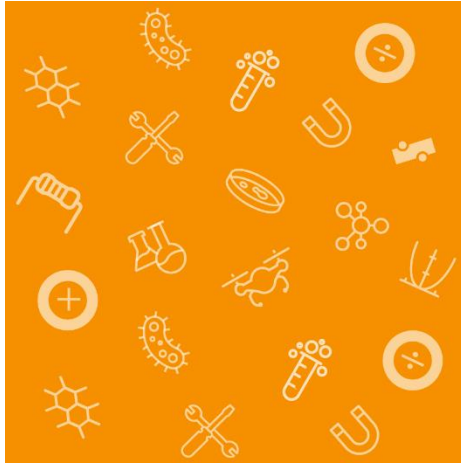


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ARMY EDUCATIONAL OUTREACH PROGRAM

2021 Annual Program Evaluation Report Selected Summative Findings

November 2022



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Table of Contents

Introduction 4

 AEOP Priorities & Goals 4

 Overview of 2021 Portfolio of Programs 4

 Overview of Participants 5

Evaluation Approach 7

 Survey Respondents 7

Evaluation Findings 8

 Limitations 8

 Key Findings 9

 Participant Research Question #1: To what extent do participants report growth in interest and engagement in STEM? 9

 Participant Research Question #3: To what extent do participants and mentors report increased participant interest in STEM research and careers? 14

 Participant Research Question #4: To what extent do participants and mentors report increased participant awareness of and interest in Army/DoD STEM research and careers? 16

 Alumni Survey Findings 20

 Alumni Research Question #1: To what extent do alumni report positive, sustained interest and engagement in STEM? 21

 Alumni Research Question #3: To what extent do alumni report pursuit of and achievement in STEM courses in secondary school, post-secondary STEM degrees, STEM careers, and Army/DoD STEM? 22

 Alumni Research Question #4: To what extent do alumni report awareness of and interest in STEM research careers overall and for the Army/DoD specifically? 23

Participant Feedback 26

Recommendations 26

Introduction

AEOP Priorities & Goals

The Army Educational Outreach Program (AEOP) mission is to offer students and teachers a collaborative, cohesive portfolio of Army sponsored science, technology, engineering and mathematics (STEM) programs that effectively engage inspire and attract the next generation of STEM talent through K-college programs and expose them to Department of Defense (DoD) STEM careers.

AEOP has three priorities:

1. **STEM Literate Citizenry.** Broaden, deepen, and diversify the pool of STEM talent in support of our Defense Industry Base (DIB).
2. **STEM Savvy Educators.** Support and empower educators with unique Army research and technology resources.
3. **Sustainable Infrastructure.** Develop and implement a cohesive coordinated, and sustainable STEM education outreach infrastructure across the Army.

This 2021 summative evaluation report focuses on research questions that address STEM Literate Citizenry—AEOP participants’ interest and engagement in STEM, interest in STEM research and careers, and awareness of and interest in Army/DoD STEM research and careers. See the *Evaluation Approach* section of this report for more detailed information.

Overview of 2021 Portfolio of Programs

AEOP offers a collaborative and cohesive portfolio of STEM programs that engage, inspire and attract the next generation of STEM talent. These programs are led by multiple partners as shown in Table 1.

Table 1. AEOP Partners and Programs

Partner	Program	Description
National Science Teaching Association (NSTA)	eCYBERMISSION (eCM)	eCM is a web-based STEM competition for students in grades 6–9 that promotes self-discovery and empowers students to recognize the real-life applications of STEM.
	Gains in the Education of Mathematics and Science (GEMS)	GEMS is an Army-sponsored summer STEM enrichment program for students in grades 5–12 held in the summer at participating Army Research Laboratories.
	Junior Science and Humanities Symposium (JSHS)	The JSHS is a tri-service—U.S. Army, Navy, and Air Force—sponsored STEM competition that promotes original research and experimentation in STEM at the high school level and publicly recognizes students for outstanding achievement.
National Inventors Hall of Fame (NIHF)	Camp Invention (CI)	CI is a week-long summer program that engages children to develop creativity, inventive thinking, and problem-solving skills through hands-on STEM content, while also providing professional development to teachers and high school leadership interns nation-wide.

Partner	Program	Description
Rochester Institute of Technology (RIT)	Apprenticeships & Fellowships	A career development initiative, AEOP Apprenticeships and Fellowships provides high school (HSAP, REAP, Research Foundations, SEAP), college (CQL, URAP), and graduate students (Fellowships) with immersive STEM research opportunities in military and university laboratories across the United States and its territories.
Technology Student Association (TSA)	Junior Solar Sprint (JSS)	The JSS program is available for 5th-8th grade students and provides the opportunity for students to apply scientific understanding, creativity, experimentation, and teamwork to design, build, and race solar electric vehicles.
	Unite	Unite is a pre-collegiate, academic, summer program for rising 9th through rising 12th grade students from groups historically underrepresented and underserved in STEM areas.
Tennessee Tech University (TTU)	RESET	RESET is designed to provide high school and middle school educators with authentic summer research experience at participating Army Research Laboratories and Centers.

FY21 was in the midst of the COVID-19 pandemic, which had a significant impact on program delivery and participation. Some programs pivoted to offering virtual-only programming, while others offered hybrid activities.

Overview of Participants

In FY21, AEOP programs served a total of 16,784 participants – 89% were students and 11% were educators, advisors, mentors, Science & Engineering (S&E) volunteers, or other adults (see Table 2). The vast majority of the student participants (95%) were in grades K-12 and 5% were post-secondary. About one third of adult participants were teachers or educational professionals (31%) while the rest were mentors, team advisors, and volunteers. A total of 2,662 organizations also participated in FY21 AEOP programming. See Appendix A for more detailed information about participant counts.

Table 2. Total number of AEOP FY21 program participants, by program¹

Program	Students	Adults (Educators, Advisors, Mentors, S&E Volunteers)	Total
Apprenticeships*	588	210	798
eCYBERMISSION	7,135	491	7,626
GEMS^	2,463	160	2,623
Camp Invention	2,034	Data not available	2,034
JSHS	2,182	273	2,455
JSS	215	82	297
RESET	0	67	67
Unite	569	315	884
Total, All Programs	15,186	1,598	16,784

*Apprenticeships includes counts from CQL, Fellowships, HSAP, REAP, SEAP, and URAP.

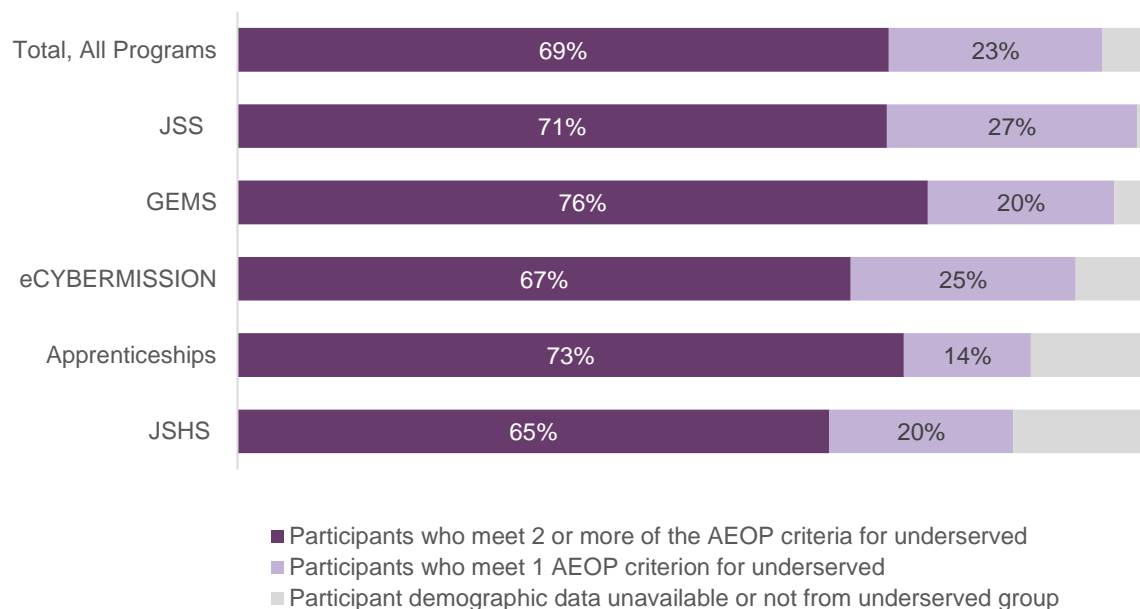
Note: The total for All Programs may include individuals who participated in more than one AEOP program.

¹ AEOP programs have different means of tracking participant data. The majority (80%) of participant data is tracked using the online registration system and 20% is tracked by programs directly. This report relied on both data sources, and counts were vetted with AEOP program staff.

AEOP has a focus on reaching participants who have more limited access to STEM learning opportunities and/or who are from groups that are underrepresented in STEM education and careers. AEOP defines underserved and underrepresented participants as those who possess one or more of the following characteristics: attend a rural, urban, or frontier/tribal school; identify as female²; identify as racial/ethnic minority in STEM (i.e., Alaska Native, Native American, Black or African American, Hispanic, Native Hawaiian and other Pacific Islander, other); receive free or reduced meals price at school; speak English as a second language (ELL); first generation college student; students with disabilities; or a dependent of a military service member or veteran.

AEOP has identified a particular interest in reaching students who meet two or more of the underserved and underrepresented (Underserved) criteria described above. As shown in Figure 1, in FY21, more than two thirds of all AEOP student participants (69%) meet two or more of the Underserved criteria. An additional quarter of student participants (23%) meet one of the AEOP Underserved criteria. See Appendix A for full data tables and additional information.

Figure 1. Percentage of FY21 Student Participants Meeting AEOP Criteria for Underserved*



FY21 Registration Data (n = 12,583)

*Unite provided aggregate demographic counts so it was not possible to determine how many criteria were met by individual participants.

² Two AEOP programs—JSHS and Apprenticeships—only females engaged in certain STEM fields (physical science, computer science, mathematics or engineering) are considered as underserved. For the purpose of this analysis, we have included all students who identified a female but not based on their STEM discipline, as those data were not available. This likely overestimates numbers for JSHS and Apprenticeships as well as the total for all programs.

Evaluation Approach

Education Development Center, Inc. (EDC) became the AEOP’s external evaluation partner in fall 2021, after FY21 data collection was complete. The FY21 research questions and data collection tools were developed and administered by the previous AEOP external evaluator.

The primary tools for data collection were student, mentor, and alumni post-surveys which were designed to evaluate the benefits of participation, program strengths and challenges, and overall effectiveness in meeting AEOP and program objectives. Some survey questions were asked of all participants across all AEOP programs, some questions were similar across programs but asked in slightly different ways depending on the program, and some questions were unique to a particular program. In most cases, AEOP program staff were responsible for distributing the online survey links to their student participants and mentors at the conclusion of program activities. The sampling approach for identifying alumni to complete the alumni survey, and the method for distributing the alumni survey are unknown.

The EDC evaluation team was tasked with reporting FY21 participation numbers collected via AEOP’s online registration system, as well as with analyzing a subset of the FY21 survey data. In consultation with the Army, EDC selected three of the research questions to address regarding the impact of AEOP on student participants and alumni, respectively, shown in Table 3. We then identified which participant, mentor, and alumni survey items were aligned with those research questions.

Table 3. Research Questions Addressed in This Report

AEOP Priority	Research Questions Regarding Participants	Research Questions Regarding Alumni
STEM Literate Citizenry: Broaden, deepen, and diversify the pool of STEM talent in support of our defense industry base.	<i>Participant Research Question #1 - To what extent do participants report growth in interest and engagement in STEM?</i>	<i>Alumni Research Question #1 - To what extent do alumni report positive, sustained interest and engagement in STEM?</i>
	<i>Participant Research Question #3 - To what extent do participants and mentors report increased participant interest in STEM research and careers?</i>	<i>Alumni Research Question #3 - To what extent do alumni report pursuit of and achievement in STEM courses in secondary school, post-secondary STEM degrees, STEM careers, and Army/DoD STEM careers?</i>
	<i>Participant Research Question #4 - To what extent do participants and mentors report increased awareness of and interest in Army/DoD STEM research and careers?</i>	<i>Alumni Research Question #4 - To what extent do alumni report awareness of and interest in STEM research and careers overall and for the Army/DoD specifically?</i>

Survey Respondents

This report describes participant data and results from student, mentor, and alumni surveys. Table 4 shows the number of surveys by program. Appendix B shows the demographics of survey respondents and Appendix C has the surveys.

Table 4. Participant and Mentor Survey Response Rates

Program	Participant Surveys		Mentor Surveys	
	Count	Response Rate	Count	Response Rate
Apprenticeships	236	40%	105	50%
eCYBERMISSION	1,222	17%	139	28%
GEMS	1,345	55%	63	39%
JSHS	414	19%	262	96%
JSS	8	4%	0	-
Unite	328	58%	95	30%
Total, All Programs	3,553	27%	664	46%

Note: RESET did not have surveys in FY21.

Evaluation Findings

Evaluation findings presented below are organized by research question. The first group of research questions, labeled Participant Research Question #1, #3, and #4, is focused on near-term outcomes and relies on data gathered in participant and mentor surveys. The second group of research questions, noted as Alumni Research Question #1, #3, and #4, is focused on medium- to long-term outcomes and relies on data gathered in the alumni survey. In general, the evaluation team focused on presenting aggregated results for the overall AEOP program. However, there were some instances when it made sense to disaggregate results to reveal notable differences across programs.

Limitations

It is important to recognize that survey results only reflect those individuals that completed surveys and cannot be applied across the Consortium and may not be generalizable within a specific program. For example, the response rate among participants in eCYBERMISSION and JSHS was 17% and 19%, respectively. It is possible that these responses do not generalize well to the population of students that were involved in these programs. For this same reason, we do not include participant data for JSS since there were only eight participants (4%) who responded to the JSS participant survey.

It is also important to consider the characteristics of survey respondents. For the alumni survey, for example, 58% of respondents had not yet completed high school. In this instance, it is important to note that we cannot reasonably expect respondents to report postsecondary outcomes that are long-term goals of the AEOP program.

Finally, while we have presented participant and mentor findings together topically, these results should be interpreted with caution since the proportions of respondents for each group vary considerably by program. In addition, not all questions across the participant and mentor surveys are exactly aligned.

Key Findings

The key findings from our evaluation of these data are summarized below. Subsequent sections of this report explore these findings in more detail.

AEOP offers enriching STEM education opportunities to students.

- By participating in AEOP, students have the opportunity to engage in STEM activities, acquire research experiences, develop skills to work collaboratively as part of a team, and, in some programs, obtain experience working with researchers.
- Students learned about STEM careers and career pathways in AEOP, and most students increased interest in pursuing a STEM degree or career as a result of their participation in AEOP.
- Overall, AEOP is well-aligned with the DoD's strategic efforts to engage historically marginalized populations, as a substantial majority of student participants were from underserved/underrepresented populations.

Mentors are instrumental to supporting participants' STEM learning and awareness of STEM education and career pathways.

- Mentors play a key role in helping students to develop STEM awareness and skills, and learn about STEM careers and career pathways, including Army/DoD STEM careers.

AEOP appears to contribute to STEM educational pathways for alumni.

- Alumni survey findings indicate strong interest in STEM careers, some exposure to Army/DoD research and career opportunities, and a desire to learn more.

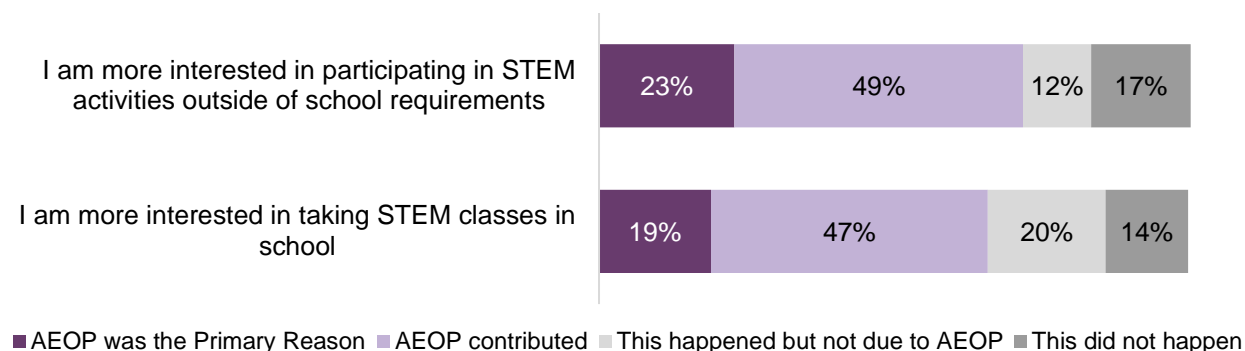
Participant Research Question #1: To what extent do participants report growth in interest and engagement in STEM?

AEOP provides student participants the opportunity to engage in STEM activities, gain research experiences, develop skills to work effectively as part of a team, and, in some programs, obtain experience working with researchers. Below are key findings in these areas. These results are primarily from the student participant surveys. Where possible, we have noted corroborating evidence from the mentor surveys, though not all individual questions were aligned with the participant surveys. We have also displayed differences by program only in specific areas where there were notable differences.

Interest in STEM

AEOP contributed to increasing students' interest in STEM classes and activities. The majority of students indicated that their interest in taking STEM classes in school (66%) and participating in STEM activities outside of school requirements (72%) increased as result of AEOP. This finding was consistent across all programs surveyed (Figure 2).

Figure 2. AEOP contributed to students' interest in STEM classes and activities

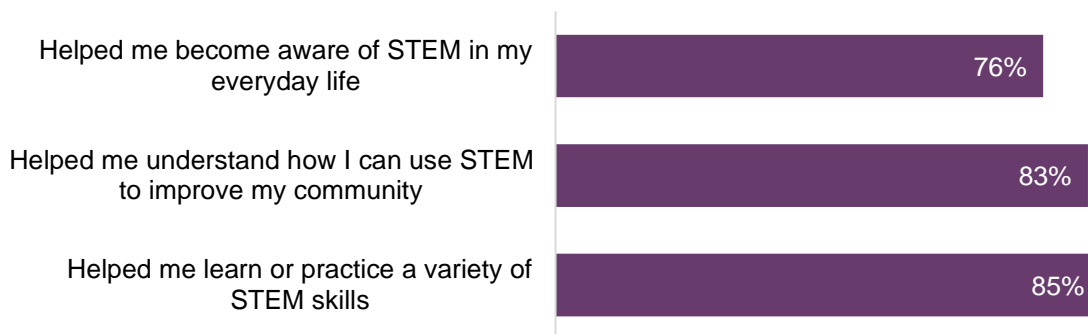


Participant Survey; All AEOP Programs combined (n = 2,835)

Mentor Strategies

Mentors supported students in developing STEM awareness and skills. A majority of students indicated that their mentors used strategies to help them to learn or practice a variety of STEM skills (85%), become aware of STEM in everyday life (83%), and understand how they can use STEM to improve their community (76%). These findings were consistent across programs.

Figure 3. Mentors supported students in developing STEM awareness and skills



Participant Survey; All AEOP Programs combined (n = 1,692)
 Note: This question was not asked of GEMS participants

Research Experiences

Students gained research experiences in AEOP. A large majority of participants reported that they designed their own research (83%), carried out investigations (84%), and analyzed data or information to draw conclusions (89%). Although mentors were asked slightly different questions, they generally reported comparable outcomes for students. Figure 4 below shows responses for both participants and mentors.

Figure 4. Students gained research experience in AEOP³



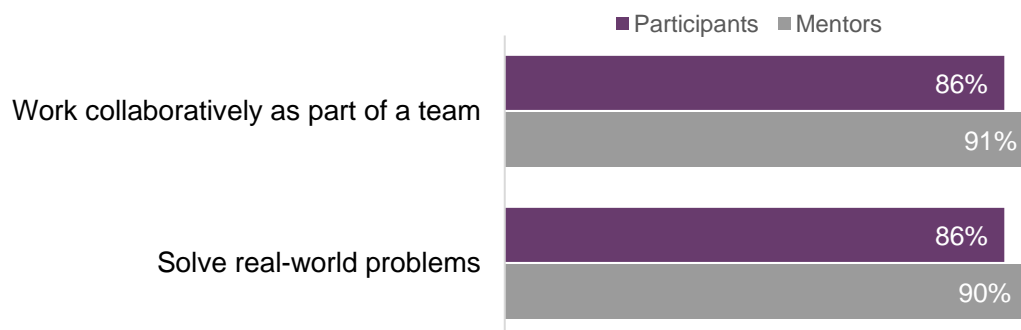
Participant Survey; All AEOP Programs combined (n = 3,186)
Mentor Survey (n = 474)

*This question was not asked of GEMS participants

Experience Working in Teams

Students gained experience working in teams to address real-world problems. Most students had the opportunity to work collaboratively as part of a team and solve real-world problems (86% for each). Mentors corroborated students' accounts about working in a team and solving real-world problems and reported slightly higher percentages (91% and 90%, respectively). Figure 5 below shows results for students and mentors.

Figure 5. Students gained experience working in teams to address real-world problems



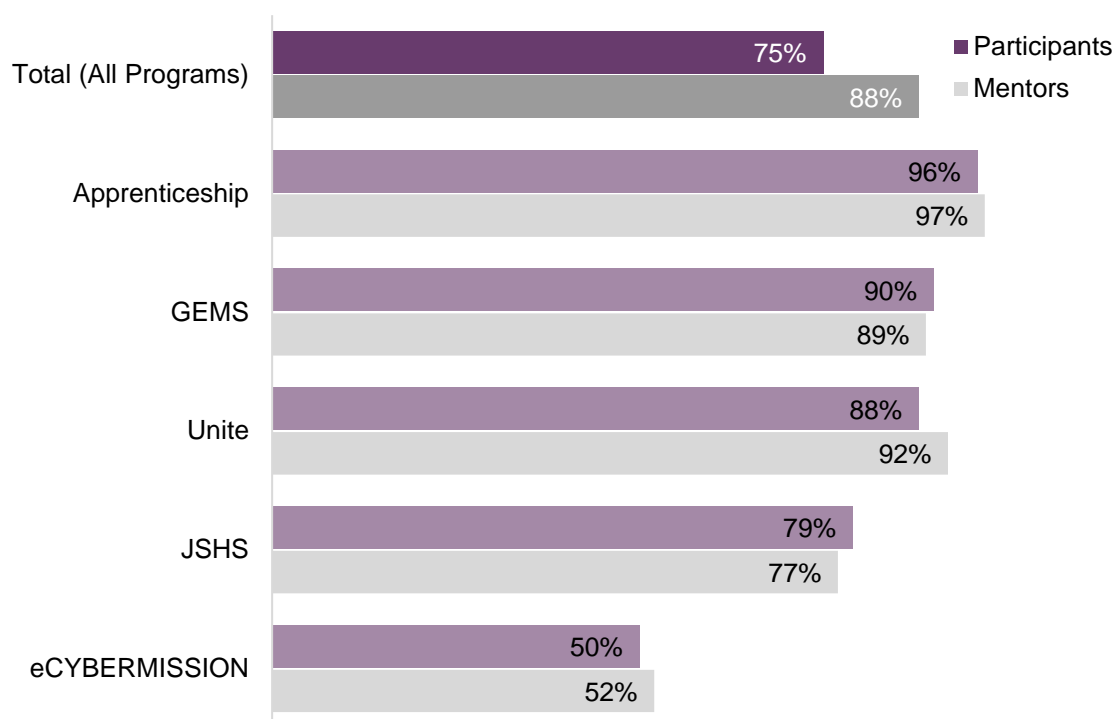
Participant Survey; All AEOP Programs combined (n = 3,179)

³ The number of responses for each item varies. This may be due to some program surveys not including specific items or respondents not completing particular survey items.

Experience Working with STEM Researchers

Most students had opportunities to work with STEM researchers, though there are some observed differences across programs. Across most programs, the majority of students reported that they interacted with STEM researchers (75%). Students in eCYBERMISSION were less likely to report interacting with STEM researchers compared to all other programs; however, eCYBERMISSION is a classroom-based program that does not focus on providing opportunities to interact with STEM researchers. Mentors similarly reported that students had the opportunity to interact with people working in STEM careers (Figure 6).

Figure 6. Most students had the opportunity to interact with STEM researchers



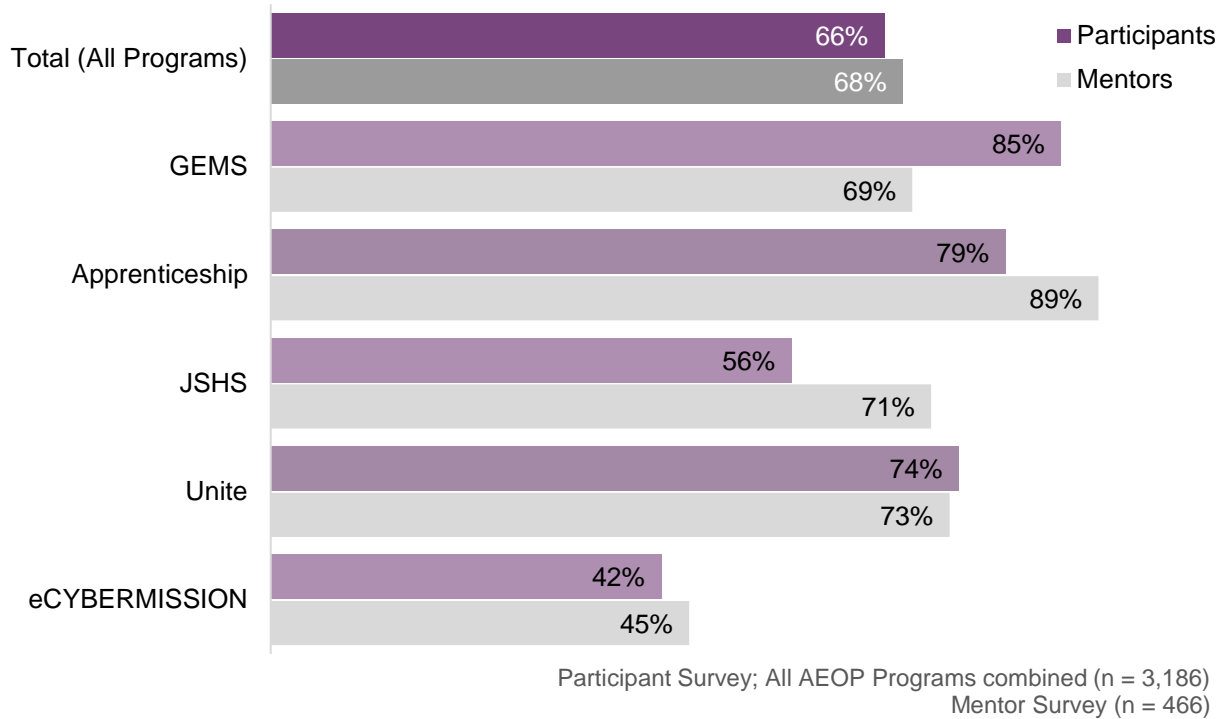
Participant Survey; All AEOP Programs combined (n = 3,182)
Mentor Survey (n = 474)

Students gained experience working on real-world STEM projects. The participant survey additionally asked students whether they had worked with a STEM researcher on a real-world project. In programs where there was an explicit focus on participants working directly with STEM researchers (GEMS, Apprenticeships, and JSHS), most students reported that they had the opportunity to work with a STEM researcher or company on a real-world STEM project (66%).

The overall characterization from students about interacting with STEM researchers on real-world projects was consistent with what mentors reported. Mentors from programs focusing on older populations of students (e.g., Apprenticeships, Unite, JSHS) were more likely to report that

students had the opportunity to work with a person in a STEM field on their real-world project. By contrast, in eCYBERMISSION, a competition-based program involving 6-9th grade students, nearly one half of mentors (45%) reported students had the opportunity to work with STEM professionals on real-world projects. Figure 7 below displays responses from both participants and mentors by program and overall.

Figure 7. Students gained experience working on real-world STEM projects



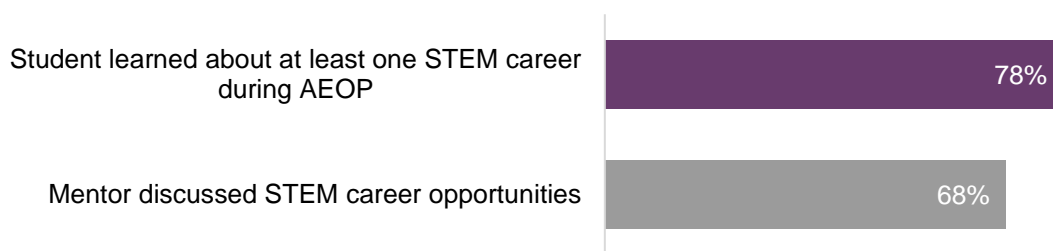
Participant Research Question #3: To what extent do participants and mentors report increased participant interest in STEM research and careers?⁴

Survey results indicate that students learned about STEM careers and career pathways in AEOP, and most students increased interest in pursuing a STEM degree or career as a result of their participation in AEOP. It is worth noting that we observed differences across programs in a few key areas, including interest in pursuing a STEM career and interest in pursuing a stem degree. These differences are mostly due to older participants (e.g., students in Apprenticeships, Unite, and JSHS) reporting interest in greater proportions than younger participants. Participants in eCYBERMISSION reported lower relative proportions, which is consistent with what we would expect from a younger population of students. As in the previous section, we have noted findings where there is alignment across the participant and mentor surveys. We also have shown differences by program only where there are notable differences.

Learning about STEM Careers

Students learned about STEM careers during their AEOP program experience. A majority of student participants (78%) indicated that they learned about at least one job as a result of their AEOP program experience. Similarly, a majority of mentors (68%) across all programs reported discussing STEM career opportunities with students.

Figure 8. Students learned about STEM careers during their AEOP program experience



Participant Survey; All AEOP Programs combined (n = 1,661)
Mentor Survey (n = 471)

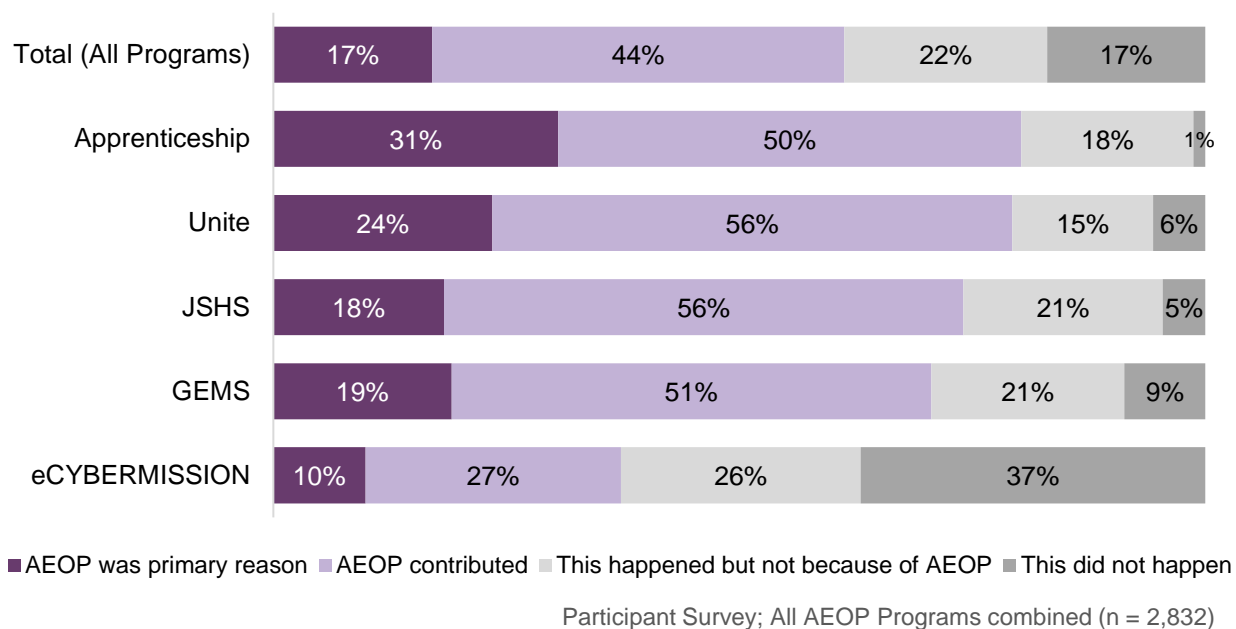
Note: This question was not asked of GEMS participants

Interest in STEM Careers

AEOP contributed to increasing students' interest in pursuing STEM careers. The majority of students indicated that their interest in pursuing a STEM career (61%) increased as result of AEOP. Older students (e.g., participants from Apprenticeships, Unite, and JSHS) were more likely to report that their interest in STEM careers had increased, which might be attributed to these students being further along in their education and more focused on career plans overall.

⁴ While this research question includes participant interest in STEM research and careers, we have only included supporting data on STEM careers. There was insufficient evidence from the survey data to address participant interest in STEM research.

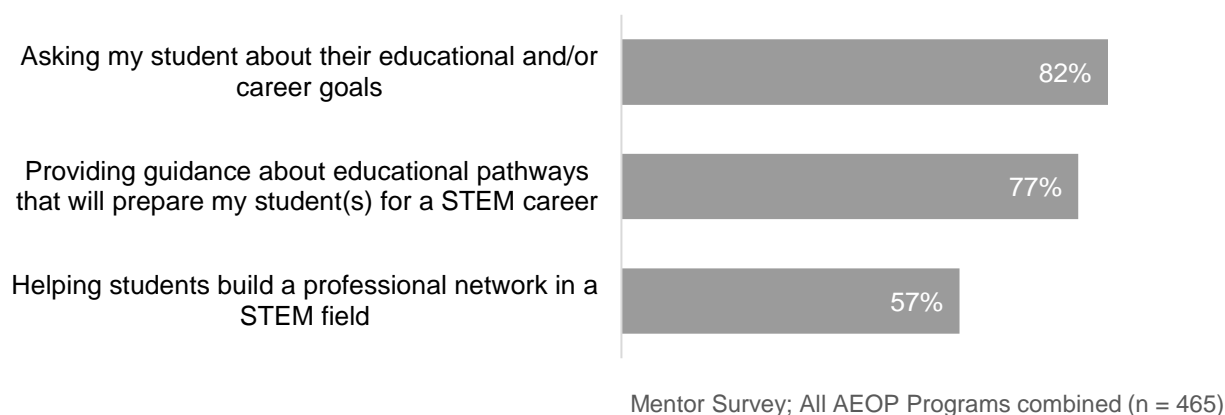
Figure 9. AEOP contributed to increasing students' interest in pursuing STEM careers



Pathways to STEM Careers

Mentors informed students about pathways to STEM careers. A majority of mentors reported that they asked students about their educational or career goals (82%), provided guidance to students about educational pathways for a STEM career (77%), and helped students build a professional network in a STEM field (57%). These findings were consistent across programs (Figure 10).

Figure 10. Mentors informed students about pathways to STEM careers



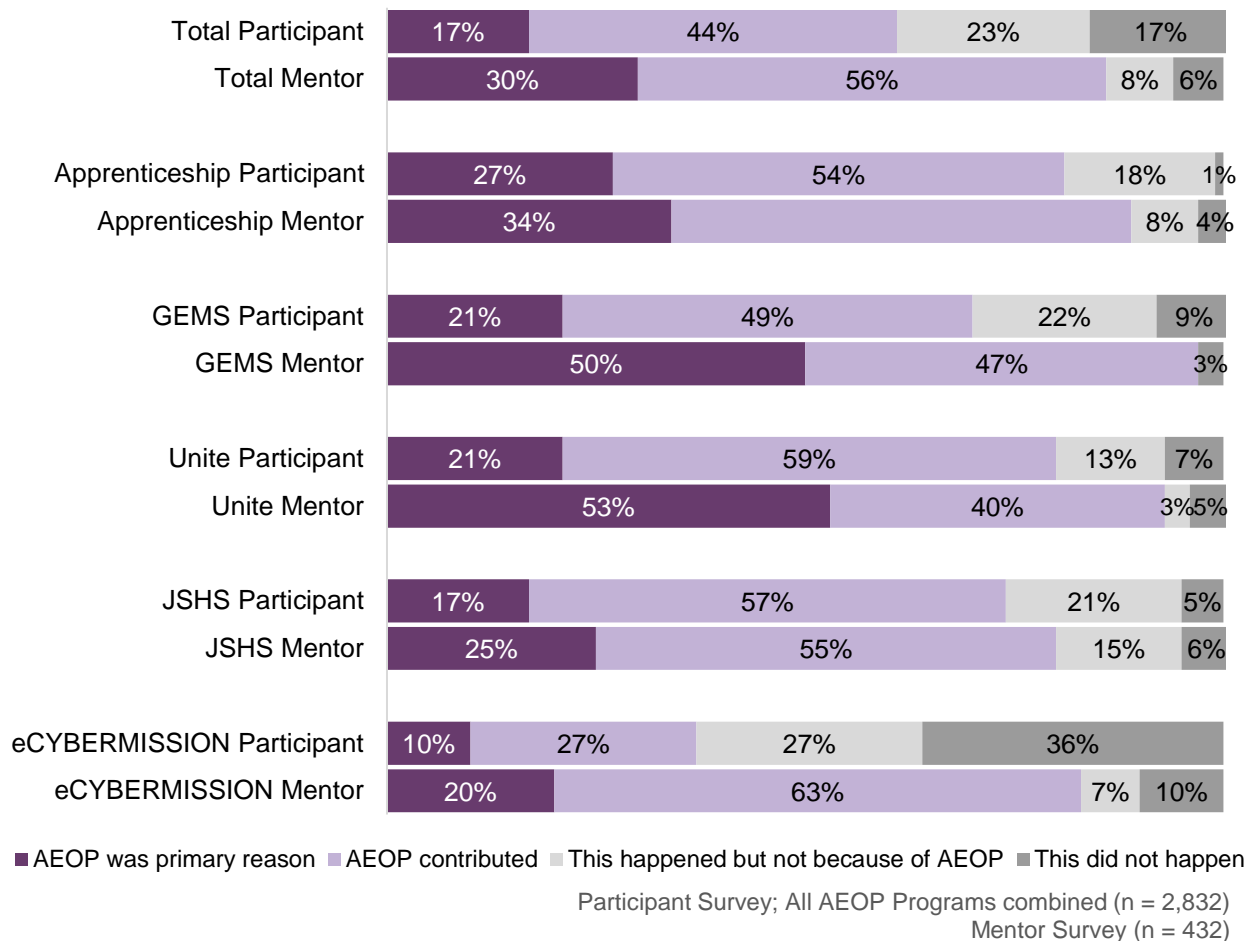
Interest in STEM Degree

AEOP contributed to increasing students' interest in pursuing STEM degrees. With the exception of eCYBERMISSION, the majority of students in all programs indicated that their

interest in pursuing a STEM degree increased as result of AEOP (61% across all programs). Again, it is important to note here that eCYBERMISSION serves a younger population of students than many of the other programs. Consequently, these results might simply reflect the fact that students participating in eCYBERMISSION are less focused on post-secondary degrees overall.

The majority of mentors in all programs indicated that they believed students were more interested in earning a STEM degree and in higher proportions than students (86% across all programs, Figure 11).

Figure 11. AEOP contributed to increasing students' interest in pursuing STEM degrees



Participant Research Question #4: To what extent do participants and mentors report increased participant awareness of and interest in Army/DoD STEM research and careers?

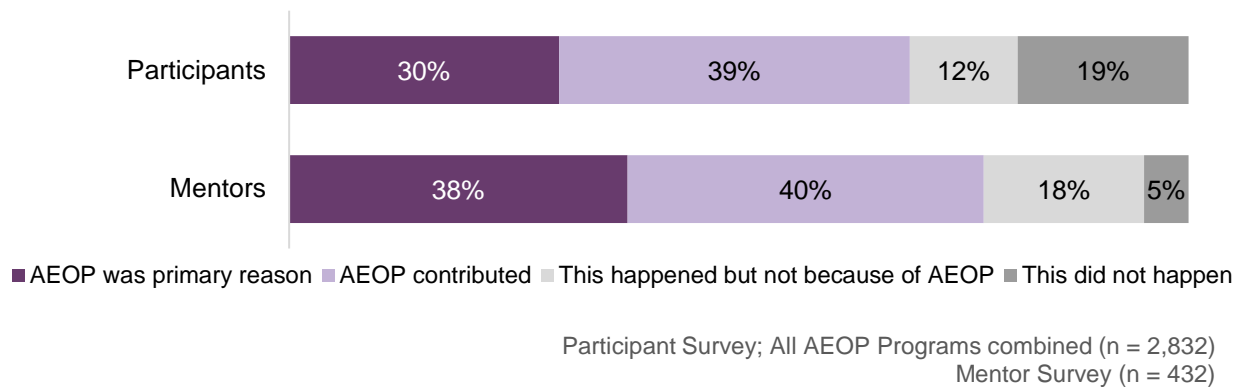
Across all programs, participants indicated an increased appreciation and awareness of Army/DoD STEM research. Nearly one half of all participants also reported interest in Army/DoD STEM careers. Examining interest in Army/DoD STEM careers by program revealed notable differences across programs, which was largely due students' ages. For example, students in

Apprenticeships were most likely to report that their interest in Army or DoD STEM careers increased as result of their participation in AEOP, while eCYBERMISSION participants were least likely to report this.

Appreciation of Army/DoD STEM Research

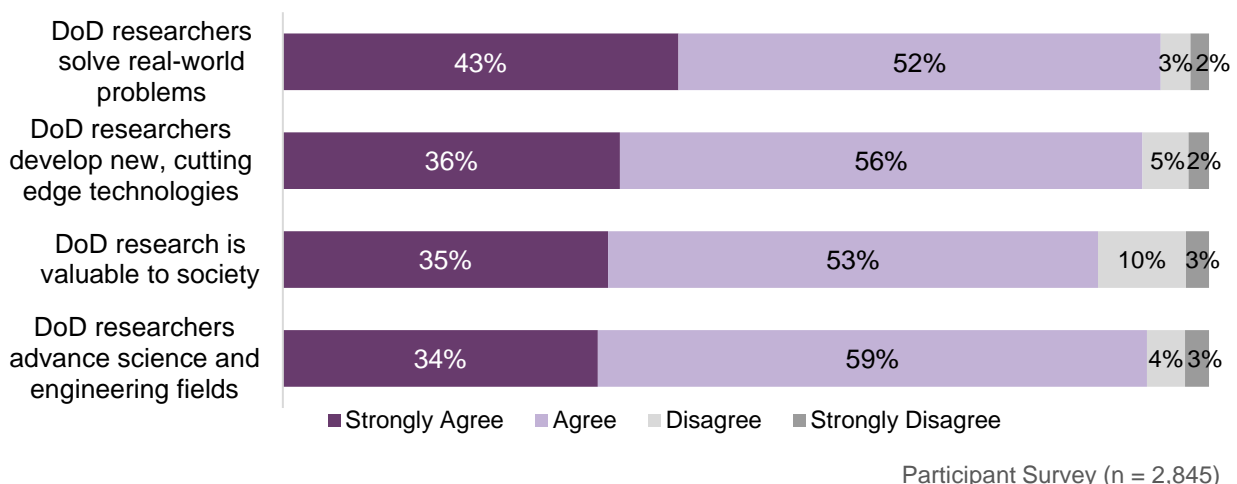
Students gained a greater appreciation of Army/DoD STEM research during their AEOP experience. A majority of students (69%) reported that they have a greater appreciation of Army/DoD STEM research as a result of their participation in AEOP. A majority of mentors (78%) also indicated that students had a greater appreciation of DoD STEM research as a result of their participation in AEOP.

Figure 12. Students gained a greater appreciation of Army/DoD STEM research during their AEOP experience



Students understand that DoD research is important. A large majority of students agreed that DoD researchers advance science and engineering fields (93%), develop new and cutting-edge technologies (93%), and solve real-world problems (95%). A majority of students (88%) also agreed that DoD research is valuable to society.

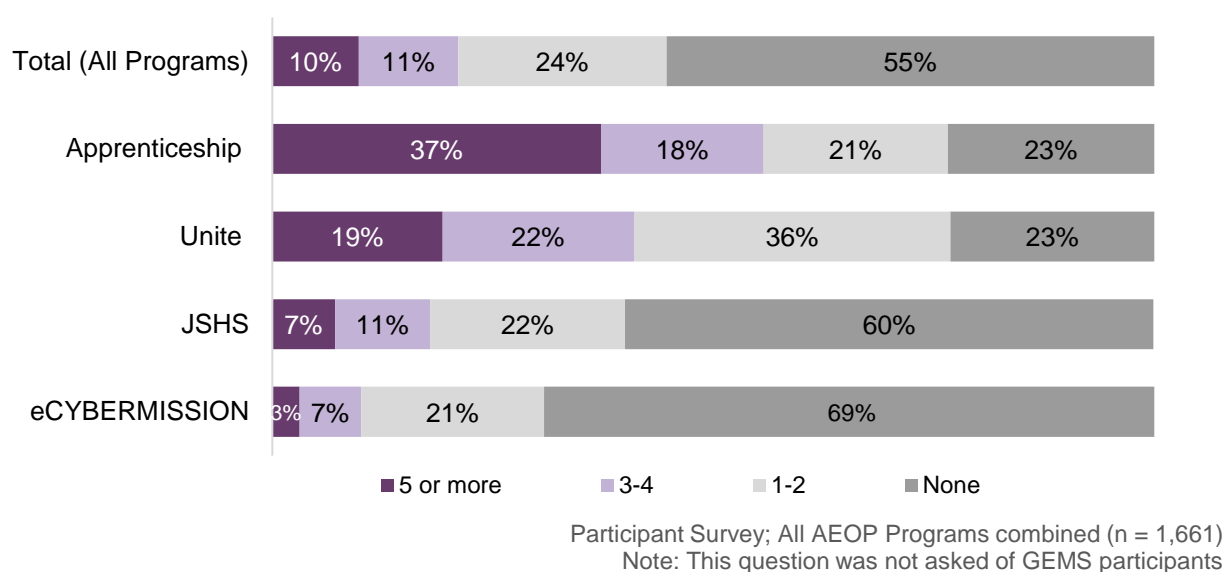
Figure 13. Students understand that DoD research is important



Learning about Army/DoD STEM Careers

Students learned about Army/DoD STEM careers during their AEOP program experience, though there are differences across programs. Overall, 45% of students reported that they learned about at least one Army/DoD STEM career as a result of their AEOP experience (see Figure 14). Examining this survey question by program, shows that students in Unite and Apprenticeships were much more likely to indicate that they learned about at least one Army/DoD STEM career as a result of their AEOP experience (77% and 76%, respectively). By comparison, eCYBERMISSION participants were least likely to report learning about Army/DoD STEM careers; 31% noted that they learned about at least one Army/DoD STEM career.

Figure 14. Students learned about Army/DoD STEM careers during their AEOP program experience, there are differences across programs

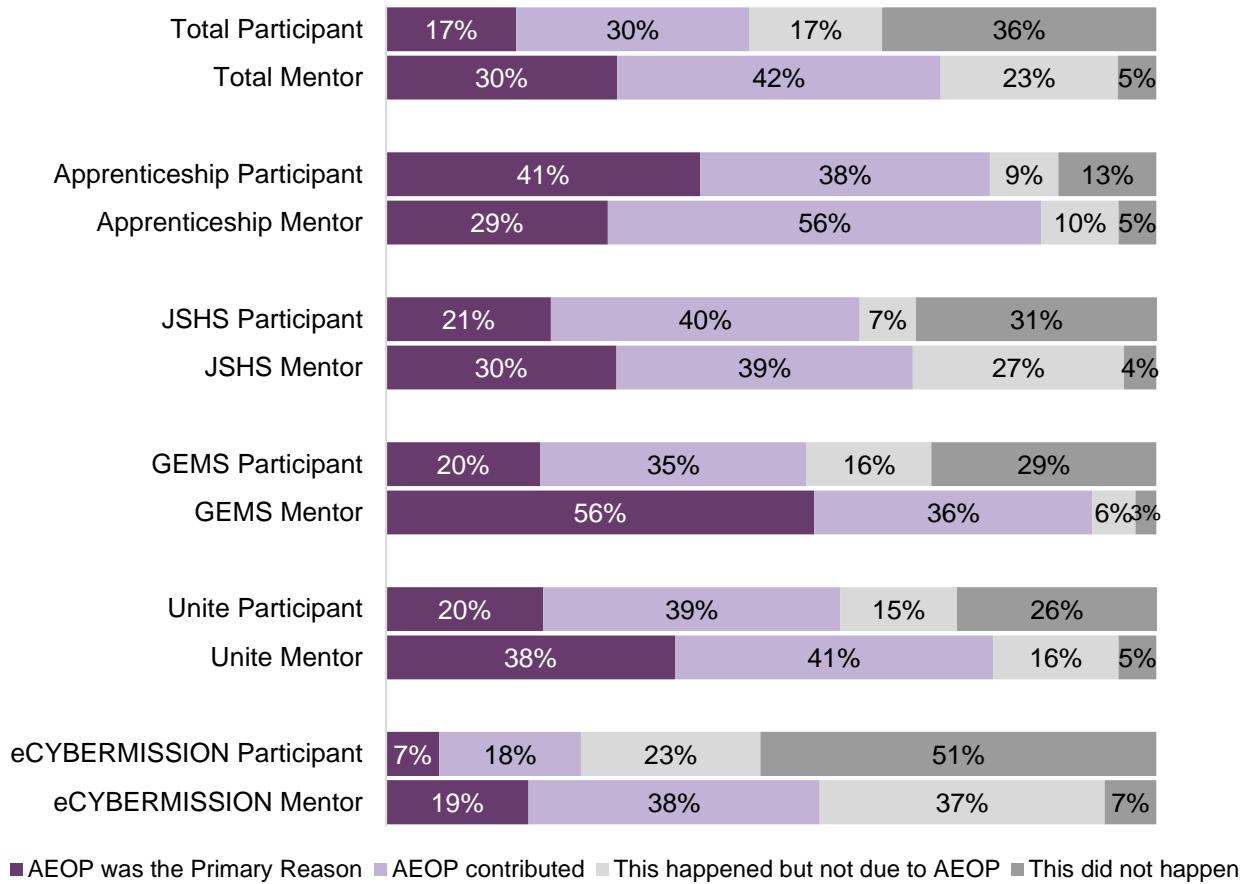


Interest in Army/DoD STEM Careers

AEOP contributed to increasing students' interest in pursuing STEM careers with the Army or DoD. With the exception of eCYBERMISSION, the more than one half of students in all programs indicated that their interest in pursuing a STEM career with the Army or DoD increased as result of AEOP (47% overall, 58% not including eCYBERMISSION; see Figure 15). Students in Apprenticeships were most likely to report that their interest in Army or DoD STEM careers increased as result of their participation in AEOP (78%).

Overall, mentors reported similar results as participants; with the exception of eCYBERMISSION, a majority of mentors in all programs indicated that they believed students were more interested in pursuing a STEM career with the Army or DoD. Again, it is important to note that eCYBERMISSION serves a younger population of students than many of the other programs. Consequently, these results might simply reflect the fact that these students are less focused on their career options.

Figure 15. AEOP contributed to increasing students' interest in pursuing STEM careers with the Army or DoD



Participant Survey; All AEOP Programs combined (n = 2,832)
Mentor Survey (n = 432)

Alumni Survey Findings

Participant and mentor surveys provide related snapshots of current AEOP programs. AEOP program alumni were additionally surveyed in order to examine longer-term outcomes with respect to sustained interest in STEM, post-secondary education and career trajectories. While alumni respondent data are presented here to examine long-term AEOP goals, survey respondents may not be fully representative of the larger population of AEOP alumni. Of the 79 respondents to the AEOP alumni survey, 46 (58%) reported still being in high school with the remaining 33 (42%) reporting pursuing or having completed an advanced degree. While results from this sample of AEOP alumni are consistent with AEOP long-term goals, care should be taken not to overgeneralize to the full population of program alumni.

The following section presents the results from the alumni surveys that were aligned with the three research questions. Because EDC did not administer the surveys, we do not know how many former AEOP participants were invited to complete the surveys, and it is not possible to calculate the response rate.

Alumni Survey Sample

The majority of the respondents (58%) had not yet graduated from high school at the time they completed the survey (Table 5). Respondents were most likely to have participated in GEMS (56%; Table 6). About one third of alumni respondents (32%) had participated in more than one AEOP program. See Appendix B, Tables 8-11 for additional demographic information regarding alumni survey respondents. Results are shown for all respondents combined or only for alumni who indicated they had graduated from high school, depending on the survey question.

Table 5. Alumni Survey Respondents' Year of High School Graduation

High School Graduation Year	Count	Percent
Graduating in 2022 to 2025	46	58%
Graduated/ing in 2021 (Year survey administered)	10	13%
Graduated from 2018 to 2020	15	19%
Graduated before 2018	8	10%
Total	79	100%

Table 6. AEOP Programs in which Alumni Survey Respondents Reported Participating

Program	Count of Respondents (Total n = 79)	Percent of Respondents*
GEMS	44	56%
High school apprenticeship (HSAP, REAP, SEAP)	17	22%
JSHS	15	19%
Camp Invention	10	13%
Unite	7	9%
GEMS Near Peer Mentor	7	9%
Undergraduate apprenticeship (CQL, URAP)	6	8%
eCYBERMISSION	4	5%
SMART College Scholarship**	4	5%
JSS	1	1%
NDSEG Fellowship**	1	1%
Graduate fellowship	1	1%
More than one program	25	32%

*Respondents could select as many programs as they had participated in, so percentages do not total to 100%.

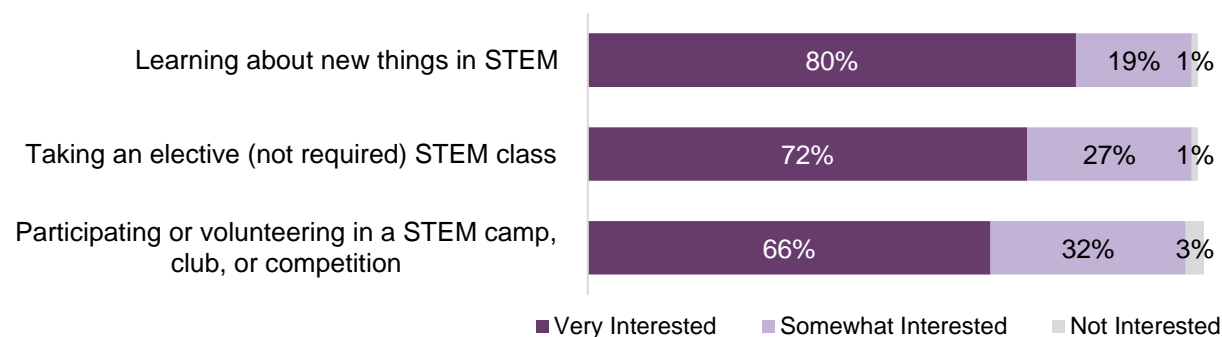
**The SMART College Scholarship and NDSEG Fellowship are supported by the Office of the Secretary of Defense (OSD).

Alumni Research Question #1: To what extent do alumni report positive, sustained interest and engagement in STEM?

Interest in STEM

AEOP alumni survey respondents reported continued interest in a variety of STEM activities. Almost all alumni indicated that they continued to be interested or somewhat interested in learning about new things in STEM (99%), with most (80%) indicating strong interest (Figure 16). Similarly, most alumni (99%) reported interest in taking an elective STEM class, and, in a separate question, almost two thirds of alumni (63%) reported doing so.

Figure 16. AEOP alumni showed positive, sustained interest in STEM



Alumni Survey; All alumni respondents (n = 79)

Other STEM activities that alumni continued to express interest in included watching or reading non-fiction STEM (85%), tinkering with a mechanical or electrical device (85%), working on solving mathematical or scientific puzzles (86%), and using a computer for design and programming (81%). Engagement was further demonstrated by AEOP alumni expressing interest in talking with friends or family about STEM (96%), being interested in mentoring or teaching (89%), and helping with a community service project related to STEM (97%).

Alumni Research Question #3: To what extent do alumni report pursuit of and achievement in STEM courses in secondary school, post-secondary STEM degrees, STEM careers, and Army/DoD STEM?⁵

Pursuit of STEM Degrees

Almost all the AEOP alumni respondents who had graduated from high school reported either being enrolled in a degree program focused on STEM and/or already having earned a STEM degree. Of the 79 alumni who completed the survey, 33 had graduated from high school. Most of these alumni (94%) reported that they were currently pursuing either an associate's, bachelor's, or graduate degree focused in STEM (% Currently Enrolled in Table 7 below), with approximately two thirds (67%) pursuing a bachelor's degree in STEM. Across degrees, engineering was the most frequently cited degree pursued.

Many AEOP alumni who had graduated from high school have already earned advanced degrees. Just over one half (55%) of the alumni who had graduated from high school reported having completed a bachelor's degree (% Already Earned in Table 7). Some alumni had completed a STEM certificate program (36%), earned an associate's degree (21%), or completed a graduate degree (15%).

Table 7. Alumni Enrollment and Completion of Degree Programs Focused on STEM

	n = 33 % Currently Enrolled*	n = 33 % Already Earned*
STEM training or certificate program	12%	36%
STEM-focused associates degree program	12%	21%
STEM-focused bachelor's degree program	67%	55%
STEM-focused graduate degree program	15%	15%

*Respondents were asked whether they were enrolled in each program, and therefore could indicate they were enrolled in multiple programs simultaneously.

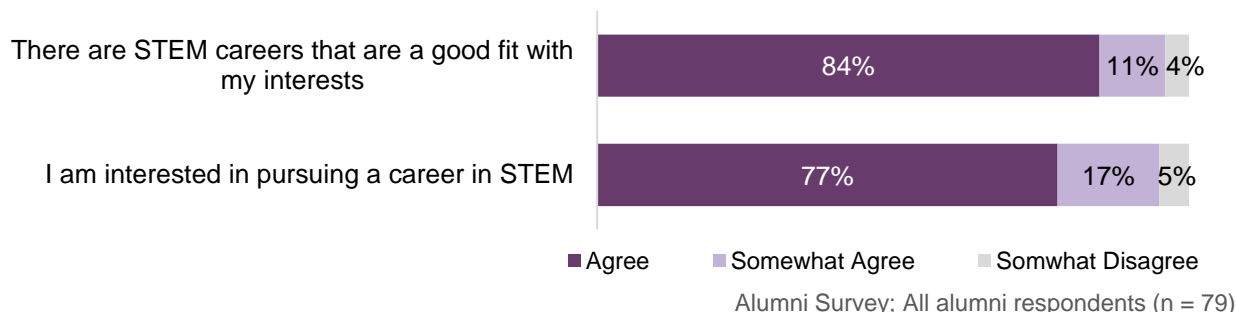
⁵ Alumni Research Question #3 includes pursuit of and achievement in STEM careers and Army/DoD STEM. However, we have addressed findings related to STEM careers and Army/DoD research within Research Question #4, which specifically asks about alumni awareness of and interest in STEM research careers overall and for the Army/DoD. For Research Question #3, we focused on educational pathways.

Alumni Research Question #4: To what extent do alumni report awareness of and interest in STEM research careers overall and for the Army/DoD specifically?

Interest in STEM Careers

The majority of AEOP alumni reported awareness of and interest in STEM careers. Almost all alumni (95%) agreed or somewhat agreed that there are STEM careers that fit their interests, and 94% expressed interest in pursuing a career in STEM (Figure 17).

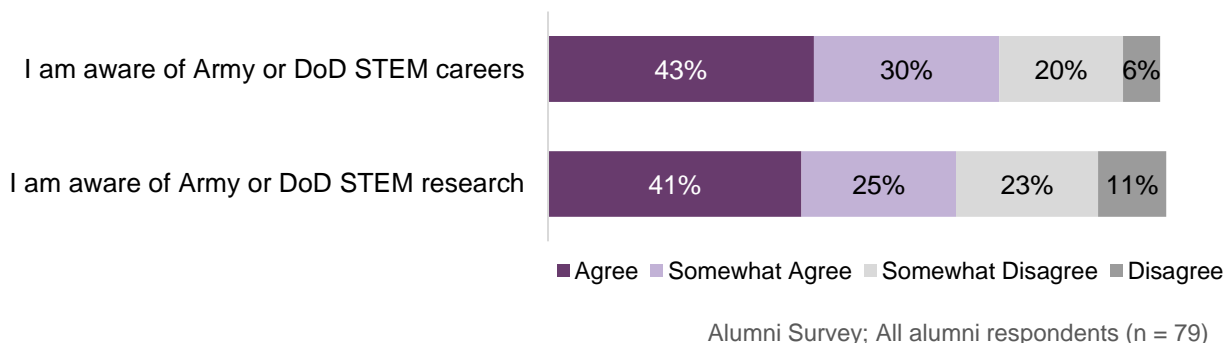
Figure 17. AEOP alumni are interested in pursuing STEM careers



Interest in Army/DoD STEM Careers

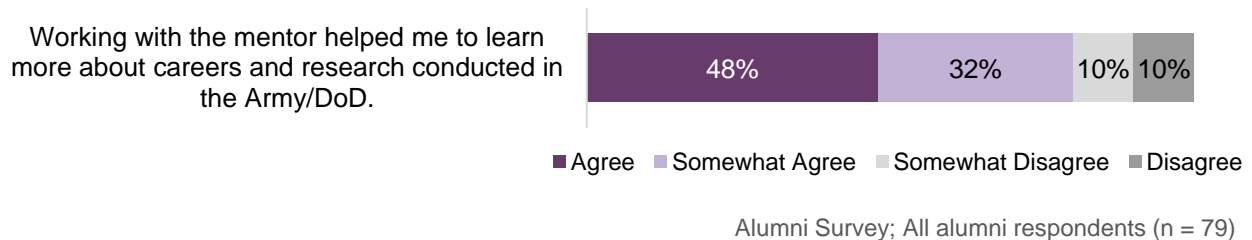
Although a substantial majority of AEOP alumni expressed awareness of and interest in STEM careers, a somewhat smaller number of alumni were aware of and interested in Army/DoD STEM research or STEM careers specifically. Two thirds of alumni (66%) expressed agreement that they are aware of Army/DoD research, while about three quarters (73%) reported being at least somewhat aware of Army or DoD careers (Figure 18). While awareness and interest were slightly higher among out-of-high school AEOP alumni than those still in high school, results were similar for both groups.

Figure 18. There was room for growth in alumni's awareness of Army/DoD STEM research and careers



AEOP alumni credited their mentors with helping them learn more about Army/DoD research and careers. Almost one half (48%) of alumni agreed and about one third (32%) somewhat agreed that working with their mentors helped them learn about Army/DoD careers and research (Figure 19).

Figure 19. AEOP alumni said their mentors helped them learn about Army/DoD research and careers



Relatively fewer AEOP alumni reported plans to seek Army/DoD STEM focused career positions compared to STEM-focused positions overall. Most alumni (87%) reported that they plan to seek a STEM-focused career position in the future (Figure 20). Fewer (41%) reported that they plan to seek an Army/DoD STEM-focused career position in the future.

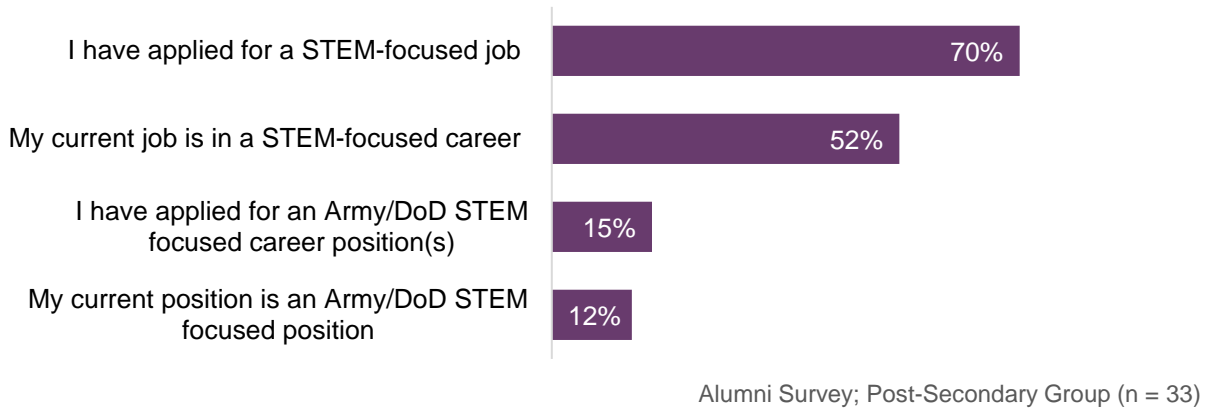
Figure 20. Relatively fewer AEOP alumni reported plans to seek Army/DoD STEM focused career positions than STEM-focused positions overall



More than half of AEOP alumni beyond high school reported either working in a STEM-focused job or had at least applied for a STEM-focused job. The majority of alumni who have graduated from high school reporting having applied for a STEM-focused job (70%), while just over half (52%) reported that they currently work in a STEM-focused career (Figure 21).

However, a relatively small percentage of AEOP alumni not in high school at the time of the survey reported having jobs in Army/DoD STEM-focused positions or having applied for such positions. Only 12% of alumni reported that their current position was an Army/DoD STEM-focused position. Similarly, only 15% reported that they had applied for one or more Army/DoD STEM-focused career position(s).

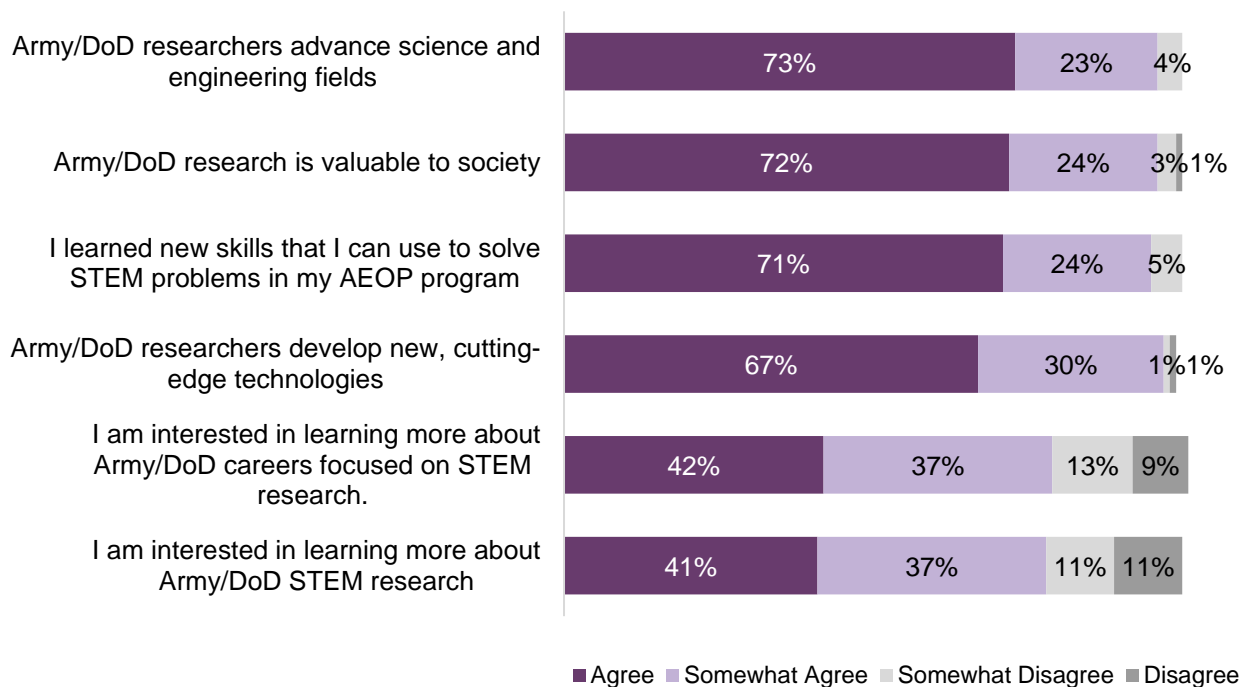
Figure 21. The majority of AEOP alumni who had graduated from high school reported having a STEM job; relatively few alumni had applied for or taken an Army/DoD STEM job



Appreciation of Army/DoD STEM research

AEOP alumni saw value in Army/DoD research and careers, and many expressed interest in learning more about them. The vast majority of alumni (97%) expressed agreement that the Army/DoD develops new, cutting-edge technologies, and that Army/DoD research is valuable to society (96%). Most would be interested in learning more about Army/DoD careers focused on STEM careers (79%) and research (77%).

Figure 22. AEOP alumni saw value in Army/DoD research and careers, and many expressed interest in learning more about them



Alumni Survey; All alumni respondents (n = 79)

While it is uncertain the degree to which the alumni who completed the survey represents the larger population of AEOP alumni across programs and years, results at least suggest strong interest in STEM careers, some exposure to Army/DoD research and career opportunities, and a desire to learn more.

Participant Feedback

In addition to examining the priority research questions presented above, we analyzed a sample of open-ended responses to the question, “What are the three most important ways this program should be improved for future participants?”⁶

Below we have summarized the main takeaways across programs. As noted above, we cannot generalize findings across AEOP due to the limited and variable surveys response rates; in addition, for this analysis we have only analyzed a sample of responses. However, we offer this as an insight into participants’ perspectives, especially as their remarks were captured during height of the pandemic and could inform a return to post-COVID programming.

- **Many participants indicated they want to return to an in-person model.** They suggested holding classes in-person again, or as a hybrid of both virtual and in person. Though these comments represent a snapshot in time, they clearly represent the impact of the pandemic and students’ desire to resume in-person programming.
- **A number of participants suggested increasing the time and duration of research projects,** specifically improving the time structure in class by providing students with more “one-on-one time with STEM professionals” and additional time in labs.
- **Participants also expressed a desire for shorter, relevant surveys as well as a more user-friendly and “accessible registration process.”** Survey respondents noted the length and complexity of the survey and registration.

Recommendations

This report summarizes findings from a select number of items from the student participant, mentor, and alumni surveys that aligned with the six overarching research questions associated with the AEOP’s priority area focused on STEM Literate Citizenry. As a result, our recommendations are limited to this main area, though there may be broader implications for these findings.

While overall results across AEOP are strong, we did find some variation across programs. This suggests that there may be some room for improvement in key areas. We offer the following recommendations:

⁶ The evaluation team selected a random sample of responses from each program. The number of responses selected from each program was of a sufficient size to make it highly likely that the selected responses were representative of all survey responses from that program (a 90% confidence interval with a 10% margin of error).

- **Improve sharing information about Army/DoD STEM careers and pathways.** Recognizing that learning about Army/DoD STEM careers was variable across the programs and that alumni results show room for improvement, programs, particularly those serving younger students, should consider how they can more effectively share information about Army/DoD STEM career paths.
- **Engage youth participants in the design and implementation of AEOP programs.** While data from open-ended comments were limited, it appears that youth participants shared valuable feedback on their AEOP experiences, which could inform future program improvements. Centering students' perspectives in this way aligns with work that is underway with the Alumni Council and could be further enhanced for each program.
- **Consider additional ways that AEOP can make its efforts culturally responsive.** Overall, AEOP has been successful at reaching students from historically marginalized populations, as a substantial majority of student participants were from underserved/underrepresented populations. To reach even more students, and engage them effectively, the Consortium may want to consider how all of its strategies (e.g., participant and mentor recruitment, programming, alumni engagement, data collection and evaluation) are culturally responsive.

Aside from program-related recommendations, we suggest that future evaluation efforts should address the following issues related to data quality:

- **Explore ways to improve response rates.** The variable responses across and within programs makes it difficult to draw compelling conclusions from these data. Our team is exploring options for improving responses rates, which will involve close coordination with IPAs and other staff responsible for outreach to participants.
- **Address survey content and length.** Based on feedback from participants and Consortium members as well as our own experience analyzing survey data for this report, we plan to examine ways to improve the content and length of surveys.
- **Improve online registration navigation to ensure more accurate accounting of participants.** Like the surveys, we have received feedback and have first-hand experience on the complicated navigation of the registration platform. This will remain a priority for both internal and external reporting.