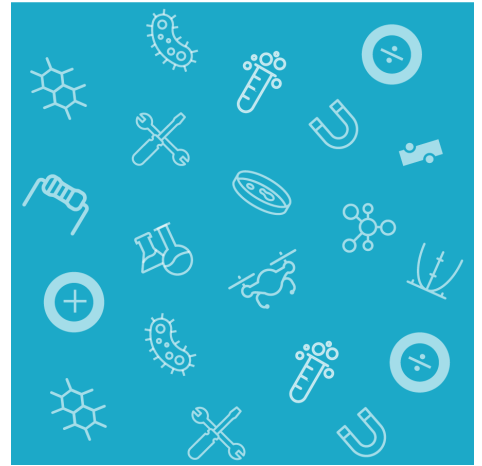


IT STARTS HERE. ★



ARMY EDUCATIONAL OUTREACH PROGRAM eCYBERMISSION

**2018 Annual Program Evaluation Report
Executive Summary**
September 2019

**2018 Annual Program Evaluation Report
Executive Summary**
March 2019



1 | AEOP Consortium Contacts

U.S. Army Contacts

Matthew Willis, Ph.D.

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

Andrea Simmons

Army Educational Outreach Program (AEOP)
Office of the Deputy Assistant Secretary of
Army for Research and Technology
andrea.e.simmons.ctr@mail.mil

AEOP Cooperative Agreement Manager Organization

Christina Weber

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

Battelle Memorial Institute – Lead

David Burns

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

eCM Program Administrators

Jarod Phillips

eCM Program Director
National Science Teachers Association
jphillips@nsta.org

Sue Whitsett

Principal Investigator
National Science Teachers Association
swhitsett@nsta.org

Evaluation Team Contacts – NC State University

Carla C. Johnson, Ed.D. Ph.D.

Evaluation Director, AEOP CA Assistant Director, AEOP CA
carlacjohnson@ncsu.edu
walton25@purdue.edu

Toni A. Sondergeld, Ph.D.

tonisondergeld@metriks.com

Janet B. Walton,

Assistant Director, AEOP CA

Report eCM_03_09222019 has been prepared for the AEOP Cooperative Agreement and the U.S. Army by NC State University College of Education on behalf of Battelle Memorial Institute (Lead Organization) under award W911 SR-15-2-0001.

2 | Executive Summary

eCYBERMISSION (eCM) is sponsored by the U.S. Army and managed by the National Science Teachers Association (NSTA). Since the program's inception in 2002, nearly 200,000 students from across the U.S., U.S. territories, and Department of Defense Educational Activities (DoDEA)'s schools worldwide have participated in eCM. The program is a web-based science, technology, engineering, and mathematics (STEM) competition designed to engage sixth through ninth grade students in real-world problem solving *Mission Challenges* that address local community needs through scientific practices or the engineering design process. eCM teams work collaboratively to research and implement their projects, from inception to prototyping, which are documented and judged through the submission of *Mission Folders* to the eCM website.

This report documents the evaluation of the FY18 eCM program. The evaluation addressed questions related to program strengths and challenges, benefits to participants, and overall effectiveness in meeting AEOP and program objectives. The assessment strategy for eCM included questionnaires for students and Team Advisors; two focus groups with eCM NJ&EE student participants and one with their Team Advisors; observations of the National Judging & Educational Event (NJ&EE), and an annual program report compiled by eCM.

A total of 20,004 students entered state competitions in FY18 (Table 1 displays the number of participants per State/DoDEA/Territories). The top 12 teams from each of the 5 regions advanced to regional competitions for regional judging done via video conference (facilitated by Blackboard Elluminate). The highest score in each region for each grade determined the national finalists. The STEM in Action Grant recipient teams are selected from the regional finalist teams that submit a proposal to implement their solution in their community. Up to 5 STEM in Action Grants are given each year. Twenty-two National Finalist Teams with a total of 71 students along with their Team Advisors competed at NJ&EE in FY18.

2018 eCM Fast Facts

Description	eCYBERMISSION is a web-based science, technology, engineering, and mathematics (STEM) competition for
-------------	---

	students in grades 6 through 9 that promotes self-discovery and enables all students to recognize the real-life applications of STEM. Teams of 3 or 4 students are instructed to ask questions (for science) or define problems (for engineering), and then construct explanations (for science) or design solutions (for engineering) based on identified problems in their community.
Participant Population	6th-9th grade students
Number of Student Applicants	22,391
Number of Participants	20,004
Number/Percentage of U2 Participants	10,248 / 52%
Placement Rate	NA (all students who register may participate)
Submission Completion Rate	76%
Number of Adults (Team Advisors and Volunteers – incl. S&Es and Teachers)	3,590
Number of Team Advisors (Predominantly math and science teachers)	869
Number Volunteers (Ambassadors, Cyberguides, Virtual Judges)	2,660
Number of Army S&Es	4
Number of Army/DoD Research Laboratories	29
Number of K-12 Teachers (including pre-service teachers)	791
Number of K-12 Schools	572
Number of K-12 Schools – Title I	278
Number of Colleges/Universities	26
Number of HBCU/MSIs	6
Number of DoDEA Students	476
Number of DoDEA Teachers	14
Number of DoDEA Schools	13
Number of Other Collaborating Organizations	12
Total Cost	\$3,189,980
Administrative/Overhead & Indirect Costs	\$1,436,761
Mini-grants and Savings Bonds	\$785,674
National Judging & Educational Event	\$351,811
Travel, Conference & Outreach	\$386,091
Other Operational Costs	\$133,859
Travel Costs – Paid for S&E's	\$47,892
Cost Per Student Participant	\$159

Summary of Findings

The FY18 evaluation of eCYBERMISSION included collection of data about participants, their perceptions of program processes, resources, and activities, and indicators of achievement related to AEOP's and eCM's objectives and intended outcomes. A summary of findings is provided in the following table.

2018 eCM Evaluation Findings	
Priority #1: <i>Broaden, deepen, and diversify the pool of STEM talent in support of our Defense Industry Base</i>	
Participation in eCM decreased slightly in FY18 as compared to previous years. The demographics of students participating in the NJ&EE in terms of race/ethnicity are not representative of the demographics of students competing at regional levels.	In FY18, eCM regional sites registered 20,004 students, which represents a slight (6%) decrease from FY17 (21,277), and a 3% decrease from the 20,607 students who participated in FY16.
	Overall, 52% of students engaged in regional eCM were from underserved groups. As in previous years, both males and females are relatively equally represented at the regional level (51% were female and 49% were male).
	Slightly less than half (45%) of regional students identified themselves as White, 18% identified themselves as Hispanic or Latino/a, 13% identified themselves as Black or African American 9% as Asian, and 8% of students chose not to report their race/ethnicity.
	NJ&EE participants included a much smaller percentage (32%) of underserved students compared to the regional level (52%). Over half of NJ&EE participants (52%) were Asian, while 33% were White, 4% were Hispanic or Latino/a, and 3% were Black or African American.
eCM student participants reported engaging in STEM practices more frequently in eCM than in their typical school experiences, although students competing at the NJ&EE reported significantly more frequent engagement than students competing at the regional level, and there were differences in engagement by U2 status, and between several subgroups.	A majority of eCM national and regional respondents indicated they engaged with most STEM practices at least once during eCM. Nearly all (90%-100%) eCM and NJ&EE students reported engaging in STEM practices such as analyzing data or information and drawing conclusions and working collaboratively as part of a team. A majority (60% -86%) of eCM and NJ&EE participants reported engaging in several other STEM practices during eCM, including using laboratory procedures or tools; solving real world problems; designing and carrying out an investigation; and identifying questions or problems to investigate.
	Regardless of competition level, students reported significantly greater Engagement with STEM in eCM than in school (high effect size for both NJ&EE and regional students)
	There were differences in engagement in STEM across several subgroups:

	<ul style="list-style-type: none"> • National competition level students reported significantly higher engagement in STEM practices in eCM than Regional level students (small effect size) • Non-U2 students reported significantly higher levels of engagement in STEM as compared to U2 students (small effect size) • Non-minority students reported significantly higher levels compared to minority students (small effect size) • Low-SES students reported significantly lower levels of engagement in STEM practices compared to non-free/reduced lunch students (small effect size). • Students attending schools in the suburbs reported significantly higher levels compared to urban/rural/frontier school students (small effect size) • Students who had at least one parent attend college reported significantly higher levels compared to students who did not have a parent attend college (small effect size).
<p>eCM student participants reported gains in their STEM knowledge as a result of participating in eCM, although students competing at the NJ&EE reported significantly greater gains than students competing at the regional level, and there were differences in gains by U2 status, and between several subgroups .</p>	<p>A large majority (nearly 80% or more) of eCM and NJ&EE students indicated they experienced some degree of STEM knowledge gain as a result of participating in eCM.</p> <p>Differences in gains in STEM knowledge were identified across various subgroups:</p> <ul style="list-style-type: none"> • Students competing at the NJ&EE level reported significantly higher STEM Knowledge gains than Regional level students (medium effect size) • Non-U2 students reported significantly higher gains than U2 students (small effect size) • Non-minority students reported larger gains than minority students (small effect size) • Low-SES students reported significantly lower STEM Knowledge gains compared to regular-SES students (small effect size) • No differences in STEM Knowledge were found by gender or ESL status. • Students with a parent who had attended college reported significantly higher STEM Knowledge gains compared to students who did not have a parent attend college (small effect size)

<p>eCM student participants reported gains in their STEM competencies, although students competing at the NJ&EE reported significantly greater gains than students competing at the regional level, and there were differences in gains by first generation college status, and SES status.</p>	<p>A majority of eCM and NJ&EE student participants (53% - 98%) reported at least small gains on all STEM competency (science and engineering practices) items.</p> <p>Although there were no differences in students' gains in STEM competencies by U2 status, the following group differences were identified:</p> <ul style="list-style-type: none"> • Students competing at the NJ&EE reported significantly higher gains in STEM Competencies compared to regional students (large effect size) • Students who had a parent attend college reported significantly higher gains in STEM Competencies than students who did not have a parent who attended college (small effect size) • Low-SES students reported significantly lower gains in STEM competencies than regular SES students (small effect size).
<p>Student participants reported that eCM had positive impacts on their 21st Century Skills, although students competing at the NJ&EE reported significantly larger gains than students competing at the regional level, and there were differences in gains by first generation college status. Mentors reported that they observed gains in students' 21st Century Skills over the course of their eCM participation.</p>	<p>Most eCM students (92% - 99% NJ&EE; 83% - 90%) reported at least small gains in all items assessing the knowledge, skills, and habits that are considered critical for success in the 21st century workplace.</p> <p>Although there was no significant difference by U2 status, significant differences by subgroup were identified for students' gains in 21st Century skills:</p> <ul style="list-style-type: none"> • NJ&EE students reported significantly greater gains in their 21st Century skills than regional students (small effect size) • Students who had a parent attend college reported significantly greater gains in their 21st Century Skills (small effect size). <p>Students whose schools were participating in the eCM Mini-Grant experienced significant growth in assessed 21st Century skills from the beginning (pre-) to the end (post-) of their eCM experiences for all six assessed domains. On average, participants' initial ratings were at the Progressing level while their final, post-eCM, ratings were at the approaching Demonstrates Mastery level.</p>
<p>Students reported gains in their STEM identities as a result of participating in eCM, although students competing at the NJ&EE reported significantly larger gains than students competing at the</p>	<p>Most eCM students (59% - 93%) reported at least small gains in items related to their STEM identities, including their interest in STEM and feelings of self-efficacy regarding STEM, however the impact of eCM on participants' STEM identities varied greatly by competition level. Nearly all NJ&EE students (more than 90%) indicated at least some gain as a result of eCM, and regional eCM students reported an average of slightly more than two-thirds (68%) for the same.</p>

<p>regional level, and there were differences in gains by first generation college status and SES status.</p>	<p>Although there was no significant difference by U2 status, significant differences in STEM Identity gains were identified for some subgroups:</p> <ul style="list-style-type: none"> • Students competing at the NJ&EE reported significantly higher STEM Identity gains than regional students (large effect size) • Students who did not have a parent who attended college reported significantly lower gains in STEM Identity (small effect size) • Low-SES students reported significantly lower gains in STEM identity (small effect size)
<p>Priority #2: <i>Support and empower educators with unique Army research and technology resources</i></p>	
<p>Team advisors used a range of mentoring strategies with students.</p>	<p>A majority of mentors reported using strategies to establish the relevance of learning activities (85% - 91%), support the diverse needs of students as learners (54% - 94%), support students' development of collaboration and interpersonal skills (63% - 96%), and support students' engagement in authentic STEM activities (73% - 96%). Most mentors also used strategies to support students' STEM educational and career pathways (33% - 72%); as compared to other areas of mentoring, fewer mentors reported using several of these strategies, including discussing STEM career opportunities within the DoD or other government agencies, recommending student and professional organizations in STEM to students, helping participants build a professional network in a STEM field, and helping participants with their resume, application, personal statement, and/or interview preparations.</p>
<p>Very few eCM team advisors discussed any AEOP other than eCM with students.</p>	<p>While fewer than 15% of team advisors reported discussing any AEOP other than eCM with students (4%-13%), over a third (36%) indicated they discussed AEOP programs in general.</p>
<p>eCM students reported being satisfied with program features that they had experienced, although students competing at the NJ&E reported higher levels of satisfaction than students competing at the regional level. Students also offered various suggestions for program improvement.</p>	<p>Very few NJ&EE participants (4% or fewer) reported being dissatisfied with any feature of eCM about which they were asked, and most had experienced each of the features and were at least somewhat satisfied with each feature they had experienced. More regional students had not experienced various program features (9%-50%), and were more likely (10%-15%) to express being "not at all" satisfied with features. Areas in which majorities of both national and regional participants reported being somewhat or very much satisfied were the submission process, applying or registering for the program, the eCM website, and educational materials used during program activities.</p>

	Regional eCM students' suggestions for improvement focused on eCM content or resources, including providing better or clearer instructions, questions, and/or deadlines; providing more topics or options for projects; providing more ideas and/or examples of projects; allowing more time or shortening the project requirements; improving the website; and providing more support or resources for student research.
	NJ&EE students' suggestions for improvement focused on elements of the NJ&EE event, including providing more freedom and/or free time for students, improving the quality and/or choice of food, providing more and/or longer field trips, shorter program days and/or more time to sleep, more time to socialize with other teams, and more hands-on/interactive activities.
eCM team advisors reported being satisfied with program features that they had experienced. Mentors also offered various suggestions for program improvements.	Very few team advisors (2% or less) expressed dissatisfaction with any program features. More than half of team advisors reported not experiencing Cyber Guide live chats and Cyber Guide discussion forums. Large majorities of mentors were at least somewhat satisfied with all program features they had experienced.
	Team advisors cited a number of strengths of eCM, including its focus on real-world problems, the opportunity for students to work in teams, the usefulness of program materials and resources, and the opportunity for students to develop research skills.
	Team advisors suggested improvements focused on eCM resources, program features, and website improvements. Improvements suggested for resources included providing more student live supports; providing more sample mission folders and/or examples of successful projects; and providing more specific information, more choices of topics, and/or clearer questions. Improvements related to program features included allowing more varied group sizes and/or mixing grade levels within groups; allowing more time for students to complete projects; and providing a timeline or incremental deadlines. Suggested improvements for the website included general improvements and improving features related to mission folder submission. Other qualitative findings included a perceived need for increased publicity for the program and suggestions for using students and alumni as eCM ambassadors.
Priority #3: <i>Develop and implement a cohesive, coordinated and sustainable STEM education outreach infrastructure across the Army</i>	

<p>Students were motivated to participate in eCM primarily by the learning and service opportunities.</p>	<p>Students most frequently identified the desire to learn something new or interesting (eCM - 41%, NJ&EE - 56%) and serving the community or country (eCM - 12%, NJ&EE - 36%) as motivators for participating.</p>
<p>eCM participants were likely to express interest in participating in eCM again, however the majority of students at the regional level had not heard of other AEOPs.</p>	<p>A large majority of students (92%) competing at the NJ&EE were at least a little interested in competing in eCM again, and 64% of students at the regional level were interested in participating again in the future.</p>
	<p>Findings suggest that students are exposed to other AEOPs at NJ&EE. Most NJ&EE students reported that they had heard of all other AEOPs, and over half (54% - 92%) expressed having some interest in participating in each of the programs in the future. As compared with FY17, NJ&EE students' awareness of JSS increased (38% had not heard of it in FY17; 22% in FY18). More than half of all regional students reported not having heard of any AEOP other than eCM, and fewer (11%-38%) expressed interest in future participation in other AEOPs as compared to NJ&EE students (38%-89%).</p>
	<p>Adults reported that participating in eCM (89%) and the eCM website (93%) were the most useful resources for exposing students to AEOPs, however most adult respondents had not experienced any of the other resources listed, such as the AEOP website, AEOP social media, and the AEOP brochure.</p>
<p>eCM students at all competition levels learned about STEM careers generally, however students competing at the NJ&EE level were much more likely to be familiar with DoD STEM jobs or careers.</p>	<p>All NJ&EE students and 70% of regional participants reported hearing about at least one STEM job/career through eCM. However, NJ&EE students reported learning about more DoD jobs/careers than regional participants. Nearly all NJ&EE (93%) and only 38% of regional students indicated learning about one or more DoD STEM job/career.</p>
	<p>Adults rated participation in eCM (73%) and the eCM website (81%) as the most useful resources for exposing students to DoD STEM careers. More than half of adults had not having experienced any of the other AEOP resources.</p>
	<p>NJ&EE students in focus groups cited the workshops and presentations at the NJ&EE as sources of information about DoD STEM careers, along with research they conducted during their projects, and talking with mentors.</p>

<p>eCM students expressed positive opinions about DoD research and researchers, although regional students were less likely to have an opinion when asked about these topics.</p>	<p>Most students at both the regional and national levels of competition agreed with various statements about DoD research and researchers, although NJ&EE students expressed greater agreement (90% or more) than regional students (approximately 50%) across items.. Approximately a third of all regional students indicated “neither agree nor disagree” with items related to DoD research and researchers compared to less than 10% of NJ&EE students.</p>
<p>Most eCM students competing at the NJ&EE level reported that they were more likely to engage in various STEM activities in the future after participating in eCM, although regional students reported substantially less increase in the likelihood of future STEM engagement, and there were significant differences by U2 status, race/ethnicity, first generation college status, and SES status.</p>	<p>An average of two-thirds (67%) of NJ&EE students reported they were more likely to engage in all STEM activities about which they were asked. A 30% point average gap existed between national and regional respondents’ reports of likelihood to engage in activities such as helping with a community service project related to STEM, talking with friends or family about STEM, and participating in a STEM camp, club, or competition. It is noteworthy, however, that the regional respondent reports are 5 percentage points higher than FY17 regional findings for these items.</p>
	<p>There were differences in likelihood of future engagement in STEM across subgroups:</p> <ul style="list-style-type: none"> • Students competing at the NJ&EE were significantly more likely to report an increase in likelihood of future STEM engagement than were regional participants (medium effect size) • U2 students were significantly less likely to report an increase in likelihood of future STEM engagement (small effect size) • Minority students were significantly less likely to report an increase in likelihood of future STEM engagement (small effect size) • Students who did not have a parent who attended college were significantly less likely to report an increase in likelihood of future STEM engagement (small effect size) • Low SES students were significantly less likely to report an increase in likelihood of future STEM engagement (small effect size).
<p>Most eCM students planned to at least complete a Bachelor’s degree.</p>	<p>Regardless of competition level, the vast majority of students (eCM - 87%, NJ&EE - 99%) expected to, at minimum, complete a Bachelor’s degree. More than half of NJ&EE students (67%) reported aspirations to get more education after college while fewer than half of regional</p>

	students (42%) indicated that they intended to pursue post-Baccalaureate education.
eCM had positive impacts for students at all levels of competition, however NJ&EE students reported significantly higher levels of impact, and there were significant differences in impact by subgroups.	<p>More than half of students at both the regional and NJ&EE levels of competition reported that eCM impacted their STEM knowledge, skills, and abilities (eCM - 65%, NJ&EE - 96%) and gave them a greater appreciation of Army or DoD STEM research (eCM - 52%, NJ&EE - 94%). in terms of eCM's impact on their future interest in other AEOP programs or DoD STEM positions, there was a substantial difference by group with NJ&EE reporting much higher impacts than regional students in their interest in participating in other AEOPs (eCM - 39%, NJ&EE - 95%); more interested in pursuing a STEM career with the Army or DoD (eCM - 34%, NJ&EE - 81%).</p>
	<p>Although there was no significant difference in overall program impact by U2 status, significant differences across some subgroups were identified:</p> <ul style="list-style-type: none"> • Students competing at the NJ&EE reported significantly higher levels of overall impact in comparison to regional students (large effect size). Minority students reported significantly lower levels of overall impact compared to non-minority students (very small effect size) • Low-SES students reported significantly lower levels of overall impact compared to regular-SES students (very small effect size) • ESL students reported significantly higher levels of overall impact than non-ESL students (very small effect size).
	<p>Both students at the regional and national competition levels cited benefits of participating in eCM. Regional students were most likely to identify teamwork, STEM learning, and the opportunity to solve real-world problems as benefits. National students were most likely to identify career information, STEM learning, teamwork, the opportunity to solve real-world problems, and the opportunity to network as benefits of participating in eCM.</p>

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. However, beginning with the FY16 evaluation, the goal is for programs to be able to leverage the evaluation reports as a means to target specific areas for improvement and growth.

In this report, we will highlight recommendations made in FY17 to programs and summarize efforts and outcomes reflected in the FY18 APR toward these areas.

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

FY17 Recommendation: Despite NSTA's continued efforts in outreach to the Team Advisors and subsequently students through emails and the eCM website, the results of the survey indicate that, as in FY16 (53% regional; 23% NJ&EE) and few participants use the CyberGuide live chat (22% regional; 38% NJ&EE). NSTA should continue to work to market to participants the value of the use of these important resources to increase the usage.

eCM FY18 Efforts and Outcomes: Was not discussed in the FY18 APR under responsiveness to FY17 evaluation, so unclear what efforts and outcomes eCM engaged in to address this recommendation.

FY17 Recommendation: In FY17, more than a third of regional eCM participants (31%) reported on the evaluation survey they had not learned about any DoD/STEM jobs/careers. Conversely, 68% of NJ&EE participants reported learning about five or more DoD/STEM careers. NSTA should continue to work with regional sites to infuse the learning and connections of the program to the DoD and relevant STEM careers within and outside of the DoD.

eCM FY18 Efforts and Outcomes: Was not discussed in the FY18 APR under responsiveness to FY17 evaluation, so unclear what efforts and outcomes eCM engaged in to address this recommendation.

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

FY17 Recommendation: Students continue to report having little knowledge of other programs in the AEOP. This is an area of concern due to the overarching goal of creating an AEOP pipeline and retention of participants in additional AEOPs. Over a third (38%) of NJ&EE students had never heard of JSS, indicating two things: 1) eCM is likely their first program in the AEOP pipeline, and 2) eCM may not be marketing this program as frequently as other opportunities. Few Team Advisor/Adults (9%) reported discussing any other AEOPs with students besides eCM, a decrease from 25% in FY16. Most regional participants (60-71%) had not heard of other individual AEOPs. As stated in FY16, the evaluation results suggest that more should be done to make the connection and to inform students of future

opportunities in AEOP. In addition, since Team Advisors are an important source of student information, additional efforts should be made to educate Team Advisors about the AEOP and programs for which their students are eligible.

eCM FY18 Efforts and Outcomes: Was not discussed in the FY18 APR under responsiveness to FY17 evaluation, so unclear what efforts and outcomes eCM engaged in to address this recommendation.

Recommendations for FY19 Program Improvement/Growth

Evaluation findings indicate that FY17 was another successful year for the eCM program. A notable success for the year was the engagement of underserved students at the regional level, which was 53%. Overall, 80% or more of participants in eCM reported growth in STEM knowledge and 21st Century Skills as a result of participation in the program. While these successes are commendable, there are some areas that remain with potential for growth and/or improvement.

The evaluation team therefore offers the following recommendations for FY18 and beyond:

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

The NJ&EE demographics continue to not be reflective of the overall population of participants in eCM. Only 32% of NJ&EE students were from underserved backgrounds, compared to 52% of the overall participant group. It is recommended that NSTA utilize scaffolding strategies and supports to enable more participants from underserved groups to grow their skills and knowledge so that they have increased opportunities for success. A targeted campaign to reach out to past participants from underserved groups that includes additional mentoring through the process is one potential strategy to engage students in future years who have experienced the program and provide additional supports to increase their chance of having a more effective project and presentation for eCM.

The overall participation in eCM has continued on a downward trend. In FY18, participation decreased by 6%. It is recommended that eCM employ strategies to reach new participants, as well as supports for previous participants to engage again. Through multiple years of participation, it is likely that students will grow their knowledge, skills, and experience with competition programs and this in and of itself may increase their chances of success in the future. Therefore, reaching out to underserved groups of past participants may be a strategy that may help with both of these areas for future growth.

In FY18, participants at regional and national levels again reported significantly different experiences in eCM. At the national level, students reported being more engaged in STEM practices. Further, students from underserved backgrounds reported less engagement in STEM practices in eCM than for other students. This trend was also similar for students from suburban schools. Therefore, in the continuous

improvement process, eCM should think about resources and strategies that may work to level the playing field for students from various backgrounds, as well as finding ways to make regional experiences more similar in context and quality as NJ&EE experiences. Though some of this may be attributed to NJ&EE students coming from more affluent areas and more supportive backgrounds prior to NJ&EE, it is clear that the week-long activities at NJ&EE are something that regional students could benefit from if there were some way to package opportunities online or through the local mentor.

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

Few Team Advisors (less than 15%) are discussing specific AEOP opportunities other than eCM with participants. This is an incredible missed opportunity, as students in eCM are eligible for a number of other AEOP programs in the future, including apprenticeships and programs such as JSHS and Unite.

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

As in FY17, eCM students overall continue to report having little knowledge of other programs in the AEOP besides eCM (more than 50%). Additionally, only 38% of eCM regional participants reported learning about DoD STEM careers. It is understood that the level of influence over the many regional sites is less than what is available at the NJ&EE. However, it is recommended that eCM work with the consortium to utilize current and develop other additional resources that teachers/Team Advisors can use as tools to communicate with students about future AEOP opportunities and DoD STEM careers overall.